CellAdvisor JD700B Series

User's Guide

JD785B/JD745B Base Station Analyzer

JD786B/JD746B RF Analyzer

JD788B/JD748B Signal Analyzer

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Notice

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Acknowledgement

This product incorporates open source software entitled “zlib”. The zlib is the compression library written by Jean-loup Gailly and Mark Adler, who granted permission to use this software for any purpose, including commercial applications.

This product includes open source software developed by the Apache Software

Foundation (http://www.apache.org/).

This product used free library for JPEG image compression written and distributed by Independent JPEG Group or IJG (http://www.ijg.org/).

See “Viewing OSS license” on page 40 for more information.

Ordering information

This document is a product of JDSU, issued as part of the JD700B Series analyzers. The catalog number for a published manual is JD700B362 - printed. The catalog number for an electronic manual on CD-ROM is JD700B361 - electronic.

Terms and conditions

Specifications, terms, and conditions are subject to change without notice. The provision of hardware, services, and/or software is subject to JDSU’s standard terms and conditions, available at www.jdsu.com/terms.

NRTL compliance

This product was tested according to UL 61010-1:2012 and CAN/CSA C22.2 No. 61010-1-12. Conformity with these requirements is based upon compliance with the standard IEC 61010-1. A copy of the Declaration of Conformity is provided upon your request.

Ce produit a été testé selon la norme UL 61010-1 : 2012 et CAN / CSA C22.2 No. 61010-1-12. La conformité à ces exigences est fondée sur la conformité à la norme CEI 61010-1. Une copie de la déclaration de conformité est disponible sur demande.

EMC directive compliance

This product was tested and conforms to the EMC Directive, 2004/108/EC and its amending directives for electromagnetic compatibility. Conformity with this directive is based upon compliance with the harmonized European standards: EN61326-1 and CISPR11. A copy of the Declaration of Conformity is provided upon your request.

Low voltage directive compliance

This product was tested and conforms to the Low Voltage Directive, 2006/95/EC and its amending directives. Conformity with this directive is based upon compliance with the harmonized European standard EN61010-1. A copy of the Declaration of Conformity is provided upon your request.

WEEE and battery directive compliance

JDSU has established processes in compliance with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC, and the Battery Directive, 2006/66/EC.

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations. In the European Union, all equipment and batteries purchased from JDSU after 2005-08-13 can be returned for disposal at the end of its useful life. JDSU will ensure that all waste equipment and batteries returned are reused, recycled, or disposed of in an environmentally friendly manner, and in compliance with all applicable national and international waste legislation.

It is the responsibility of the equipment owner to return equipment and batteries to JDSU for appropriate disposal. If the equipment or battery was imported by a reseller whose name or logo is marked on the equipment or battery, then the owner should return the equipment or battery directly to the reseller. Instructions for returning waste equipment and batteries to JDSU can be found in the Environmental section of JDSU's web site at www.jdsu.com. If you have questions concerning disposal of your equipment or batteries, contact JDSU's WEEE Program Management team at WEEE.EMEA@jdsu.com.

Table of Contents

About This Guide

Topics discussed in this chapter include the following:

Sections "Safety and compliance information" and "Conventions" in this chapter contain information in French as well.

Purpose and scope

The purpose of this guide is to help you successfully operate the JD700B series (firmware version 3.020 and later) and use its features and capabilities. This document includes instructions that describe how to operate, set up, configure, and use the JD700B series, consisting of JD785B/JD745B Base Station Analyzer, JD786B/JD746B RF Analyzer, and JD788B/JD748B Signal Analyzer.

Objectif et champ d'application
Le but de ce guide est de vous aider à utiliser avec succès la série JD700B (version du firmware 3.020 et plus tard) et à utiliser ses fonctions et capacités. Ce document contient des instructions qui décrivent comment utiliser, créer, configurer et utiliser la série JD700B, composé de JD785B/JD745B Base Station Analyzer, JD786B/JD746B RF Analyzer, et JD788B/JD748B Signal Analyzer.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the JD700B series effectively and efficiently. We are assuming that you have basic operation experience and are familiar with basic mobile communication concepts and terminology.

Hypothèses
Ce guide est destiné aux débutants, intermédiaires et les utilisateurs avancés qui veulent utiliser série JD700B efficace et efficiente. Nous supposons que vous avez une expérience de base du fonctionnement et êtes familier avec les concepts de communication mobile et de la terminologie.

Safety and compliance information

It is mandatory to permanently connect this product to the protective earth.

When supplying power to this device, always use an AC power cable that includes an earth (safety) ground connection.

Informations de sécurité et de conformité
Il est obligatoire de se connecter en permanence ce produit à la protecteur terre. Lorsque alimenter en énergie cet appareil, utilisez toujours un câble d'alimentation secteur qui comprend une terre de sécurité.

WARNING
Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage and other hazards. Refer all servicing to qualified service personnel.

AVERTISSEMENT
Ne pas tenter de réparer ce produit vous-même, car l'ouverture ou le retrait des capots peut vous exposer à des tensions dangereuses et autres risques. Confiez toute réparation à un personnel qualifié de service JDSU.

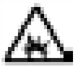
CAUTION
This equipment contains parts and assemblies sensitive to electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing, or inserting ESD sensitive parts and assemblies, or damage to components could result.

An electrostatic-sensitive device can only withstand voltage spikes of 10 to 100 volts. Any discharge greater than this can damage or effectively destroy such a device while going unnoticed by a technician. Common plastics (synthetic insulating materials), clothing, and paper or cardboard are the most common source of static charges.

MISE EN GARDE
Cet équipement contient des pièces et des assemblages sensibles aux décharges électrostatiques

(ESD). Utilisez ESD procédures de précaution en cas de contact, la suppression ou l'insertion de pièces de l'EDD et des assemblages sensibles, ou des dommages aux composants pourraient en résulter.

Un dispositif électrostatique sensible ne peut supporter des pointes de tension de 10 à 100 volts. Toute décharge supérieur à ce qui peut endommager ou détruire efficacement un tel dispositif alors passer inaperçu par un technicien. Matières plastiques (matériaux synthétiques isolants), les vêtements et le papier ou le carton sont la source la plus fréquente de charges statiques.



CAUTION
This instrument uses a Lithium Ion battery that, if not connected correctly, may lead to explosion. In case the battery needs to be exchanged, it must be the same kind as or compatible with the one shipped with your instrument.

The battery must not be disposed of in a landfill site or as municipal waste, and should be disposed of according to your national regulations.

MISE EN GARDE
Cet instrument utilise une batterie lithium-ion qui, s'il n'est pas connecté correctement, peut conduire à une explosion. Dans le cas où la batterie a besoin d'être remplacé, il doit être du même type ou compatible avec celui fourni avec votre instrument.

La batterie ne doit pas être éliminé dans un site d'enfouissement ou les déchets municipaux, et doit être éliminé conformément à la réglementation nationales.

Conventions

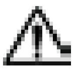
This guide uses typographical and symbols conventions as described in the following tables.

Conventions
Ce guide utilise les conventions typographiques et les symboles tels que décrits dans les tableaux suivants.

Table 1 Text formatting and other typographical conventions

Item	Text formatting/symbols used	Example(s)
Buttons or hard keys that the user presses on a physical device	Bold, all caps, default font	Press the **ON** button. Press the **MODE** hard key. Press the **MARKER** hard key.
Hot keys that the user presses on a physical device	Bold, all caps, italics, default font	Press the ***SYSTEM*** hot key. Press the ***MEASURE*** hot key.
Soft keys or toggle keys that the user presses on a physical device to select corresponding menus	Bold, default font	Press the **Span** soft key. Press the **Channel Power** soft key.
Soft key option separators	Denoted by a vertical bar | that means “or”, only one option can be selected with a single press	Press the **Zone [1|2|3]** soft key.
File type	Courier New	In `.tra` file type.
Required arguments (text variables in code)	Denoted by slanted brackets < >.	Enter **`<password>`**

Table 2 Symbol conventions



This symbol represents a general hazard. It may be associated with either a DANGER, WARNING, or CAUTION message.

Ce symbole signale la présence d'un danger général.

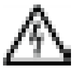
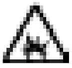
	This symbol represents hazardous voltages. It may be associated with either a DANGER, WARNING, or CAUTION message. *Ce symbole signale la présence d'un risque d'électrocution.*
	This symbol represents a risk of explosion. It may be associated with either a DANGER, WARNING, or CAUTION message. *Ce symbole signale la présence d'un risque d'explosion.*
	This symbol, located on the equipment, battery, or the packaging indicates that the equipment or battery must not be disposed of in a landfill site or as municipal waste, and should be disposed of according to your national regulations. *Ce symbole, situé sur l'équipement, la batterie ou l'emballage indique que l'équipement ou de la batterie ne doivent pas être jetés dans un site d'enfouissement ou les déchets municipaux, et doivent être éliminés conformément à la réglementation nationales.*

Table 3 Safety definitions

DANGER ***DANGER***	Indicates a potentially hazardous situation that, if not avoided, *will* result in death or serious injury. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. *Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.*
WARNING ***AVERTISSEMENT***	Indicates a potentially hazardous situation that, if not avoided, *could* result in death or serious injury. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. *Indique une situation de danger potentiel qui, si elle n'est pas évitée, peut entraîner la mort ou des dommages corporels graves.*
CAUTION ***MISE EN GARDE***	Indicates a potentially hazardous situation that, if not avoided, *could* result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. When applied to software actions, indicates a situation that, if not avoided, *could* result in loss of data or a disruption of software operation. *Indique une situation de danger potentiel qui, si elle n'est pas évitée, peut entraîner des dommages corporels légers ou modérés.*

Technical assistance

Contact information for technical assistance is listed in the following table. For the latest TAC information, go to www.jdsu.com or contact your local sales office for assistance. Contact information for regional sales headquarters is listed on the back cover of this document.

Assistance technique
Coordonnées pour l'assistance technique est listé dans le tableau suivant. Pour les dernières informations de TAC, allez à www.jdsu.com ou contactez votre bureau de vente local pour assistance. Coordonnées pour le siège régional des ventes est cotée sur le dos de ce document.

Table 4 Technical assistance centers

Region	Phone Number		E-mail Address
Americas	1-855-ASK-JDSU (option #3) (1-855-275-5378, option #3)		catvsupport@jdsu.com
Europe, Africa, and Mid-East	+49 (0) 7121 86 1345 (JDSU Germany)		hotline.europe@jdsu.com
Asia and the Pacific	China Taiwan India Australia New Zealand Japan Korea Singapore Malaysia Thailand Vietnam Philippines Indonesia	400 122 6542 008 06651950 1800 103 5378 1800 095 127 0800 448 482 005 316 50533 007 986 517 490 1800 223 7070 1800 806584 1800 658177 12065180 1800 16510736 001 803657082	tac.apac@jdsu.com

During off-hours, you can request assistance by doing one of the following: leave a voice mail message at the Technical Assistance number, e-mail the North American Technical Assistance Center, tac@jdsu.com, or submit your question using our online Technical Assistance Request form at www.jdsu.com.

Chapter 1 JD700B Series Overview

This chapter provides a general description of the JD700B series. Topics discussed in this chapter include the following:

About the JD700B series

JDSU wireless RF and fiber test solutions for the field include base station analyzers, cable and antenna analyzers, and signaling analyzers for the installation and maintenance of modern wireless communication systems. RF and fiber test is critical for wireless operators facing challenges of signal quality and signaling interference, and maintaining quality high-bandwidth services.

The JD700B series addresses spectrum analysis, interference analysis, and cable, antenna and modulation analysis, covering current wideband technologies such as WiMAX and LTE/LTE-A.

Base station analyzer JD785B and JD745B

The Base Station Analyzer contains all the features and capabilities required to perform field testing of cell sites of all wireless technologies, from 2G to 4G.

RF analyzer JD786B and JD746B

The RF Analyzer provides multi-purpose solution for the analysis of RF systems covering all physical aspects of transmission, reception, and interference of RF systems up to 8 GHz and 4 GHz, respectively.

Signal analyzer JD788B and JD748B

The Signal Analyzer contains all the features and capabilities required to perform cell site field testing for all wireless technologies from 2G to 4G.

Features and capabilities

The JD700B series is the optimal test solution for installation and maintenance of cellular base stations and cell sites, running with external AC power or battery for the field.

The user interface has been specifically designed with customized menus and simple calibration procedures, providing service providers with accurate and reliable measurement results.

Applicable Systems

- cdmaOne/cdma2000
- EV-DO
- WCDMA/HSPA+
- GSM/GPRS/EDGE
- TD-SCDMA
- WiMAX
- LTE/LTE-Advanced (FDD/TDD)
- RF over Fiber

Key Features

Table 5 Key functions

Functionality	JD785B/JD745B	JD786B/JD746B	JD788B/JD748B
Spectrum Analyzer	■	■	■
Cable and Antenna Analyzer	■	■	
RF Power Meter	■	■	■
Optical Power Meter	■	■	■
Fiber Inspection	■	■	■
Signal Analyzers (optional)	■		■
RFoFiber (optional)	■	■	■
Interference Analyzer (optional)	■	■	■
Channel Scanner (optional)	■	■	■
OTA Measurement (optional)	■		■

Options

This instrument is provided with various options/features that are available to be ordered. See “Appendix I – Ordering information” on page 541 for more information.

Specifications

AC power

Input voltage is automatically selected within the instrument’s tolerable input line voltage from 100 to 240 VAC. This instrument does not have a separate line protection fuse.

Table 6 AC power requirements

Item	JD780B Specification	JD740B Specification
AC Power	100 to 240 V AC, 50-60 Hz	100 to 240 V AC, 50-60 Hz
Power Consumption	42 W in operation 54 W with battery charging	42 W in operation 54 W with battery charging

Physical specifications

Table 7 shows weight with standard configurations and the battery pack installed.

Table 7 Physical specifications

Parameter	JD785B/JD786B/JD788B	JD745B/JD746B/JD748B
Height	7.7” (195 mm)	7.7” (195 mm)
Width	11.6” (295 mm)	11.6” (295 mm)
Depth	3.2” (82 mm)	3.2” (82 mm)

Chapter 2 Getting Started

This chapter provides general guides of how to get started with your JD700B series instrument. Topics discussed in this chapter are as follows:

Unpacking the JD700B series

Unpack and inspect the shipping package thoroughly to ensure that nothing was damaged during the shipment. Also, check that your delivered package includes all of your ordered items in the shipment. If contents in the package are damaged or defective or if there are any missing items, keep the shipping list and materials for carrier's inspection and contact your nearest JDSU's authorized sales and service office.

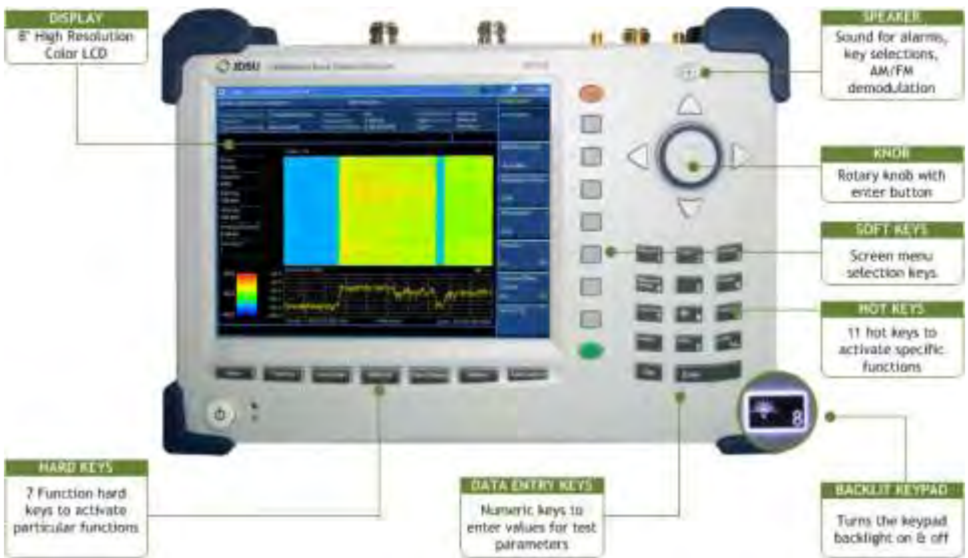
A basic test set of JD700B series would include the following items in the package. For more options, see "Appendix I – Ordering information" on page 541.

Table 8 Items included in a basic test set shipment

Item	Quantity
JD700B series instrument (JD785B, JD786B, JD788B, JD745B, JD746B, or JD748B)	1
AC/DC power adapter and power cord	1
1.5 meter cross LAN cable	1
1.8 meter USB A-to-B cable	1
> 1 GB USB memory	1
Rechargeable Lithium Ion battery pack	1
12 V DC automotive adapter	1
Stylus pen	1
User's guide and application software CD	1

Exploring the JD700B series

Figure 1 JD785B front panel view



Front panel

The JD700B series analyzers have the same front panel look as like Figure 1, except for the bumpers in different colors.

Power on/off button

Key	Description
	**POWER ON/OFF** – You can turn your instrument on or off. Two LEDs indicate power source and status. See “Starting up the JD700B series” on page 31.

Function hard keys

You can use these hard keys to activate specified functions as labeled on each key.

Key	Description
	**MODE** – You can select an analyzer mode from all the standard and optional modes available to your instrument.
	**FREQ/DIST** – You can configure frequency or distance settings.
	**AMP/SCALE** – You can configure amplitude and scale settings.
	**BW/AVG** – You can configure bandwidth and average settings.
	**TRACE/DISPLAY** – You can set up trace and display parameters.
	**MARKER** – You can analyze measurements with markers.
	**PEAK SEARCH** – You can set up peak search parameters.

Hot keys

When the user input field on the screen is inactive, you can use these hot keys to activate specific functions instead of numbers. When you see the user input field activated or highlighted, press the **ESC** hard key to use these hot keys.

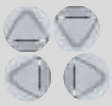
Key	Description
	**MEASURE** – You can select measurements available for your selected analyzer mode.
	**MEASURE SETUP** – You can set measurement parameters available for your selected measurement mode.
	**SAVE/LOAD** – You can save or load your current screen, result, setup, or limit into or from the internal memory or an external USB memory drive.
	**SWEEP** – You can configure sweep parameters.
	**TRIGGER** – You can select trigger options such as internal, external, and GPS.
	**SYSTEM** – You can configure your system settings or view your current system information.

	**PRESET** – You can use this key to return to a known state and make measurements.
	**HOLD** – You can change the sweep mode: Continue or Single.
	**LIMIT** – You can set limit settings such as display line, multi segment line, save limits, recall limits, or test specification limits.
	**BACKLIGHT** – You can turn the key backlight feature on or off.
	**HELP** – You can have the online help screen on.

Soft keys

You can use not only the touchscreen keys but also these physical keys placed along the right side of the display to start a specific function associated with each soft key, invoke other screen keys, or select a unit. The **More** screen menu indicates that there are more than seven screen menus for the level. The small arrowhead symbol in the screen menu indicates that there are screen menus under the screen menu.

Data entry and other keys

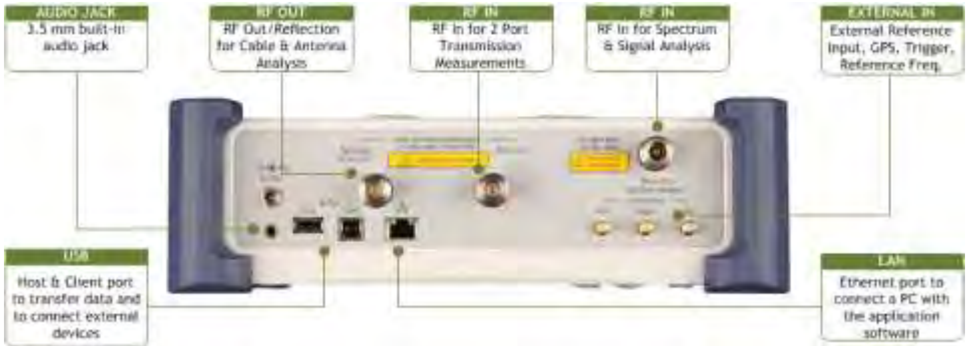
Key	Description
	**ROTARY KNOB WITH ENTER KEY** – You can change a value with predefined increments or move marker position. Rotating this knob clockwise increases value or moves a marker to the right and rotating counter clockwise does vice versa. This knob works as the ENTER hard key as well.
	**ARROW KEYS** – You can increase or decrease value or move your selection up, down, to the left, or to the right.
	**NUMERIC KEYS** – You can manually enter a value for measurement parameters.
	**DEL** – You can delete data entry. After pressing the ENTER key or selecting a unit soft key, you cannot delete or remove data entered.
	**ENTER** – You can save and confirm data entry.
	**ESC** – You can cancel any input in the user input field or dismiss a pop-up window on the screen.
	**PREV** – You can go back to the previous menu without changing current setup.

Top panel

The JD700 series products have the same top view as Figure 2 and **Figure 3**.

Figure 2 Top view of JD785B with optical hardware option

Figure 3 Top view of JD785B without optical hardware option



Reflection/RF Out (Cable and Antenna Analyzer)

The **Reflection/RF Out** port of the Cable and Antenna Analyzer is a precise 50 Ω N-type female connector that is used as the output signal port for the Cable and Antenna Analyzer mode.

> **CAUTION**
> Do not apply or connect power exceeding +25 dBm to this Reflection/RF Out port. If such power is applied, it will degrade the product's performance and can cause damage to the product in worst case.

RF In (Cable and Antenna Analyzer)

The **RF In** port is a precise 50 Ω N-type female connector that is used as the input signal port for 2-port vector measurements in the Cable and Antenna Analyzer mode.

> **CAUTION**
> The maximum power allowed to the RF In port is +25 dBm. If the input power exceeds the limit, it may degrade the product performance or cause damage to the instrument in a worst case. Do not connect any power feed exceeding 1 W directly to this port.

DC 18 V

The input power to this port shall be 18 V DC.

RF In (Spectrum Analyzer)

The **RF In** port is a precise 50 Ω N-type female connector that is used as the input signal port for spectrum analysis, signal analysis, and RF power measurement.

> **CAUTION**
> The maximum power allowed to the RF In port is +25 dBm for JD780B series and +20 dBm for JD740B series. If the input power exceeds the limit, it may degrade the product performance or cause damage to the instrument in a worst case.

Audio jack

The audio jack is labeled with a headphones icon. Plugging in headphones or earphones turns the speaker off.

USB

- **CLIENT:** This is a communication port that you can connect your instrument and your PC with application software JDViewer, JDRemote, or JDMapCreator. You must install driver software for the instrument on to the computer. See “Appendix H – Device driver installation” on page 540 for more information.
- **HOST:** You can use this port to plug in an external USB memory to extend storage capacity or to upgrade the instrument’s firmware. It supports most USB memory devices with 32-bit file system. You can also use this port to connect an external power sensor, Bluetooth USB adapter, or P5000i fiber microscope. See “Appendix G – Bluetooth connection” on page 537 on how to set up and use the Bluetooth connection.

LAN

You can use this Ethernet communication port to connect your instrument and your PC using the application software JDViewer or Motorola WinLMF, if necessary. Two LEDs indicate data transfer activity and link status.

- **ACTIVITY:** The yellow LED is illuminated during data transfer.
- **LINK:** The green LED is illuminated when there is a valid communication connection.

SFP/SFP+

The RFoCPRI option board supports all type of MSA (Multi-Source Agreement) compliant SFP modules. You can use these SFP/SFP+ ports to connect SFP modules to test CPRI protocols, detect an error or alarm, perform interference analysis, and transmit test pattern over fiber link.

External In

- **GPS:** You can plug in a GPS antenna to this SMA type female connector in order to get location information and highly accurate reference.
- **TRIGGER:** You can use this SMA type female connector to receive PP2S clock or 10 ms synchronization signals from an external timing reference.
- **REF:** You can use this SMA type female connector to receive 10 MHz, 13 MHz, or 15 MHz reference clock signals from an external frequency source.

Installing battery pack

You need to install the Lithium Ion battery pack provided with your instrument. Follow the instruction to install or remove the battery pack as needed.

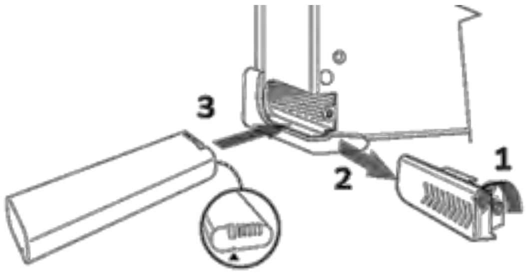
Procedure

To install the battery pack:

1. Loosen the latching screw of the battery cover by turning counter clockwise.
2. Slide out the battery cover to open.
3. Insert the battery pack with the connector terminal side up and push in until it stops.
4. Slide in the battery cover to close.
5. Tighten the latching screw of the battery cover by turning clockwise.

To remove the battery pack:

1. Loosen the latching screw of the battery cover by turning counter clockwise.
2. Slide out the battery cover.
3. Hold the battery strap and pull it out.



CAUTION
The battery pack that came with your instrument is Lithium Ion and it may, if not connected correctly, lead to explosion. In case you need to replace the battery, you must use one of the same kinds or compatible ones. You must dispose a battery according to your local safety and environmental regulations.

NOTE
It is recommended that you turn off the instrument to replace the battery. However, if you do not want to interrupt the current test, you can leave the module turned on with the AC power adapter plugged in.

Starting up the JD700B series

Use the power button to turn your JD700B series on or off. When external power is supplied via the AC/DC adapter, the upper orange LED is illuminated.

Procedure

To turn on:

1. Press and hold the  **POWER** button for a few seconds until the lower green LED indicator is illuminated.
2. Release the button and wait for a few seconds while booting up.

To turn off:

1. Press and hold the  **POWER** button for a few seconds until the lower green LED indicator goes out.
2. Release the button.

Managing files

The JD700B series lets you save and load screen, result, setup, limit, logging data, or Fail events depending on your selected measurement mode and option.

> **NOTE**
> If you see greyed-out menus as you change measurement modes, this indicates that the menu(s) are not available to be used.

Using save

You can save your current screen, result, setup, and limit into the internal memory or your external USB memory drive.

Procedure

1. Press the ***SAVE/LOAD*** hot key. The Save/Load screen menu bar appears.
2. Press the **Save** soft key.
3. Select the save option, from the following choices:

To save	Select	File type
Current screen	Save Screen > Screen	`.png`
Measurement result in a report format with comments	Save Screen > Report	`.pdf`

Measurement result	Save Result	`.tra`
		`.gom`
		`.grr`
		`.jdt`

Measurement result (.csv)	Save Result as CSV Format	`.csv`
Setup and test configuration	Save Setup	`.sta`
Limit setting	Save Limit	`.jml`

Logging data	Save Logging Data	`.grr`
		`.gsr`
		`.csv`

Automatically screen or results that falls outside the defined limit settings (Failed event)	Save On Event	`.png`
		`.tra`
		`.csv`

The on-screen keyboard appears.

> **NOTE**
> Save Setup saves a test configuration only, not a measurement limit setting. You must use Save Limit to save your limit settings.
>
> A RFoCPRI spectrum can be save as a file, but the difference in its data point does not allow the saved RFoCPRI spectrum to be overlaid on a standard spectrum.

4. Type the name of the file in the **File Name** field with or without using a keyword.
5. *Optional.*
   – To create or edit keywords, touch the **Edit Keywords** button, select your desired keyword button in the upper screen, type a keyword, and then tap the **Save** button on the keyboard. See “Editing or adding a custom keyword” on page 551 for more information.
   – To include a keyword in the file name, touch the **Append Keywords** button, select your

desired keyword, and then tap the **Keyboard** button. See “Appending a keyword” on page 552 for more information.

- To change the file location in the internal memory or to your USB memory drive, tap the **Location** button, select your desired file path using the touch screen or the rotary knob, and then press the **Apply** soft key.
- To create a folder, press the **Create Folder** soft key, type a directory name, and then press the **Apply** soft key.

6 Press the **Save** soft key.

Saving fail events

Depending on the measurement mode, you can let the instrument automatically save measurement screen or result that falls outside the defined limit settings or the Fail indicator is on. You can also set to save the first event and hold the measurement or to save all the events continuously.

Procedure

1. Press the ***SAVE/LOAD*** hot key. The Save/Load screen menu bar appears.
2. Press the **Save** soft key.
3. Press the **Save On Event** soft key.
4. Press the **Save Type** soft key, and then select the save option: **Screen**, **Result**, or **Result as CSV Format**.
5. *Optional*. Toggle the **Save Then Stop** soft key and select **On** in order to save the first event that falls outside the limit(s) and to hold the measurement. Otherwise, leave this feature off to save events continuously.
6. Press the **Start** soft key to start saving. The on-screen keyboard appears.
7. Type the name of the file in the **File Name** field with or without using a keyword.
8. *Optional.*
   - To create or edit keywords, touch the **Edit Keywords** button, select your desired keyword button in the upper screen, type a keyword, and then tap the **Save** button on the keyboard. See “Editing or adding a custom keyword” on page 551 for more information.
   - To include a keyword in the file name, touch the **Append Keywords** button, select your desired keyword, and then tap the **Keyboard** button. See “Appending a keyword” on page 552 for more information.
   - To change the file location in the internal memory or to your USB memory drive, touch the **Location** button, select your desired file path using the touch screen or the rotary knob, and then press the **Apply** soft key.
   - To create a folder, press the **Create Folder** soft key, type a directory name, and then press the **Apply** soft key.
9. Press the **Done** soft key.
   The “Event Save” appears on the screen and the **Start** screen menu changes to **Stop**.
10. Press the **Stop** soft key to end the event saving.

Saving logging data

You can save logging data if the measurement mode supports the feature and has the activated Save Logging Data soft key.

Procedure

1. Press the ***SAVE/LOAD*** hot key. The Save/Load screen menu bar appears.

2 Press the **Save** soft key.
3 Press the **Save Logging Data** soft key. The on-screen keyboard appears.
4 Type the name of the file in the **File Name** field with or without using a keyword.
5 *Optional.*
   – To create or edit keywords, touch the **Edit Keywords** button, select your desired keyword button in the upper screen, type a keyword, and then tap the **Save** button on the keyboard. See "Editing or adding a custom keyword" on page 551 for more information.
   – To include a keyword in the file name, touch the **Append Keywords** button, select your desired keyword, and then tap the **Keyboard** button. See "Appending a keyword" on page 552 for more information.
   – To create a folder, press the **Create Folder** soft key, type a directory name, and then press the **Apply** soft key.
   – To change the file location in the internal memory or to your USB memory drive, touch the **Location** button, select your desired file path using the touch screen or the rotary knob, and then press the **Apply** soft key.

NOTE
In is recommended that you use an external USB memory drive to save logging data in the Auto Measure mode in order to have enough free space.

6 *Optional only in the **Auto Measure** mode*.
Toggle the **Save Screen** soft key and select **All** to save all the Auto Measure screens or **Fail** to save only the ones with the Fail on.
7 Press the **Save** soft key to start logging.
The "Recording" appears on the screen.
8 Press the **ESC** hard key to stop logging data and complete saving.

Using load

You can load your saved screen, result, setup, and limit from the internal memory or your external USB memory drive.

Procedure

1 Press the ***SAVE/LOAD*** hot key. The Save/Load screen menu bar appears.
2 Press the **Load** soft key. The Load screen menu bar appears.
3 Select the load option, from the following choices:

To load	Select
Saved screen or report	Load Screen
Measurement result	Load Result
Setup and test configuration	Load Setup
Limit setting	Load Limit
Logging data	Load Logging Data
Map file	Load Map
Scenario	Load Scenario

The file manager window appears.

NOTE
A RFoCPRI spectrum can be recorded and replayed in the RFoCPRI Interference Analyzer (IA) mode only. It is not compatible with a standard IA spectrum logging file.

4. Select the name of the file to be loaded from the internal memory or from your USB drive. Information of your selected file appears in the File Information pane.
5. Press the **Load** soft key.

Using file manager

The File Manager lets you copy, cut, paste, and delete data files saved in the internal memory or in your USB memory drive.

Procedure

1. Press the ***SAVE/LOAD*** hot key. The Save/Load screen menu bar appears.
2. Press the **File Manager** soft key. The file manager window appears.
3. To copy, cut, and paste, complete the following steps:
   a. Select a file or folder by using the touch screen or the rotary knob.
   b. Select the **Copy** or **Cut** soft key.
   c. Select the location to which the file or folder to be pasted.
   d. Press the **Paste** soft key.
4. To delete, complete the following steps:
   a. Select a file or folder by using the touch screen or the rotary knob.
   b. Press the **Delete** soft key.
      The confirmation dialog box appears.
      Once the file or folder is deleted, you cannot recover it.
   c. Select **OK** to delete.
5. Press the **Exit** soft key or the **ESC** hard key to close the file manager window.

Configuring system

Setting frequency reference

You can improve measurement accuracy by setting frequency reference.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Press the **Freq Reference** soft key.
3. Select the frequency reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, and **GPS**.

Setting date and time

You can set the instrument’ system clock to your region.

Procedure

1. Press the ***SYSTEM*** hot key.

2 Select **System Configuration > Date/Time**. The current time zone information box appears.
3 To change the standard time zone, complete the following steps:
   a Press the **Std Time Zone** soft key.
   b Select your time zone by using the rotary knob or arrow keys. You can also use the **Top/Bottom** or **Page Up/Down** soft keys.
   c Press the **ENTER** hard key to save your change. You can also press the rotary knob.
4 To change the date format, complete the following steps:
   a Press the **Date Format** soft key.
   b Select **YYMMDD**, **MMDDYY**, or **DDMMYY** as needed.
5 To set the date and time manually, complete the following steps:
   a Select **Year**, **Month**, **Day**, **Hour**, or **Minute** soft key as needed.
   b Enter a value by using numeric keys.
   c Press the **Enter** soft key to save your change.
6 Press the **Apply** screen key to save and exit.

Setting language

You can change the system language for the menus, messages, and information on screen.

Procedure

1 Press the ***SYSTEM*** hot key.
2 Select **System Configuration > Language**.
3 Select the language option from the choices available.

Setting power on

Procedure

To set the power-on option:

1 Press the ***SYSTEM*** hot key.
2 Press the **Power On** soft key.
3 Select the power-on option, from the following choices:
   – **Last:** Boots up with the last state of the instrument before power-off or shut-down.
   – **Preset:** Boots up with the default settings preset in the factory.
   – **User:** Boots up with the user-defined setup.
   When the User is selected, the User Setup menu under System becomes activated.
4 *Optional*. To specify the user setup file, complete the following steps:
   a Press the **User Setup** soft key.
   b Select the name of the user setup file.
   c Press the **Done** soft key.

> **NOTE**
> The Preset option returns the instrument settings to the factory preset. It is recommended that you use this option when you experience badly misadjusted settings.

Changing display mode

You can change the instrument’s display mode as needed.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **System Configuration > Display Mode**.
3. Select a display mode from the choices: **Indoor**, **Outdoor**, and **Night**.
4. The instrument optimizes screen colors to each choice.

Setting sleep time

You can set the amount of time up to 255 minutes to let the instrument automatically turn the backlight off and enter into power saving mode after no actions or data entries. Default setting is zero, which indicates that the sleep mode is turned off and screen backlight is always on.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **System Configuration > Sleep Time**.
3. Enter the amount of minutes by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Adjusting LCD brightness

You can adjust display brightness from one to ten as needed. The larger number you set, the brighter the display becomes.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **System Configuration > LCD Brightness**.
3. Enter a value by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Adjusting volume

You can turn the sound on or off or adjust the volume from one to ten as needed.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select the sound option, from the following choices:
   – To turn the sound or alarm off, toggle the **Sound** soft key and select **Off**.
   – To turn the sound or alarm on, toggle the **Sound** soft key and select **On**.
   – To adjust the volume, complete the following steps:
      a Press the **Sound** soft key.
      b Enter a value by using the numeric keys.
      c Press the **Enter** soft key.

Upgrading firmware

It is recommended that you maintain your instrument up-to-date with its latest firmware in order to achieve the instrument's optimal performance.

Checking installed firmware version

Procedure

1. Press the ***SYSTEM*** hot key.
2. Press the **HW/FW Info** soft key.
3. Find the installed version number in the **Firmware** field.
4. From a computer with Internet access, visit JDSU's Software Updates website and check if your installed firmware is the latest one. Do the steps **5-6** if you want to update your firmware with using your USB memory drive.
5. Download a latest firmware file from the website to the root directory of your USB memory drive.

> **NOTE**
> It is recommended that you format your memory drive to have enough space to download the file.

6. Unzip the download file into the root directory of your USB memory stick.
   A firmware file (`*.fw`) and a firmware release note (`*.pdf`) are extracted.

Installing new firmware

To update your firmware, you can choose either way of using your USB memory drive or accessing the FTP server over the network.

Upgrading from USB memory drive

Procedure

1. Power your instrument via the AC-DC adapter to prevent any severe damage to your instrument caused by a power-off in the middle of the upgrade, which may require a repair in the factory.
2. Plug in the USB memory drive to the **USB Host** port of your instrument.
3. Press the ***SYSTEM*** hot key.
4. Select **More (1/2) > Upgrade > USB**.
   The file manager window appears.
5. Highlight the firmware file (`.fw`) saved in the root directory of your USB drive.
6. Press the **Select** soft key.
   The Update Firmware dialog box appears.
7. Press the **OK** button to start to install the new firmware.
   The Upgrade Status bar appears.
   The instrument reboots the system automatically and completes upgrading.

> **NOTE**
> Firmware upgrade will be done within 30 minutes or so in most cases, but depending on the number of files to be reconfigured, it may take longer than that.

8. After the instrument restarted, check the installed firmware version and DSP versions in the System settings. Refer to the firmware release note to find correct DSP version and compatible application software versions.

WARNING
Do not remove the USB drive while upgrading the firmware.

Upgrading from FTP server

Procedure

1. Power your instrument via the AC-DC adapter to prevent any severe damage to your instrument caused by a power-off in the middle of the upgrade, which may require a repair in the factory.
2. Press the ***SYSTEM*** hot key.
3. Select **More (1/2) > Upgrade > FTP Server**.
   The upgrade server dialog box appears.

NOTE
Older version of firmware does not have the FTP Server option. It is recommended that you update your firmware with the USB option first.

4. Enter **ftp2.jdsu.com** in the server address field.
5. Enter your proxy server address in the proxy server field, if necessary.
   Contact your system administrator for your proxy server information.
6. Tap the **Check** button to check if the installed firmware version is the latest one.
7. Do one of the following:
   – If you view the latest firmware version information, tap the **Install** button to continue upgrading.
   – If the message “**Your firmware is up to date.**” is displayed, tap the **Cancel** button.

NOTE
Firmware upgrade will be done within 30 minutes or so in most cases, but depending on the number of files to be reconfigured, it may take longer than that.

8. After the instrument restarted, check the installed firmware version and DSP versions in the System settings. Refer to the firmware release note to find correct DSP version and compatible application software versions.

Managing licenses

The License Manager lets you view installed options, install additional ones, and load evaluation licenses.

Checking options

Procedure

To view the list of installed or installable options:

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > License Manager**. The License Manager screen menu bar appears.
3. Select the menu, from the following choices:
   – To view the installed options, select the **Installed Options** soft key.
   The list of options appears. The “(T)” indicates temporary licenses.
   – To view the installable options, select the **Installable Options** soft key.
4. Press the **PREV** hard key to return to the previous screen.

Installing options

Procedure

To install an option that you have purchased:

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > License Manager**.
   The License Manager menu bar appears.
3. Select the **Install an Option** soft key. The Installable Options window appears.
4. Highlight the name of the option from the list by using the rotary knob.
5. Press the **ENTER** hard key. You can also press the rotary knob.
   The License Code bar appears.
6. Enter the number of the license to activate by using the numeric keys.
7. Press the **ENTER** hard key. You can also select the **Enter** soft key.

Loading temporary license

The temporary license that you received from JDSU is intended for your evaluation only and it expires after its specified time limit.

Procedure

To load a temporary license that you have received for evaluation:

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > License Manager**.
   The License Manager menu bar appears.
3. Select the **Load Temp License** soft key. The file manager window appears.
4. Select the name of the license file.
5. Press the **Load** soft key.
6. *Optional*. You can check the loaded license using the **Installed Options** menu.

Viewing OSS license

The JD700B series incorporates software that is covered by either the GNU General Public license or GNU Lesser General Public License. Check the OSS license notification for more details.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > License Manager**.
   The License Manager menu bar appears.
3. Select the **OSS License** soft key.
   The Open Source Code Notification & Distribution screen appears.
4. Press the **ESC** hard key to return to your previous screen.

Performing service diagnostic

The Service Diagnostic lets you view system log, perform self test, revert the instrument settings to its factory settings, or perform touch alignment.

Viewing system log

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Svc Diagnostic > System Logging**.
3. *Optional*. Press the **Save** soft key to save the system log as a `.log` file type.
4. Press the **PREV** hard key to return to the previous screen.

Running self-test

You can run a self-test on your instrument boards and modules.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Svc Diagnostic > Self Test**.
   The on-screen instruction appears.
3. Connect a test cable between the **Reflection/RF Out** port for Cable and Antenna Analyzer and the **RF In** port for Spectrum Analyzer.
4. Press the **Start** soft key.
   The test result window appears.
5. *Optional*. Press the **Save Screen** soft key to save the self-test results.
6. Press the **PREV** hard key to return to the previous screen.

Performing factory reset

The Factory Reset is used only when you want to purge all the user settings and data stored in the system and return to the instrument's factory state.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Svc Diagnostic > Factory Reset**.
   The confirmation window appears.
3. Press the **Yes** soft key to continue. Otherwise, select **No**.
4. Press the **PREV** hard key to return to the previous menu.

NOTE
It is recommended that you copy your setup or result data to an external USB memory drive so that you can restore them later.

Re-aligning touch screen

When you consistently experience of the instrument responding improperly to your touch on the screen, you may need to perform this touch-screen alignment.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Svc Diagnostic > Touch Alignment**.

The white screen with a plus sign (+) in the upper-left corner appears.

3 Touch the plus sign and repeat until the previous screen is back on.

Using system administration

The Administration is used to disable editing limits, enable modifying online help, or change administration password.

Logging in

You need to log in first to access the administration menus.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Administration**. The password box appears.
3. Enter **<password>** by using the numeric keys.
   Default password is "**0000**". To change the password, see "Changing password" on page 42.
4. Press the **Apply** soft key.

Changing password

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Administration**, and then enter your password.
3. Press the **Change Password** soft key. The new password box appears.
4. Enter a new password up to eight digits by using the numeric keys.
5. Press the **Apply** soft key. The reconfirmation box appears.
6. Enter the new password again by using the numeric keys.
7. Press the **Apply** soft key to complete changing password.

Locking limit key

You can lock the ***LIMIT*** hot key and disable editing predefined limit settings to prevent any unintentional changes, which could result in incorrect measurements.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Administration**, and then enter your password.
3. Toggle the **Edit Limit** soft key and select **Disable** to lock the ***LIMIT*** hot key or **Enable** to unlock the key.

> **NOTE**
> Disabling the Edit Limit limits the access to the ***LIMIT*** hot key only. The Limit features including displaying limit line(s) and Pass/Fail result function properly as predefined.

Running IP test

You can test an Internet Protocol (IP) configuration of the cell site's backhaul.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **More (1/2) > Utility > IP Test**.
3. Select the command option, from the following choices:
   – To display the route and measure transit delays of packets, toggle the **Commands** soft key and select **Traceroute**.
   – To display the reachability and measure the round-trip time, toggle the **Commands** soft key and select **Ping**.
4. To set the destination IP address to be tested, complete the following steps:
   a Press the **Destination IP** soft key.
   b Press the **First Octal** soft key.
   c Enter a value, and then press the **Enter** soft key.
   d Press the **Second Octal** soft key and repeat step **c**.
   e Press the **Third Octal** soft key and repeat step **c**.
   f Press the **Fourth Octal** soft key and repeat step **c**.
5. Press the **Execute** soft key and select **Start** to start testing.
   Test result is displayed on the screen as the test is progressing.
6. Press the **Execute** soft key and select **Stop** to stop testing.
7. *Optional*. Press the **Save** soft key to save the test result as a `.txt` file type.

Activating StrataSync

StrataSync is a cloud-based solution that provides asset, configuration, and test data management for JDSU instruments. StrataSync manages and tracks test instruments, collects and analyzes results from the entire network, and informs and trains the workforce.

The JD700B series is compatible with the JDSU StrataSync cloud. This optional capability allows you to manage your instrument inventory ensuring you know where all your valuable equipment is and which engineer is using it. In addition, it allows you to keep your instruments current through the remote upgrade capability that ensures all instruments have the latest firmware. It also enables the centralized distribution of configuration settings to ensure all your engineers use the same instrument settings resulting in consistent measurements.

Once testing is completed, the trace files can be uploaded onto StrataSync for secure storage and sharing. This sharing capability allows engineers who have a problem they cannot resolve to request help from an expert who can analyze the trace file via StrataSync using applications such as JDViewer, JDFileViewer, JDPowerMeter, etc. from anywhere without having to be at the instrument, helping resolve problems even faster.

Setting up Internet connection

Your JD700B series instrument must have an access to the Internet to be able to connect to the StrataSync. You can connect the Ethernet network to the RJ45 port of your instrument. You can also use your mobile device's data network such as the Bluetooth tethering on an Android-based smartphone and the Personal Hotspot on an iOS-based smartphone. If you want to share your mobile's data network, you need to connect your instrument to your mobile device.

Procedure

1 Connect one of the Parani-UD100 Bluetooth adapters to the USB port of your JD780B or JD740B series.
2 Turn on Bluetooth on your mobile device, and then activate its tethering or hotspot.
  – On Android mobile devices:
    a Go to **Settings > Connections > Bluetooth**.
    b Check the box for **Visible to all nearby Bluetooth devices** to make your mobile device discoverable by your instrument.
    c Go to **Settings > More networks > Tethering and portable hotspot**.
    d Check the box for **Bluetooth tethering** to enable sharing your mobile device's Internet connection with your instrument.
  – On iOS mobile devices:
    a Go to **Settings > Bluetooth**.
    b Turn on **Bluetooth**.
    c Go to **Settings > Personal Hotspot**.
    d Turn on **Personal Hotspot** to make your mobile device discoverable by your instrument and enable sharing your mobile device's Internet connection with your instrument.
3 On your JD780B or JD740B series instrument, press the ***SYSTEM*** hot key.
4 Select **System Configuration > Remote Interface > Bluetooth > Connect**.
5 Press the **Scan** soft key to discover your mobile device.
  You will find your mobile device from the list on the screen.
6 Highlight your mobile device name from the list, and then press the **Select** soft key.
  A dialog box appears.
7 Tap the **Connect** button to pair and connect.
8 On your mobile device, enter **0000** in the PIN field, and then tap the **OK** button or **Pair**.
  If the connection is successful, "(Paired & Connected)" appears next to the name of your mobile device on your instrument. If the connection is unsuccessful, repeat steps **6** and **7**.
9 Press the **PREV** hard key to return to the Bluetooth Information screen that displays the paired device and connected service.

Establishing a connection to StrataSync

Procedure

1 Press the ***SYSTEM*** hot key.
2 Select **More (1/2) > Utility > StrataSync**.
  The StrataSync setting window appears as shown in **Figure 4**.
3 Enter **<server address>** in the **Server Address** field for StrataSync.
  The server address at the time of this document production is "**stratasync.jdsu.com**", which may change.

> **NOTE**
> JDSU provides you with the information required to access StrataSync at your purchase of StrataSync, including the **Server Address**, **Account ID**, and **Port** number. See "JD700B Series Common Options" on page 547 for more information on available options.

4 Enter **<account number>** in the Account ID field.
5 Enter **<technician number>** in the Technician ID field.
6 To set the port number and proxy server address, complete the following steps:
  a Tap the **Detail Settings** button.

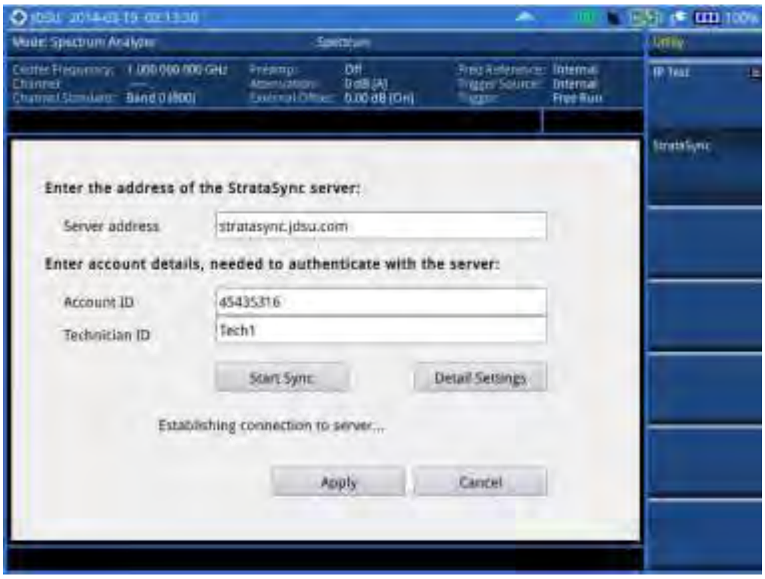
The input dialog box appears.

- **b** Enter **<port number>** in the **Port** field.
- **c** Enter **<proxy server address>** in the **Proxy Server** address, if necessary.
  Contact your system administrator for your proxy server information.
- **d** Tap the **Apply** button to save and exit.

7 Tap the **Start Sync** button.
Once successfully synchronized, the text “Successfully synchronized with server” appears and the StrataSync status icon changes accordingly.

8 Tap the **Apply** button to exit.

Figure 4 StrataSync setting window



StrataSync status indicators

The StrataSync indication icons provide you with the connection and activity status.

Indicator	Description
	Indicates that your instrument is idle to be connected and synchronized with the StrataSync server.
	Indicates that your instrument is acquiring an authentication, synchronizing with the server, and sharing data.
	Indicates that your instrument is synchronized successfully.
	Indicates that your instrument failed to synchronize with the StrataSync server or encountered an error.

Setting communication

JD700B series provides several methods for you to connect your instrument with application software or other instruments and devices.

Configuring Ethernet

You can configure a network to connect your JD700B series and PC with JDViewer or JDRemote via Ethernet.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **System Configuration > Ethernet Config**.
   The Ethernet Configuration box appears.
3. Select the IP addressing option, from the following choices:
   – To enable automatic IP addressing, toggle the **Mode** soft key and select **DHCP**.
   – To manually assign fixed IP addresses, complete the following steps:
      a. Toggle the **Mode** soft key and select **Static**.
      b. Select **Field > IP Address**.
      c. Press the **First Octal** soft key.
      d. Enter a value, and then press the **Enter** soft key.
      e. Press the **Second Octal** soft key and repeat step **d**.
      f. Press the **Third Octal** soft key and repeat step **d**.
      g. Press the **Fourth Octal** soft key and repeat step **d**.
      h. Select **Field > Subnet Mask** and repeat steps **c**-**g**.
      i. Select **Field > Gateway** and repeat steps **c**-**g**.
4. Press the **Apply** soft key to complete the network configuration.
5. Press the **ESC** hard key to exit.

Setting for JDViewer and JDRemote

The **App SW** is set by default to make it easy to connect your instrument to JDViewer or JDRemote. After using other remote interfaces such as SCPI, LMF, and USBTMC, it is recommended that you set the LAN and USB settings back to App SW.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Press the **System Configuration** soft key.
3. Press the **Remote Interface** soft key and then do the following:
   – Select the **LAN** soft key and then press the **App SW** soft key.
   – Select the **USB** soft key and then press the **App SW** soft key.

Setting USBTMC mode

The USB Test & Measurement Class (USBTMC) is a standard for programmatic control of USB-based test instruments that defines protocols used to send and receive messages. If you want to use the USBTMC protocol to communicate with the instrument remotely, you can turn this TMC Mode on.

Procedure

1. Press the ***SYSTEM*** hot key.
2. Select **System Configuration > Remote Interface > USB**.
3. Press the **USBTMC** soft key.

The confirmation dialog box appears.

4 Press the **USBTMC** soft key again to confirm the mode change and reboot the instrument.

> **NOTE**
> After using the USBTMC mode, you may want to set this setting back to **App SW** if you use JDViewer mainly for remote controlling your JD700B series.

Setting SCPI mode

You can use SCPI commands to control your JD700B series remotely.

Procedure

1 Press the ***SYSTEM*** hot key.

2 Select **System Configuration > Remote Interface > LAN**.

3 Press the **SCPI** soft key.

> **NOTE**
> After using the SCPI mode, you may want to set this setting back to **App SW** if you use JDViewer or JDRemote mainly.

Configuring LMF setting

The Local Maintenance Facility (LMF) setting is used in order to perform TX Calibration and TX Audit on Motorola's CDMA/EV-DO BTS in the RF Power Meter mode. See “Appendix F – Motorola CDMA/EV-DO LMF” on page 535 for more information.

Enabling Bluetooth connection

You can also use the Bluetooth mode to enable communicate between your instrument and your computer with application software such as JDRemote and JDViewer or to transfer files to a Bluetooth storage device. See “Appendix G – Bluetooth connection” on page 537 for more information.

3

Chapter 3 Analyzing Measurement Results

This chapter provides instructions on how to use JD700B series' capabilities for measurement analysis. Topics discussed in this chapter are as follows:

Using marker

Marker 

Marker is used to get the information about a specific trace. Six markers can be set on the display and each marker can be used independently. The X and Y coordinates of the trace are displayed when the marker is placed on any position of the trace. The position displaying the marker's X and Y coordinates may be slightly different for each measurement mode and refer to the description of each measurement. There are three different marker types available: Normal, Delta, and Delta pair. Marker position can be set manually by entering numeric values (frequency) when one of the marker types is selected.

- **Select Marker:** Selects an active marker whose position can be changed with the rotary knob or the arrow keys. The assigned number of the active marker is displayed in the Select Marker menu box and the active marker number is also displayed right next to the active marker on the trace when the Marker View is set to On.
- **Marker View:** Displays the selected marker on the screen or hides it. When the Marker View is turned off and then on again in the same measurement mode, markers appear at the previous positions. If a measurement mode is changed, markers are not restored to their previous positions.
- **Normal:** This Normal marker type provides the reading of a marker position on the trace along with the marker number between one and six.
- **Delta:** This Delta marker type is associated with a Normal marker. A Normal marker must be set before a Delta marker is set. When the Delta marker is set, the position set by the Delta marker becomes the reference position of the Normal marker and the marker's X and Y values displays the difference compared with the Delta marker.
- **Delta Pair:** This Delta Pair marker type is associated with a Normal marker. A Normal marker must be set before a Delta Pair marker is set. When the Delta Pair marker is set, the position set by the Delta Pair marker becomes the reference position of the Normal marker and the marker's X and Y values displays the difference compared with the Delta Pair marker. The reference position will be varied in accordance with trace change.
- **Marker All Off:** Turns all the markers the screen off. When the Marker View is selected for those markers, the instrument displays those markers back at the previous position. If a measurement mode is changed, current settings are not restored.
- **Marker →:** Sets the X coordinate of the active marker as selected.
  - **Marker→Center:** Sets the frequency of the active marker to the center frequency of spectrum analyzer.
  - **Marker→Start:** Sets the frequency of the active marker to the start frequency of spectrum analyzer.
  - **Marker→Stop:** Sets the frequency of the active marker to the stop frequency of spectrum analyzer.
- **Frequency Count:** This Frequency Count is used when a highly accurate reading of the frequency is needed for the active marker on the signal. The measurement sweeps get significantly slower because the instrument runs the measurement of the signal peak with 1 Hz resolution in background. Toggle this key between **On** and **Off** to enable or disable the frequency count function for the selected marker.
- **Noise Marker:** This Noise Marker is used to measure a noise adjacent to a signal by averaging several data points to calculate the readout for the Noise Marker as if making a measurement using a 1 Hz bandwidth. Toggle this key between **On** and **Off** to enable or

disable the noise marker function for the selected active marker.

> **NOTE**
> Frequency Count and Noise Marker functions are used only in the Spectrum Analyzer mode.

Using peak search

Peak search 

Each time the Peak Search soft key is pressed, the active marker is positioned at the highest peak of the trace.

- **Peak Search:** Moves the active marker to the highest peak of the trace.
- **Next Peak:** Moves the active marker to the second highest peak of the trace.
- **Next Peak Right:** Moves the active marker to the highest peak to the right of its current position.
- **Next Peak Left:** Moves the active marker to the highest peak to the left of its current position.
- **Min Search:** Moves the active marker to the lowest peak of the trace.
- **Always Peak:** When the **Always Peak** is set to **On**, the instrument moves the active marker automatically to the highest peak of the trace every time the trace is refreshed.

4

Chapter 4 Using Spectrum Analyzer

This chapter provides instructions for using the Spectrum Analyzer function. Topics discussed in this chapter are as follows:

Introduction

The advantage of using the Spectrum Analyzer is easy to verify the presence of unwanted signals such as spurious and harmonics, which are normally very hard to identify in time domain analysis.

Performance assurance in wireless communication systems includes the observation of the out-of-band signal characteristics in order to identify the presence of harmonic signals. Harmonic signals of a carrier may interfere with other signals far out of the transmission band, or harmonic signals from other transmitter may interfere with in band signals affecting the spectral integrity.

In these days when wide variety of wireless communication services are provided in frequency bands assigned very closely to each other, it is critical to ensure that each communication service is carried out within their assigned frequency band minimizing interference with adjacent frequency bands. The Adjacent Channel Power Ratio (ACPR) characteristic of a power amplifier or other RF components is an important factor in evaluating the system performance.

The JD700B series is the optimal solution to perform following measurements:

- Spectrum Analysis
  - Spectrum
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - Adjacent Channel Power (ACP)
  - Multi-ACP
  - Spurious Emissions
  - AM/FM Audio Demodulation
  - Field Strength
  - Route Map
  - Dual Spectrum
  - PIM Detection (Single and Multiple Carriers)

Display overview

Figure 5 provides overview of each segment of the measurement screen.

Figure 5 Spectrum measurement screen

Connecting a cable

There are two ways that you can make a connection of your instrument and the base station to be tested: direct or indirect.

Procedure

To make a direct connection:

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the PA output port of BTS as shown in **Figure 6**.

To make an indirect connection:

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS as shown in **Figure 7**.

Figure 6 Direct connection

JD785B/JD786B/JD745B/JD746B **JD788B/JD748B**

Figure 7 Indirect connection

JD785B/JD786B/JD745B/JD746B **JD788B/JD748B**

CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Spectrum Analyzer** soft key. The **Measure Off** mode is selected by default.
3. Press the ***MEASURE*** hot key, and then select the measurement mode from the following choices:
   - **Channel Power**
   - **Occupied BW**
   - **Spectrum Emission Mask**
   - **Adjacent Channel Power**
   - **Multi-ACP**
   - **Spurious Emissions**
   - **AM/FM Audio Demod**
   - **Field Strength**
   - **Route Map**
   - **Dual Spectrum**
   - **PIM Detection > Single Carrier** and **Multiple Carriers**

Configuring test parameters

Setting frequency

You need to set the frequency range to be measured with either the center frequency/span or the start/stop frequencies. You can also set the frequency with the channel number and span.

Procedure

To set the center frequency and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Span** soft key, and then do one of the following:
   – To set the span manually, select **Span**, enter a value, and then select the unit.
   – To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

> **NOTE**
> The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER* > Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

To set the start and stop frequencies:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Start Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Stop Frequency** soft key.
7. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
8. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Toggle the **Link** soft key to select the sweep direction and select **Fwd** for forward or **Rev** for reverse.
5. To set the channel number, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key or **ENTER** hard key to complete the entry.
   The instrument automatically displays the corresponding center frequency value for the selected channel number.
6. To set the span, complete the following steps:
   a. Press the **Span** soft key.
   b. Select the span option, from the following choices:
      – To set the span manually, select **Span**, enter a value, and then select the unit.
      – To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

> **NOTE**
> The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER* > Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

Optional. **To define the amount of frequency increment for the rotary knob:**

1. Press the **Frequency Step** soft key, if the **Freq** is selected.
2. Enter a value by using the numeric keys.
3. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

Optional. **To define the amount of channel increment for the rotary knob:**

1. Press the **Channel Step** soft key, if the **Channel** is selected.
2. Enter a value by using the numeric keys.
3. Press the **Enter** soft key.

> **NOTE**
> This setting is not used in the Spurious Emissions mode.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference level on the Y-axis manually, complete the following steps:
   - a Press the **Reference Level** soft key.
   - b Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - c Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.
3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator’s level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - a Select **Attenuation > Manual**.
   - b Press the **Attenuation Value** soft key to set the level.
   - c Enter a value in fives by using the numeric keys.
   - d Press the **dB** soft key or the **ENTER** hard key.

   – To couple the input attenuator’s level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases accordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.

2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> For the Field Strength mode, the units change to **dBμV/m**, **dBmV/m**, **dBV/m**, **Volt/m**, **Watt/m^2**, and **dBm/m^2**.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamplifier so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

> **NOTE**
> This setting is not used in the Field Strength mode.

Scale per division

You can use the **Scale/Div** feature available for the spectrum measurement screen. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

To set the scale per division:

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Setting bandwidth

You can manually set the Resolution Bandwidth (RBW), Video Bandwidth (VBW), and the proportional VBW based on the designated RBW. Selecting **Auto** changes the value to correspond to your frequency span setting for RBW and to the current RBW and VBW/RBW settings for VBW.

Procedure

To automatically set the RBW and VBW to your selected VBW/RBW ratio:

1. Press the **BW/AVG** hard key.
2. Press the **VBW/RBW** soft key to set the proportional VBW based on the designated RBW.
   Table 9 shows the ratio example for 30 kHz RBW.
3. Select the ratio: **1**, **0.3**, **0.1**, **0.03**, **0.01**, or **0.003**.
4. Toggle the **RBW** soft key and select **Auto**.
5. Toggle the **VBW** soft key and select **Auto**.
   The RBW or VBW value on the screen changes accordingly based on the span.

To manually set the RBW or VBW to your selected VBW/RBW ratio:

1. Press the **BW/AVG** hard key.
2. Press the **RBW** soft key.
3. Enter a value between 1 Hz to 3 MHz in 1-3 sequence by using the numeric keys.
4. Select the unit: **MHz**, **kHz**, or **Hz**.
   The RBW setting automatically changes to **Manual**.
5. Press the **VBW** soft key.
6. Enter a value by using the numeric keys.
7. Select the unit: **MHz**, **kHz**, or **Hz**.
   The VBW setting automatically changes to **Manual**.
   The RBW or VBW value on the screen changes accordingly.

NOTE
This setting is not used in the Spurious Emissions mode.

Table 9 VBW/RBW ratio example

RBW	Ratio (VBW/RBW)	VBW
30 kHz	1:1	30 kHz
	1:0.3	10 kHz
	1:0.1	3 kHz
	1:0.03	1 kHz
	1:0.01	300 Hz
	1:0.003	100 Hz

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep

The ***SWEEP*** hot key is used to set and control the sweep time, sweep mode, gated sweep settings, and gated sweep on or off.

Sweep time

You can set the sweep time automatically or manually. Manual setting allows you to set the sweep time beyond an automatic setting.

Procedure

1. Press the ***SWEEP*** hot key.
2. Select the sweep time option, from the following choices:
   – To automatically set, toggle the **Sweep Time** soft key and select **Auto**.
   – To manually set, complete the following steps:
      a Press the **Sweep Time** soft key.
      b Enter a value by using the numeric keys.
      c Select the unit: **Sec**, **mSec**, or **μSec**.
      The sweep time mode automatically changes to **Manual**.

NOTE
This setting is not used in the Spurious Emissions mode.

Sweep mode

The default settings of the sweep mode are **Continue** and **Normal** to sweep continuously at a normal speed for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.
4. *Optional*. To speed up sweeping, press the **Sweep Mode** soft key and then select **Fast**.

> **NOTE**
> Selecting **Sweep Mode > Fast** may reduce the measurement accuracy, but it is useful to identify the existence of interfering signals.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

> **NOTE**
> This setting is not used in the in the Field Strength mode, the AM/FM Audio Demodulation mode, and the Route Map mode.

Gated sweep

You can configure the gated sweep settings with an internal or external trigger source. If you select **Gated Sweep Settings**, you can view the signal in time domain.

Procedure

1. Press the ***SWEEP*** hot key.
2. Press the **Gated Sweep Settings** soft key.
3. *Optional*. Adjust sweep time to allow enough time for a cycle by completing the following steps:
   a. Press the **Zero Span Time** soft key.
   b. Enter a value by using the numeric keys.
   c. Select the unit: **Sec**, **mSec**, or **μSec**.
4. Set the period, if using the internal trigger source, by doing one of the following:
   – To select the preset period, complete the following steps:
      a. Toggle the **Period** soft key and select **StdSignal**.
      b. Press the **StdSignal** soft key, and then select the period from the choices: **GSM (4.615 ms)**, **WCDMA (10 ms)**, **LTE (10 ms)**, **EV-DO (5 ms)**, **TD-SCDMA (5 ms)**, and **WiMAX (10 ms)**.
   – To manually set the period, complete the following steps:
      a. Toggle the **Period** soft key and select **Manual**.
      b. Press the **Period** soft key to enter the amount of time.
      c. Enter a value by using the numeric keys.
      d. Select the unit: **Sec**, **mSec**, or **μSec**.
5. Press the ***TRIGGER*** hot key, and then do one of the following:
   – Select **External** for an external trigger source.
   – Select **Video** or **Display Position** for the internal trigger source.
6. Press the **PREV** hard key to continue setting the gated sweep.
7. Set the gate delay by completing the following steps:
   a. Press the **Gate Delay** soft key.
   b. Enter a value by using the numeric keys.
   c. Select the unit: **Sec**, **mSec**, or **μSec**.
8. Set the gate length by completing the following steps:
   a. Press the **Gate Length** soft key.
   b. Enter a value by using the numeric keys.
   c. Select the unit: **Sec**, **mSec**, or **μSec**.
9. Press the **PREV** hard key to enable gated sweeping.
10. Toggle the **Gated Sweep** soft key and select **On**.

> **NOTE**
> This setting is not used in the in the Spurious Emissions mode, the Field Strength mode, and the Route Map mode.

Using RF source

You can turn the RF Source feature on to provide different power levels as like using a CW signal generator.

Procedure

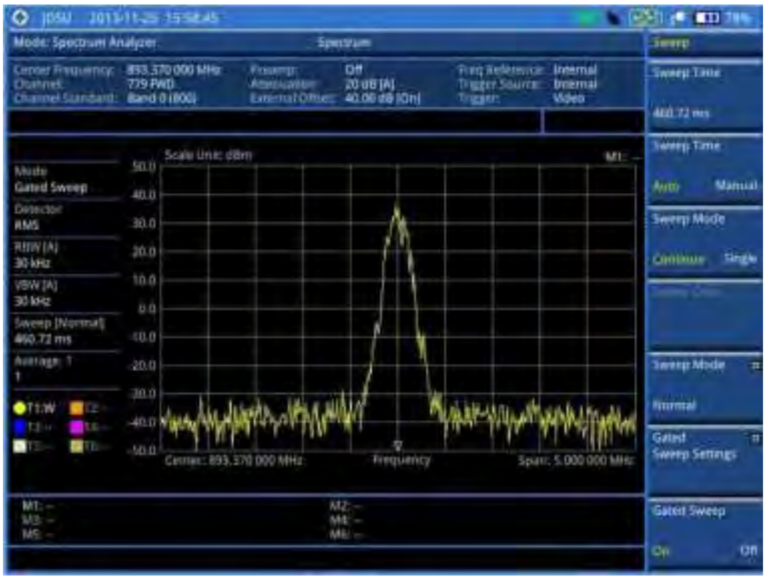
1. Press the ***MEASURE SETUP*** hot key.
2. Press the **RF Source** soft key.
3. Press the **Frequency** soft key to set the frequency of the RF source.
4. Enter a value, and then select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Press the **Power Level** soft key.
6. Enter a value between -60 and 0, and then select the **dBm** soft key.
7. Toggle the **RF Source** soft key and select **On**.

Conducting spectrum measurements

If you have configured test parameters as described in the “Configuring test parameters” on page 54, your measurement is displayed on the screen as like the following example, Figure 8.

Figure 8 Spectrum measurement with spectrum analyzer

Figure 9 Gate sweep measurement with spectrum analyzer



Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 To select the detection option, press the **More (1/2) > Detectors**, and then do one of the following:

To display	Select
Random noise better than the peak without missing signals	Normal
The highest value in each data point	Peak
The root mean squared average power across the spectrum	RMS
The lowest value in each data point	Negative Peak
The center value in each data point	Sample

6 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

7 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

> **NOTE**
> To be able to load a trace, the trace to be overlaid must be saved in the same measurement mode and frequency setting as the current measurement.

Setting limit

Procedure

To use the display line:

1 Press the ***LIMIT*** hot key.

2 Press the **Display Line** soft key for a reference line.

3 Enter a value, and then press the **dBm** unit soft key.

4 Toggle the **Display Line** soft key between **On** and **Off** to display and dismiss the reference line.
The straight line appears across the screen to be used as a visual reference only.

To display the multiple segment line:

1 Press the ***LIMIT*** hot key.

2 Press the **Multi Segment Line** soft key for Pass/Fail indication.

3 Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.

4 Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.
   a Press the **# of Line** soft key.
   b Enter a value between 1 and 50 by using the numeric keys.
   c Press the **Enter** soft key.

5 Press the **Autoset** soft key to let the instrument set the limit for each segment and display the line.

6 *Optional*. To move the limit line, complete the following steps:
   a Select **Limit Up/Down** or **Limit Left/Right**.
   b Turn the rotary knob to move the line as desired. You can also manually enter a value.

7 *Optional*. To edit the segment properties, complete the following steps:
   a Press the **Edit Limit** soft key.
   b Press the **Move** soft key and then turn the rotary knob to select the segment to edit.
   c Select the menu option, from the following choices:

- To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.
- To add a new point, press the **Add Point** soft key.
- To delete the selected point, press the **Delete Point** soft key.
- To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.

8 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring test parameters, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 54.
2 Press the ***MEASURE SETUP*** hot key.
3 Set the channel power measurement bandwidth to be measured:
   a Press the **Integrated BW** soft key.
   b Enter a bandwidth by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
4 Set the frequency range over which the instrument will sweep:
   a Press the **Span** soft key.
   b Enter a span frequency value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5 Set the number of measurements to be averaged:
   a Press the **Average** soft key.
   b Enter a value between 1 and 100.
   c Press the **Enter** soft key.

Setting limit

Procedure

1 Press the ***LIMIT*** hot key.

2. Press the **Channel Power** soft key to set the limit parameters.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. Set the upper threshold:
   a. Press the **High Limit** soft key.
   b. Enter a value for the upper limit.
   c. Press the **dBm** unit soft key.
5. Set the lower threshold:
   a. Press the **Low Limit** soft key.
   b. Enter a value for the lower limit.
   c. Press the **dBm** unit soft key.
6. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 10 Channel power measurement with spectrum analyzer

Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

Occupied bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring test parameters, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Configure test parameters as described in the “Configuring test parameters” on page 54.
2. Press the ***MEASURE SETUP*** hot key.
3. Set the percentage of power within the bandwidth to be measured:
   a. Press the **Occupied BW % Power** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
4. Set the frequency range over which the instrument will sweep:
   a. Press the **Span** soft key.
   b. Enter a span frequency value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Set the number of measurements to be averaged:
   a. Press the **Average** soft key.
   b. Enter a value between 1 and 100.
   c. Press the **Enter** soft key.

Setting limit

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Occupied BW** soft key to set the limit parameters.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. Set the upper threshold:
   a. Press the **High Limit** soft key.
   b. Enter a value for the upper limit.
   c. Select the unit: **MHz**, **kHz**, or **Hz**.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
   See “Using save” on page 32 for more information.

Measurement example

The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Figure 11 Occupied bandwidth measurement with spectrum analyzer

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of-band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The JD700B series indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring test parameters, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Configure test parameters as described in the “Configuring test parameters” on page 54.
2. Press the ***MEASURE SETUP*** hot key.
3. Set the main channel bandwidth to be measured:
   a. Press the **Main Channel BW** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **MHz**, **kHz**, or **Hz**.
4. Set the frequency range over which the instrument will sweep:
   a. Press the **Span** soft key.
   b. Enter a span frequency value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Set the number of measurements to be averaged:
   a. Press the **Average** soft key.
   b. Enter a value between 1 and 100.
   c. Press the **Enter** soft key.
6. To configure an offset, up to five, complete the following steps:
   a. Press the **Offset/Limit** soft key.
      The Offset/Limit screen menu bar appears.

- **b** Press the **Offset** soft key, and then select the number for the active offset to configure.
- **c** Toggle the **Offset** soft key and select **On** to display or **Off** to hide the active offset.
- **d** Press the **Offset Frequency** soft key to set the center frequency of the offset.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the unit: **MHz**, **kHz**, or **Hz**.
- **g** Press the **Measurement Bandwidth** soft key to set the bandwidth for the selected offset.
- **h** Enter a value by using the numeric keys. You can also use the rotary knob.
- **i** Select the unit: **MHz**, **kHz**, or **Hz**.
- **j** Toggle the **Reference** soft key between Relative and Absolute and select **Relative** or **Absolute** depending on how to use the reference.

7 To define the selected offset's limits for Pass/Fail indication, complete the following steps:

- **a** Press the **Start Offset Limit** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the left.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the **dB** soft key.
- **d** Press the **Stop Offset Limit** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the right.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dB** soft key.

Setting limit

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Spectrum Emission Mask** soft key.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
   See "Using save" on page 32 for more information.

Measurement example

Figure 12 Spectrum emission mask measurement with spectrum analyzer

Adjacent channel power (ACP)

The Adjacent Channel Power (ACP) is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

After configuring test parameters, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Configure test parameters as described in the “Configuring test parameters” on page 54.
2. Press the ***MEASURE SETUP*** hot key.
3. Set the main channel bandwidth to be measured:
   a. Press the **Main Channel BW** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **MHz**, **kHz**, or **Hz**.
4. Set the frequency range over which the instrument will sweep:
   a. Press the **Span** soft key.
   b. Enter a span frequency value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Set the number of measurements to be averaged:
   a. Press the **Average** soft key.
   b. Enter a value between 1 and 100.
   c. Press the **Enter** soft key.
6. To configure an offset, up to five, complete the following steps:
   a. Press the **Offset/Limit** soft key.
   The Offset/Limit screen menu bar appears.
   b. Press the **Offset** soft key, and then select the number for the active offset to configure.
   c. Toggle the **Offset** soft key and select **On** to display or **Off** to hide the active offset.
   d. Press the **Offset Frequency** soft key to set the center frequency of the offset.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Select the unit: **MHz**, **kHz**, or **Hz**.
   g. Press the **Integration Bandwidth** soft key to set the bandwidth for the selected offset.
   h. Enter a value by using the numeric keys. You can also use the rotary knob.
   i. Select the unit: **MHz**, **kHz**, or **Hz**.
7. To define the selected offset’s limits for Pass/Fail indication, complete the following steps:
   a. Press the **Lower** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the left.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the **dBc** soft key.
   d. Press the **Upper** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the right.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Select the **dBc** soft key.

Setting limit

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **ACP** soft key.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 13 Adjacent channel power measurement with spectrum analyzer

Multi-ACP

The Multi-ACP measurement is used to do multi-channel ACP testing. It helps you to measure ACP in multi-channel transmitting base station environment.

Setting measure setup

After configuring test parameters as described in “Configuring test parameters” on page 54, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Unit** soft key and select **Freq** or **Channel**.
   – For the frequency setting, complete the following steps:
      a. Press the **Lowest Frequency** soft key.
      b. Enter a value by using the numeric keys. You can also use the rotary knob.
      c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

- d Press the **Highest Frequency** soft key.
- e Enter a value by using the numeric keys. You can also use the rotary knob.
- f Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

– For the channel setting, complete the following steps:

- a Press the **Channel Std** soft key. The standard channel window appears.
- b Select the band to be measured by using the rotary knob or the **Page p/Page Down** soft keys.
- c Press the **Select** soft key or the rotary knob to confirm the selection.
- d Toggle the **Link** soft key to select the sweep direction and select **Fwd** or **Rev** as needed.
- e Press the **Lowest Channel** soft key.
- f Enter a value by using the numeric keys.
- g Press the **Enter** soft key or **ENTER** hard key to complete the entry.
  The instrument automatically displays the corresponding center frequency value for the selected channel number.
- h Press the **Highest Channel** soft key.
- i Enter a value by using the numeric keys.
- j Press the **Enter** soft key or **ENTER** hard key to complete the entry.
  The instrument automatically displays the corresponding center frequency value for the selected channel number.

3 To set up ACP setting, press the **ACP Settings** soft key and then complete the following steps:

- a Press the **Main Channel BW** soft key.
- b Enter a value by using the numeric keys. You can also use the rotary knob.
- c Select the unit: **MHz**, **kHz**, or **Hz**.
- d Press the **Span** soft key to set the frequency range over which the instrument will sweep.
- e Enter a span frequency value by using the numeric keys. You can also use the rotary knob.
- f Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- g Press the **Average** soft key to set the number of measurement to be averaged:
- h Enter a value between 1 and 100.
- i Press the **Enter** soft key.

4 To configure an offset, up to five, complete the following steps:

- a Press the **Offset/Limit** soft key. The Offset/Limit screen menu bar appears.
- b Press the **Offset** soft key, and then select the number for the active offset to configure.
- c Toggle the **Offset** soft key and select **On** to display or **Off** to hide the active offset.
- d Press the **Offset Frequency** soft key to set the offset frequency.
- e Enter a value by using the numeric keys. You can also use the rotary knob.
- f Select the unit: **MHz**, **kHz**, or **Hz**.
- g Press the **Integration Bandwidth** soft key.
- h Enter a value by using the numeric keys. You can also use the rotary knob.
- i Select the unit: **MHz**, **kHz**, or **Hz**.

5 To define the selected offset's limits for Pass/Fail indication, complete the following steps:

- a Press the **Lower** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the left.
- b Enter a value by using the numeric keys. You can also use the rotary knob.
- c Select the **dBc** soft key.
- d Press the **Upper** soft key to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the right.
- e Enter a value by using the numeric keys. You can also use the rotary knob.
- f Select the **dBc** soft key.

Setting limit

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Multi-ACP** soft key.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 14 Multi-ACP measurement with spectrum analyzer

Spurious emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The JD700B series indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 54, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table, complete the following steps:
   a. Press the **Range Table** soft key.
   b. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.

- **c** Press the **Enter** soft key.
- **d** Press the **Start Frequency** soft key to set up the frequency range.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **Stop Frequency** soft key to set up the frequency range.
- **h** Enter a value by using the numeric keys. You can also use the rotary knob.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

3 Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.

4 To set up the test limits for Pass/Fail indication, complete the following steps:

- **a** Press the **Start Limit** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:

- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

7 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

Setting limit

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Spurious Emissions** soft key.
3. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
   See “Using save” on page 32 for more information.

Measurement example

Figure 15 Spurious emissions measurement with spectrum analyzer

AM/FM audio demodulation

The AM/FM Audio Demodulator operates using the power received from radio waves and it serves as an alternative to identify interfering signals easily. The instrument sounds demodulated signals that can be heard through the built-in speaker or plugged-in headphones. You can hear the sound and identify interfering signals easily.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 54, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Audio Demod** soft key between **On** and **Off** to turn the AM/FM audio demodulation on and off.
3. Press the **Demod at** soft key, and then select the marker number for the frequency to be demodulated.

> **NOTE**
> You must set the marker(s) first by using the **MARKER** hard key as the AM/FM demodulator uses the marker position to demodulate. See “Using marker” on page 49 for more information.

4. Press the **Demod Mode** soft key, and then select the demodulation mode: **AM**, **FM** and **CW**.
5. Press the **Dwell Time** soft key, and then turn the rotary knob to set the demodulation interval between 1 and 20.
6. Press the **Volume** soft key, and then turn the rotary knob to set the speaker volume.
7. Toggle the **Auto Gain** soft key between **On** and **Off** to enable or disable the automatic gain feature to adjust the interval gain of the demodulator.

8. *Optional*. You can use the Save On Event soft key to let the instrument automatically save measurement screen or result that falls outside the defined limit settings or the Fail indicator is on. You can also set to save the first event and hold the measurement or to save all the events continuously. See “Using save” on page 32 for more information.

Setting limit

You can show or hide the display line on the screen that is used as a visual reference only.

Procedure

To view the display line:

1. Press the ***LIMIT*** hot key.
2. Press the **Display Line** soft key.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Display Line On/Off** soft key and select **On**.
   The straight line appears on the screen.

To dismiss the display line:

1. Press the ***LIMIT*** hot key.
2. Toggle the **Display Line On/Off** soft key and select **Off.**

You can use the multiple segment limit line to set up different limits for different frequency ranges for Pass/Fail indication.

Procedure

To display the multiple segment line:

1. Press the ***LIMIT*** hot key.
2. Press the **Multi Segment Line** soft key.
3. Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.
4. Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.
   a. Press the **# of Line** soft key.
   b. Enter a value between 1 and 50 by using the numeric keys.
   c. Press the **Enter** soft key.
5. Press the **Autoset** soft key to let the instrument set the limit for each segment and display the line.
6. *Optional*. To move the limit line, complete the following steps:
   a. Select **Limit Up/Down** or **Limit Left/Right**.
   b. Turn the rotary knob to move the line as desired. You can also manually enter a value.
7. *Optional*. To edit the segment properties, complete the following steps:
   a. Press the **Edit Limit** soft key.
   b. Press the **Move** soft key and then turn the rotary knob to select the segment to edit.
   c. Select the menu option, from the following choices:
      – To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.
      – To add a new point, press the **Add Point** soft key.
      – To delete the selected point, press the **Delete Point** soft key.
      – To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.
8. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings.

See “Using save” on page 32 for more information.

Measurement example

Figure 16 AM/FM audio demodulation with spectrum analyzer

Field strength meter

The Field Strength Meter measures the field strength over the frequency range of a connected antenna, which is known with its specific bandwidth and gain characteristics. A standard or user-defined antenna can be selected from the antenna list in the JD700B series.

Setting measure setup

Procedure

1 Connect an antenna to be used with your instrument.

2 Configure test parameters as described in the “Configuring test parameters” on page 54.

3 Press the ***MEASURE SETUP*** hot key, and then do one of the following:

– To select the connected antenna from the list stored in the instrument:

a Press the **Antenna List** soft key to view the standard and custom antennas. The antenna list window appears.

b Select an antenna to be used for the field strength measurement by using the rotary knob, the arrow keys, or **Page Up/Page Down** soft keys.

c Press the **Select** soft key.

NOTE
You can use the JDViewer to edit or define a custom antenna and add to this list.

– To edit the properties of the connected antenna:

a Press the **Antenna Start Frequency** soft key.

b Enter a value by using the numeric keys, and then select the unit: **GHz**, **MHz**, **kHz**, or **Hz**. You can also use the rotary knob.

c Press the **Antenna Stop Frequency** soft key.

d Enter a value by using the numeric keys, and then select the unit: **GHz**, **MHz**, **kHz**, or

Hz. You can also use the rotary knob.

e. Press the **Gain** soft key to enter the gain information for the antenna.
f. Enter a value by using the numeric keys, and then select the **Enter** soft key.

Setting limit

You can show or hide the display line on the screen that is used as a visual reference only.

Procedure

To view the display line:

1. Press the ***LIMIT*** hot key.
2. Press the **Display Line** soft key.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Display Line On/Off** soft key and select **On**.
   The straight line appears on the screen.

To dismiss the display line:

1. Press the ***LIMIT*** hot key.
2. Toggle the **Display Line On/Off** soft key and select **Off.**

You can use the multiple segment limit line to set up different limits for different frequency ranges for Pass/Fail indication.

Procedure

To display the multiple segment line:

1. Press the ***LIMIT*** hot key.
2. Press the **Multi Segment Line** soft key.
3. Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.
4. Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.
   a. Press the **# of Line** soft key.
   b. Enter a value between 1 and 50 by using the numeric keys.
   c. Press the **Enter** soft key.
5. Press the **Autoset** soft key to set and display the limit line for each segment automatically..
6. *Optional*. To move the limit line, complete the following steps:
   a. Select **Limit Up/Down** or **Limit Left/Right**.
   b. Turn the rotary knob to move the line as desired. You can also manually enter a value.
7. *Optional*. To edit the segment properties, complete the following steps:
   a. Press the **Edit Limit** soft key.
   b. Press the **Move** soft key and then turn the rotary knob to select the segment to edit.
   c. Select the menu option, from the following choices:
      – To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.
      – To add a new point, press the **Add Point** soft key.
      – To delete the selected point, press the **Delete Point** soft key.
      – To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.
8. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
   See “Using save” on page 32 for more information.

Measurement example

Figure 17 Field strength measurement with spectrum analyzer

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 54.
3. To load your map file, complete the following steps:
   a. Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

   > **NOTE**
   > The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument’s display. You must save your map file (`.mcf`) into the “**SavedMap**” folder of your USB drive so that you can load them onto your instrument.

   b. Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**. See “Using load” on page 34 for more information.
4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, select **GPS** and then toggle the **Screen Mode** soft key between **Map** and **Full**.

   > **NOTE**
   > With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.

> With the **Full** setting, you can view all the collected points of the route without the loaded map.

- To collect data/plot points manually without a GPS antenna, select **Position**.
- To collect data/plot points based on time, select **Time**.
  You do not need a GPS antenna as you would usually use this option indoor.

6 Press the **Plot Item** soft key, and then select the measurement option: **RSSI** or **ACP**.

7 *Optional*. If ACP is selected, set the **Main Channel BW** and **Offset/Limit** :

- **a** Press the **Main Channel BW** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the unit: **MHz**, **kHz**, or **Hz**.
- **d** Press the **Offset/Limit** soft key.
- **e** Toggle the **Offset** soft key and select **On** to display or **Off** to hide the offset.
- **f** Press the **Integration Bandwidth** soft key.
- **g** Enter a value by using the numeric keys. You can also use the rotary knob.
- **h** Select the unit: **MHz**, **kHz**, or **Hz**.
- **i** Press the **Offset Frequency** soft key to set the offset frequency.
- **j** Enter a value by using the numeric keys. You can also use the rotary knob.
- **k** Select the unit: **MHz**, **kHz**, or **Hz**.
- **l** Press the **Offset Limit** soft key to set the offset limit.
- **m** Enter a value by using the numeric keys. You can also use the rotary knob.
- **n** Select the **dB** soft key.

8 Toggle the **Plot** soft key and select **Start**.

9 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** or **Time** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with screen touch or the arrow keys and the distance with the rotary knob. For the **Time** setting, the instrument interpolates points in between two enters on a straight dotted line. You can change the direction of the route with the arrow keys and the distance with the rotary knob.

10 Toggle the **Plot** soft key and select **Stop** to stop plotting.

11 Press the ***SAVE/LOAD*** hot key to save the result. See “Using save” on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the four different color indicators.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Excellent** soft key to set its threshold.
3. Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
4. Press the **Very Good** soft key to set its threshold.
5. Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
6. Press the **Good** soft key to set its threshold.
7. Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.

8 Press the **Poor** soft key to set its threshold.

9 Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.

10 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 18 Route map measurement screen with GPS

Dual spectrum

The Dual Spectrum feature lets you view two spectrum measurements, both the Uplink and Downlink spectrum, simultaneously eliminating the need to swap between two screens back and forth.

Setting measure setup

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 54.

2 Press the ***MEASURE SETUP*** hot key.

3 Toggle the **Active Window** soft key between **Top** and **Bottom** to select the measurement window to configure or work on.

Measurement example

Figure 19 Dual spectrum measurement with spectrum analyzer

PIM detection (single and multiple carriers)

The Passive Intermodulation (PIM) Detection allows you to detect Uplink PIM across the full spectrum for any technology. When PIM is detected, the normal repair mode is to replace the offending cable and what you need to do is replacing the whole cable irrespective of the location of the fault.

Setting measure setup

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Connect cables as instructed on the screen.
3. *Optional*. To check any possibility of PIM existence in red color by calculation, complete the following steps:
   - **a** Press the **Calculated PIM** soft key.
   - **b** Press the **Radio Band** soft key for single carrier.
     There are **Radio 1 Band** and **Radio 2 Band** soft keys for multiple carriers.
   - **c** Highlight a desired band and then press the **Select** soft key.
   - **d** Press the **Return** soft key.
4. To set the uplink frequency to be measured, do one of the following:
   - To set the center frequency and span, complete the following steps:
     - **a** Toggle the **Unit** soft key and select **Freq**.
     - **b** Press the **Uplink Center Frequency** soft key.
     - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **d** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
     - **e** Press the **Uplink Span** soft key.
     - **f** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   - To set the channel number and span, complete the following steps:
     - **a** Toggle the **Unit** soft key and select **Channel**.
     - **b** Press the **Channel Std** soft key and select a desired band.

- **c** Press the **Channel Number** soft key.
- **d** Enter a value by using the numeric keys and then press the **Enter** soft key.
  The instrument automatically displays the corresponding center frequency value for the selected channel number.
- **e** Press the **Uplink Span** soft key.
- **f** Enter a value by using the numeric keys. You can also use the rotary knob.
- **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

5 Press the **Continue** soft key and follow the instructions on the screen.

Measurement example

Figure 20 PIM detection for single carrier

Figure 21 PIM detection for multiple carriers

5

Chapter 5 Using Interference Analyzer

This chapter provides instructions for using the Interference Analyzer function (option 011). Topics discussed in this chapter are as follows:

Introduction

Interference is becoming more prevalent in the wireless community with the increasing number of transmitters coming on the air. Wireless service providers have traditionally used spectrum analyzers to monitor service channels, frequencies, and adjacent spectrum and to locate sources of interference. A spectrum analyzer can only show you an interfering signal and you require determining the source of the interference. To solve interference problems, you must understand the RF environment, know adjacent operating transmitters, and identify any new or unlicensed emitters.

Once a potential interfering signal is identified in the Spectrum Analyzer mode, you can monitor the signal further in the Interference Analyzer mode. JD700B series provides two different methodologies to identify and determine interference signals: Spectrogram and Received Signal Strength Indicator (RSSI). Locating the source of interference signal can be done with geographical information received from built-in GPS receiver.

The JD700B series is extremely effective for locating and identifying periodic or intermittent RF interference. Interference signals derive from several kinds of licensed or unlicensed transmitters that cause dropped calls and poor service quality.

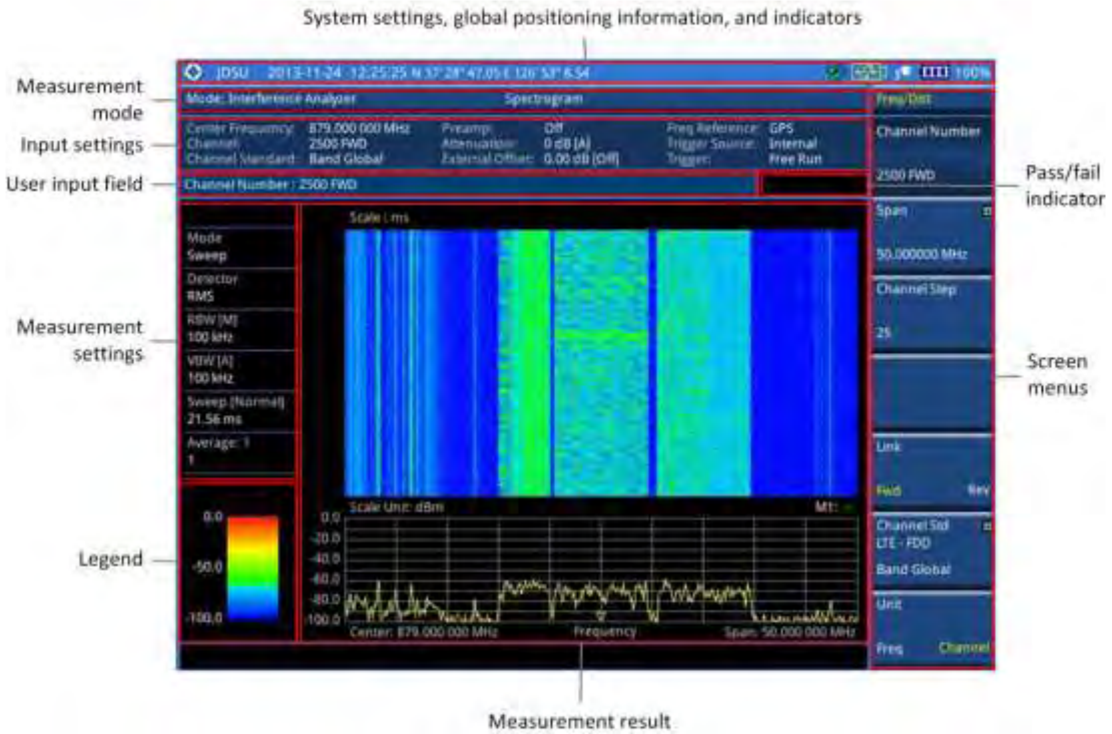
The JD700B series provides following measurements for interference analysis:

- Spectrum
- Spectrogram (Single/Dual)
- RSSI (Received Signal Strength Indicator)
- Interference Finder
- Spectrum Replayer

Display overview

Figure 22 provides descriptions for each segment of the measurement screen.

Figure 22 Interference measurement screen

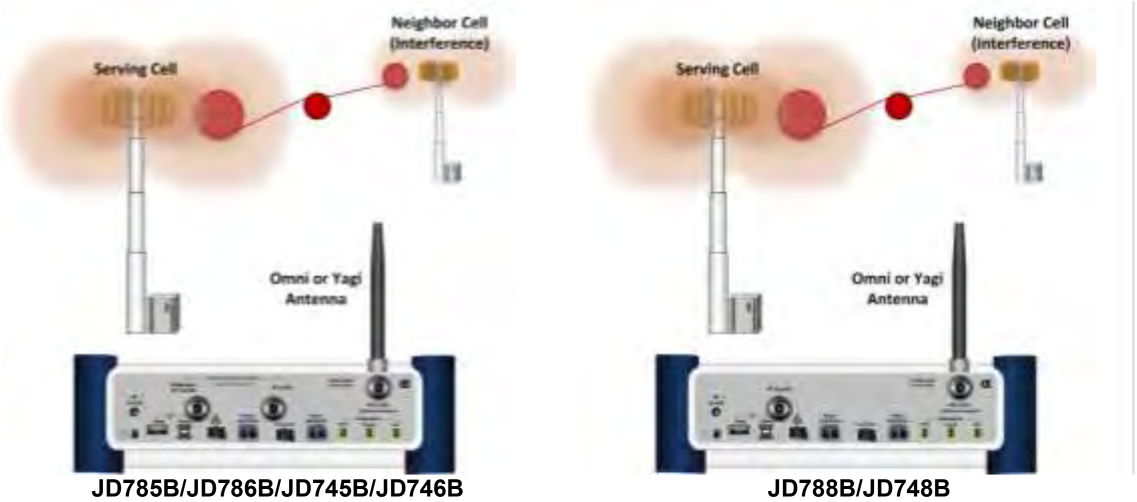


Connecting a cable

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 23 Interference measurement connection



> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set it to 0 dB attenuation or turn on the preamp to have better dynamic range for the testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Interference Analyzer** soft key. The **Spectrum** mode is selected by default.
3. To change the mode, press the ***MEASURE*** hot key and then select the measurement mode: **Spectrogram**, **Dual Spectrogram**, **RSSI**, **Interference Finder**, or **Spectrum Replayer**.

> **NOTE**
> If the **Dual Spectrogram** is selected, you can select the left or right measurement pane under ***MEASURE SETUP*** to configure measurement parameters for the selected spectrogram.

Configuring test parameters

Setting frequency

You need to set the frequency range to be measured with either the center frequency/span or the start/stop frequencies. You can also set the frequency with the channel number and span.

Procedure

To set the center frequency and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Span** soft key, and then do one of the following:
   - To set the span manually, select **Span**, enter a value, and then select the unit.
   - To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

> **NOTE**
> The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER*** **> Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

To set the start and stop frequencies:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Start Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Stop Frequency** soft key.
7. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
8. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears. See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Toggle the **Link** soft key to select the sweep direction and select **Fwd** for forward or **Rev** for reverse.
5. To set the channel number, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key or **ENTER** hard key to complete the entry. The instrument automatically displays the corresponding center frequency value for the selected channel number.
6. To set the span, complete the following steps:
   a. Press the **Span** soft key.
   b. Select the span option, from the following choices:
      – To set the span manually, select **Span**, enter a value, and then select the unit.
      – To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

> **NOTE**
> The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER*** **> Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

Optional. **To define the amount of frequency increment for the rotary knob:**

1. Press the **Frequency Step** soft key, if the **Freq** is selected.
2. Enter a value by using the numeric keys.
3. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

Optional. **To define the amount of channel increment for the rotary knob:**

1. Press the **Channel Step** soft key, if the **Channel** is selected.
2. Enter a value by using the numeric keys.
3. Press the **Enter** soft key.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key. Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.
3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.
   - **b** Press the **Attenuation Value** soft key to set the level.
   - **c** Enter a value in fives by using the numeric keys.
   - **d** Press the **dB** soft key or the **ENTER** hard key.

   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

Scale per division

You can use the **Scale/Div** feature available for the spectrum measurement screen. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

To set the scale per division:

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

NOTE
You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting bandwidth

VBW based on the designated RBW. Selecting **Auto** changes the value to correspond to your frequency span setting for RBW and to the current RBW and VBW/RBW settings for VBW.

Procedure

To automatically set the RBW and VBW to your selected VBW/RBW ratio:

1. Press the **BW/AVG** hard key.
2. Press the **VBW/RBW** soft key to set the proportional VBW based on the designated RBW. Table 9 shows the ratio example for 30 kHz RBW.
3. Select the ratio: **1**, **0.3**, **0.1**, **0.03**, **0.01**, or **0.003**.
4. Toggle the **RBW** soft key and select **Auto**.
5. Toggle the **VBW** soft key and select **Auto**.
   The RBW or VBW value on the screen changes accordingly based on the span.

To manually set the RBW or VBW to your selected VBW/RBW ratio:

1. Press the **BW/AVG** hard key.
2. Press the **RBW** soft key.
3. Enter a value between 1 Hz to 3 MHz in 1-3 sequence by using the numeric keys.
4. Select the unit: **MHz**, **kHz**, or **Hz**.
   The RBW setting automatically changes to **Manual**.
5. Press the **VBW** soft key.
6. Enter a value by using the numeric keys.
7. Select the unit: **MHz**, **kHz**, or **Hz**.
   The VBW setting automatically changes to **Manual**.
   The RBW or VBW value on the screen changes accordingly.

Table 10 VBW/RBW ratio example

RBW	Ratio (VBW/RBW)	VBW
30 kHz	1:1	30 kHz
	1:0.3	10 kHz
	1:0.1	3 kHz
	1:0.03	1 kHz
	1:0.01	300 Hz
	1:0.003	100 Hz

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep

The ***SWEEP*** hot key is used to set and control the sweep time, sweep mode, gated sweep settings, and gated sweep on or off.

Sweep time

You can set the sweep time automatically or manually. Manual setting allows you to set the sweep time beyond an automatic setting.

Procedure

1. Press the ***SWEEP*** hot key.
2. Select the sweep time option, from the following choices:
   – To automatically set, toggle the **Sweep Time** soft key and select **Auto**.
   – To manually set, complete the following steps:
      a. Press the **Sweep Time** soft key.
      b. Enter a value by using the numeric keys.
      c. Select the unit: **Sec**, **mSec**, or **μSec**.
      The sweep time mode automatically changes to **Manual**.

Sweep mode

The default settings of the sweep mode are **Continue** and **Normal** to sweep continuously at a normal speed for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

> **NOTE**
> Selecting **Sweep Mode > Fast** may reduce the measurement accuracy, but you can use this fast sweep mode to identify the existence of interfering signals.

Gated sweep

You can configure the gated sweep settings with an internal or external trigger source. If you select **Gated Sweep Settings**, you can view the signal in time domain.

Procedure

1. Press the ***SWEEP*** hot key.
2. Press the **Gated Sweep Settings** soft key.
3. *Optional*. Adjust sweep time to allow enough time for a cycle by completing the following steps:
   - a Press the **Zero Span Time** soft key.
   - b Enter a value by using the numeric keys.
   - c Select the unit: **Sec**, **mSec**, or **μSec**.
4. Set the period, if using the internal trigger source, by doing one of the following:
   - To select the preset period, complete the following steps:
     - a Toggle the **Period** soft key and select **StdSignal**.
     - b Press the **StdSignal** soft key, and then select the period from the choices: **GSM (4.615 ms)**, **WCDMA (10 ms)**, **LTE (10 ms)**, **EV-DO (5 ms)**, **TD-SCDMA (5 ms)**, and **WiMAX (10 ms)**.
   - To manually set the period, complete the following steps:
     - a Toggle the **Period** soft key and select **Manual**.
     - b Press the **Period** soft key to enter the amount of time.
     - c Enter a value by using the numeric keys.
     - d Select the unit: **Sec**, **mSec**, or **μSec**.
5. Press the ***TRIGGER*** hot key, and then do one of the following:
   - Select **External** for an external trigger source.
   - Select **Video** or **Display Position** for the internal trigger source.
6. Press the **PREV** hard key to continue setting the gated sweep.
7. Set the gate delay by completing the following steps:
   - a Press the **Gate Delay** soft key.
   - b Enter a value by using the numeric keys.
   - c Select the unit: **Sec**, **mSec**, or **μSec**.
8. Set the gate length by completing the following steps:
   - a Press the **Gate Length** soft key.
   - b Enter a value by using the numeric keys.

c Select the unit: **Sec**, **mSec**, or **µSec**.

9 Press the **PREV** hard key to enable gated sweeping.

10 Toggle the **Gated Sweep** soft key and select **On**.

> **NOTE**
> This setting is not used in the Spectrum Replayer mode.

Conducting spectrum measurements

The spectrum measurement with an audible indicator is especially useful for locating interferer sources with a directional antenna.

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**.
The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.

3 Toggle the **Trace View** soft key and select **On**.

4 Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal’s maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal’s minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

> **NOTE**
> For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 To select the detection option, press the **More (1/2) > Detectors**, and then do one of the following:

To display	Select
Random noise better than the peak without missing signals	Normal
The highest value in each data point	Peak
The root mean squared average power across the spectrum	RMS
The lowest value in each data point	Negative Peak
The center value in each data point	Sample

6 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

7 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

> **NOTE**
> To be able to load a trace, the trace to be overlaid must be saved in the same measurement mode and frequency setting as the current measurement.

Sound indicator

You can use the Sound Indicator to help you identify interfering signals by sounding an alarm.

Procedure

1 Configure test parameters as described in the "Configuring test parameters" on page 86.
2 Press the ***MEASURE SETUP*** hot key.
3 Press the **Sound Indicator** soft key.
4 Toggle the **Sound** soft key between **On** and **Off** to enable and disable the alarm sound.
5 Select the alarm reference option from the following choices:
   – To set the active marker position as the alarm reference, toggle the **Alarm Reference** soft key and select **Marker**.
   – To set the limit as the alarm reference, complete the following steps:
      a Toggle the **Alarm Reference** soft key and select **Line**.
      The Limit Line menu becomes activated to be set.
      b Press the **Limit Line** soft key to define a threshold for the limit line.
      c Enter a value by using the numeric keys. You can also use the rotary knob.
      d Press the **dBm** soft key.
6 *Optional*. To adjust the volume for alarm sound, press the **Volume** soft key and then turn the rotary knob clockwise or counter clockwise.
7 *Optional*. You can save logging data automatically so that you can load the measurement data and replay in the Spectrum Replayer mode. See "Using save" on page 32 for more information.

AM/FM audio demodulation

You can use the AM/FM Audio Demodulation to identify if the interfering signal is n^{th} harmonics of AM/FM audio. The instrument sounds demodulated signals that you can hear through the speaker or headphones.

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 86.
2 Press the ***MEASURE SETUP*** hot key.
3 Toggle the **Audio Demod** soft key between **On** and **Off** to turn the AM/FM audio demodulation on and off.
4 Press the **Demod at** soft key, and then select the marker number for the frequency to be demodulated.

> **NOTE**
> You must set the marker(s) first by using the **MARKER** hard key as the AM/FM demodulator uses the marker position to demodulate. See “Using marker” on page 49 for more information.

5 Press the **Demod Mode** soft key, and then select the demodulation mode: **AM**, **FM** and **CW**.
6 Press the **Dwell Time** soft key, and then turn the rotary knob to set the demodulation interval between 1 and 20.
7 Press the **Volume** soft key, and then turn the rotary knob to set the speaker volume.
8 Toggle the **Auto Gain** soft key between **On** and **Off** to enable or disable the automatic gain feature to adjust the interval gain of the demodulator.
9 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Interference ID

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 86.
2 Press the ***MEASURE SETUP*** hot key.
3 Toggle the **Interference ID** soft key between **On** and **Off** to turn the Interference ID on and off.
4 To set the threshold level manually, complete the following steps:
   a Press the **Threshold** soft key.
   b Enter a value by using the numeric keys.
   c Press the **dBm** soft key.
5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 101 for more information.

Conducting interference measurements

Spectrogram

The Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

Setting measure setup

Procedure

1. Configure test parameters as described in the “Configuring test parameters” on page 86.
2. Press the ***MEASURE SETUP*** hot key.
3. To set the amount of time between each trace measurement:
   a. Press the **Time Interval** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Sec** soft key.
4. To set the time cursor on a specific trace position, complete the following steps:
   a. Toggle the **Time Cursor** soft key and select **On**.
   b. Turn the rotary knob to move the time cursor. You can also enter a value and then press the **Enter** soft key.

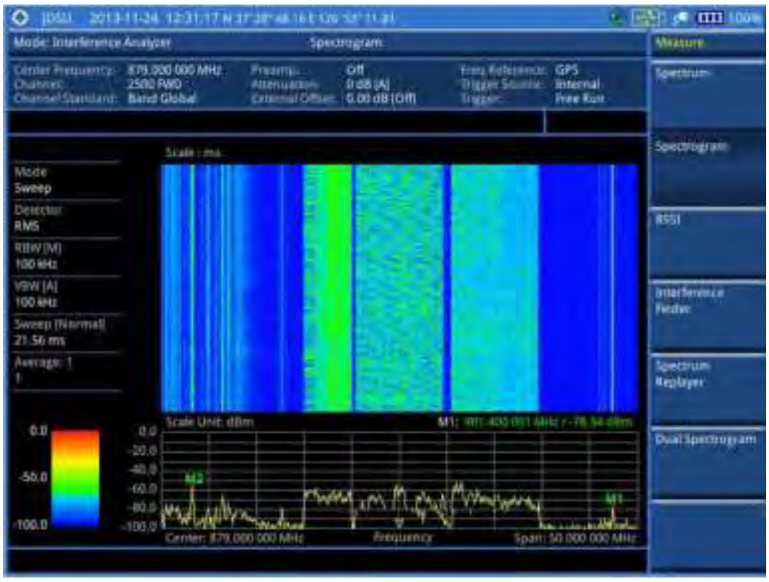
> **NOTE**
> Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

5. To start a new measurement, press the **Reset/Restart** soft key.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

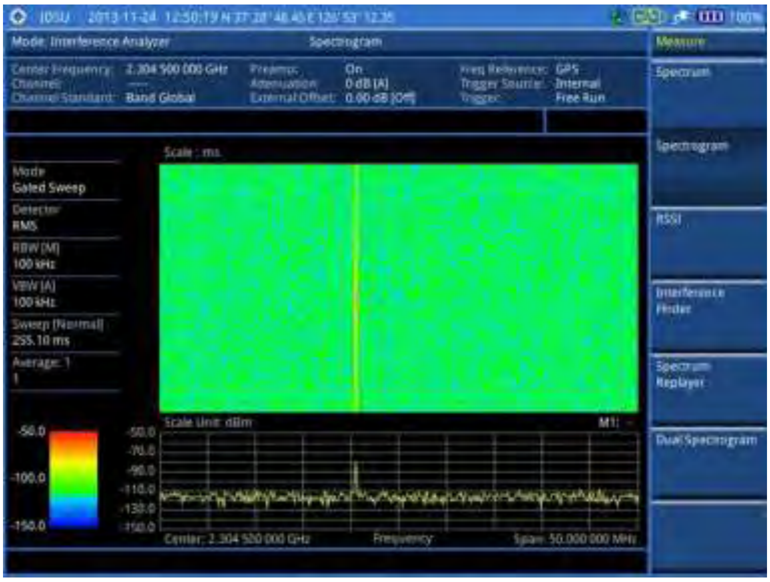
The spectrogram shows a vertical line on the chart when the marker is enabled on the screen.

Figure 24 Interference measurement in spectrogram



- The horizontal line or X-axis of the spectrogram is frequency.
- The vertical line or Y-axis is time.
- The color identification (Spectrogram) indicates power level of the tracked signal. As the signal strength increases, the color on the spectrogram changes accordingly.

Figure 25 Interference measurement in spectrogram with gated sweep on



NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 101 for more information.

Dual spectrogram

The Dual Spectrogram mode is useful to compare two spectrograms displayed simultaneously on the screen.

Setting measure setup

Procedure

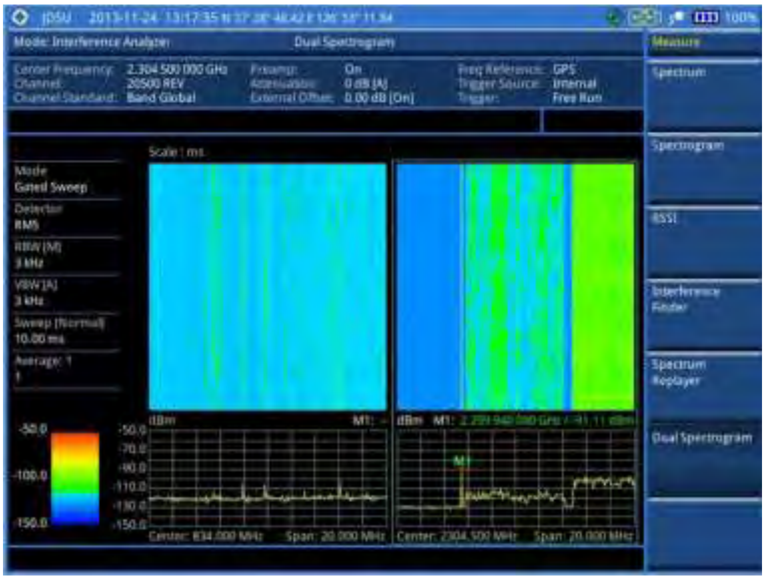
1. Configure test parameters as described in the “Configuring test parameters” on page 86.
2. Press the ***MEASURE SETUP*** hot key.
3. Toggle the **Active Window** soft key and select **Left** or **Right** spectrogram to be set up.
4. To set the amount of time between each trace measurement:
   - **a** Press the **Time Interval** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Sec** soft key.
5. To set the time cursor on a specific trace position, complete the following steps:
   - **a** Toggle the **Time Cursor** soft key and select **On**.
   - **b** Turn the rotary knob to move the time cursor. You can also enter a value and then press the **Enter** soft key.

NOTE
Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

6. To start a new measurement, press the **Reset/Restart** soft key.
7. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 26 Interference measurement in dual spectrogram view



RSSI

The Received Signal Strength Indicator (RSSI) is a multi-signal tracking metric that is particularly useful for measuring power-level variations over time. The RSSI measurement lets you assign power limit line for audible alarms and increase alarm counters every time a signal exceeds a defined limit line. For long-term analysis, the spectrogram and RSSI measurements can be automatically saved into an external USB memory. Post-analysis can be performed with JDViewer application software.

Setting measure setup

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 86.

2 Press the ***MEASURE SETUP*** hot key.

3 To set up the alarm parameters, complete the following steps:

  a Press the **Alarm** soft key.

  b Press the **Alarm at** soft key and select the marker number: M1 to M6.

  c Press the **Limit Line** soft key to set a threshold for the alarm.

  d Enter a value by using the numeric keys. You can also use the rotary knob.

  e Press the **dBm** soft key.

  f Toggle the **Alarm** soft key between **On** and **Off** to turn the alarm feature on or off.

  g *Optional*. Press the **Volume** soft key and adjust the volume.

4 To set up the AM/FM audio demodulation, complete the following steps:

  a Press the **AM/FM Audio Demod** soft key.

  b Toggle the **Audio Demod** soft key between **On** and **Off** to turn the AM/FM audio demodulation on or off.

  c Press the **Demod at** soft key, and then select the marker number for the frequency to be demodulated.

NOTE
For the alarm and AM/FM audio demodulation, you must set the marker(s) first by using the **MARKER** hard key as these features use the marker position to sound alarm or demodulate. See “Using marker” on page 49 for more information.

- **d** Press the **Demod Mode** soft key, and then select the demodulation mode: **AM**, **FM**, and **CW**.
- **e** Press the **Dwell Time** soft key, and then turn the rotary knob to set the demodulation interval between 1 and 20.
- **f** Toggle the **Auto Gain** soft key between **On** and **Off** to enable or disable the automatic gain feature to adjust the interval gain of the demodulator.
- **g** *Optional*. Press the **Volume** soft key and adjust the volume.

5 To start a new measurement, press the **Reset/Restart** soft key.

6 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 27 Interference measurement in RSSI

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 101 for more information.

Interference finder

The Interference Finder is an automatic triangulation algorithm that uses GPS coordinates to locate possible interference sources based on three measurements. The interference finder calculates possible interference locations using its inscribed circle or circumscribed circle based on measured intersection points. You can plot up to seven measurement points and select three that are more representative for triangulation. JD700B series automatically logs measurement positions not to lose them while changing measurement modes.

Setting measure setup

Procedure

1 Configure test parameters as described in the “Configuring test parameters” on page 86.

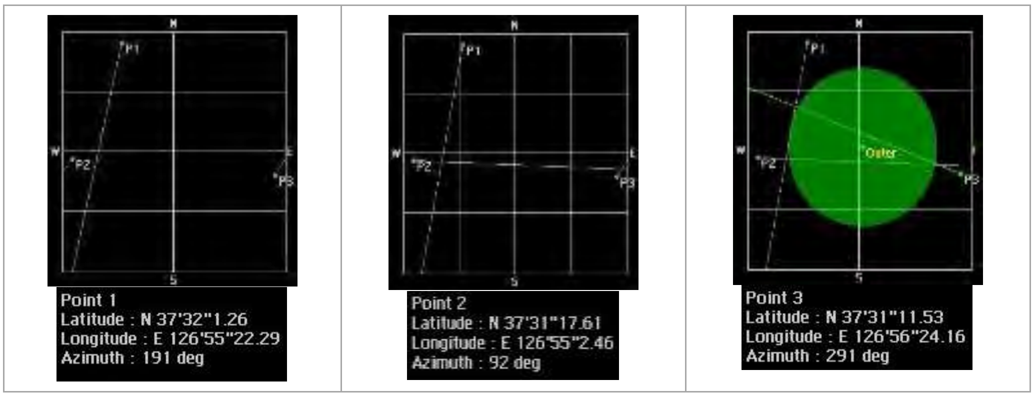
2 To load your map file, complete the following steps:

a Plug in your USB drive that has a map file in `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes a map to fit onto your instrument's display. You must save your map file (`.mcf`) into the "**SavedMap**" folder of your USB drive so that you can load them onto your instrument.

b Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**. See "Using load" on page 34 for more information.

3 Press the ***MEASURE SETUP*** hot key.
4 Press the **Location Setup** soft key.
5 Press the **Location** soft key.
6 Press the **Point 1** soft key, and then do one of the following option:
   – To automatically get the selected point's positioning information with GPS locked, press the **Get GPS Position**.
     The instrument displays the latitude and logitude information of the signal received by a Yagi antenna.
   – To manually determine positioning for the selected point, complete the following steps:
     a Press the **Latitude** soft key, and then set the properties: **North/South**, **Degree**, **Minute**, and **Second**.
     b Press the **Longitude** soft key, and then set the properties: **East/West**, **Degree**, **Minute**, and **Second**.



7 Press the **Azimuth** soft key to set an azimuth, and then do one of the following:
   – Without using a compass, turn the rotary knob to align the straight line on the loaded map with the direction of the connected Yagi antenna.
     The instrument calculates the azimuth and the angle appears on the screen.
   – Measure an azimuth by using a compass, enter the measured angle, and then press the **Enter** soft key.
8 *Optional*. To save a defined position, press the **Save Position** soft key and then select one of the soft keys to which you want to save the position information. You can use the **Load Position** soft key to load any saved positions.
9 Press the **Point 2** soft key, and then repeat steps **6-7**.
10 Press the **Point 3** soft key, and then repeat steps **6-7**.
11 Press the **Display Setup** soft key.
12 Press the **Display Mode** soft key, and then select the display mode: **Circum**, **Inscribed**, or **Double**.

> **NOTE**
> Change the display to different mode options and check possible location of the interfering signal.

Circumscribed	Inscribed	Double
		

13 Toggle the **Screen Mode** soft key and select the display option: **Map** or **Full**.

– **Map:** Displays points on the loaded map.

– **Full:** Displays points without the map.

Measurement example

Figure 28 Interference finder measurement in map view

Spectrum Replayer

The Spectrum Replayer lets you retrieve and replay recorded spectrum analyzer traces in interference analysis mode. These traces can be played back in the spectrogram or RSSI. You can configure the limit line to create failure points when signals exceed it. The failure points are clearly displayed on the trace timeline for quick access during playback.

Setting measure setup

Procedure

1 Press the ***MEASURE*** hot key.

2 Press the **Spectrum Replayer** soft key.
The file manager window appears.

3 Select a file to be loaded, and then press the **Load** soft key.
The Measure Setup screen menus appear.

4 Toggle the **Replay Direction** soft key between **FWD** and **REV** to change play direction to forward or reverse.

5 Press the **Replay Speed** soft key, and then select the speed option: **x1**, **x2**, **x3**, and **x4**.

6 Press the **Play** soft key to start playing.

7 Press the **Pause** soft key to pause or stop playing data.

8 To move to a particular failure position directly and play from there, complete the following steps:

   a Press the **Jump to Fail Index** soft key.

   b Enter a value by using the numeric keys.

   c Press the **Enter** soft key.

9 *Optional*. Toggle the **Time Cursor** soft key between **On** and **Off** to display or dismiss the time cursor on the screen. This key becomes activated when you play logged data in the Spectrogram mode.

> **NOTE**
> If you connected a USB drive, do not remove it while playing. Doing so may freeze the USB port, which will require you to restart the instrument to get a USB drive recognized again.

Setting display

You can select the display option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Select the display option: **Spectrum**, **Spectrogram**, or **RSSI**.

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 101 for more information.

Setting limit for interference analyzer

Procedure

To use the display line:

1 Press the ***LIMIT*** hot key.

2 Press the **Display Line** soft key for a reference line.

3 Enter a value, and then press the **dBm** unit soft key.

4 Toggle the **Display Line** soft key between **On** and **Off** to display and dismiss the reference line. The straight line appears across the screen to be used as a visual reference only.

To display the multiple segment line:

1 Press the ***LIMIT*** hot key.

2 Press the **Multi Segment Line** soft key for Pass/Fail indication.

3 Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.

4 Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.

- **a** Press the **# of Line** soft key.
- **b** Enter a value between 1 and 50 by using the numeric keys.
- **c** Press the **Enter** soft key.

5 Press the **Autoset** soft key to let the instrument set the limit for each segment and display the line.

6 *Optional*. To move the limit line, complete the following steps:

- **a** Select **Limit Up/Down** or **Limit Left/Right**.
- **b** Turn the rotary knob to move the line as desired. You can also manually enter a value.

7 *Optional*. To edit the segment properties, complete the following steps:

- **a** Press the **Edit Limit** soft key.
- **b** Press the **Move** soft key and then turn the rotary knob to select the segment to edit.
- **c** Select the menu option, from the following choices:
  - – To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.
  - – To add a new point, press the **Add Point** soft key.
  - – To delete the selected point, press the **Delete Point** soft key.
  - – To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.

To define the channel limit:

1 Press the ***LIMIT*** hot key.

2 Press the **Channel Limit** soft key.

3 To define the index table, complete the following steps:

- **a** Toggle the **Table** soft key between **On** and **Off** to display and hide the channel index table on the screen.
- **b** Press the **Index** soft key.
- **c** Enter an index number to be set between 1 and 10 by using the numeric keys.
- **d** Press the **Enter** soft key.
- **e** Press the **Start Frequency** or **Center Frequency** soft key depending on your prior frequency setting.
- **f** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
- **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **h** Press the **Stop Frequency** or **Span Width** soft key depending on your prior frequency setting.
- **i** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
- **j** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

4 To set the limits for Pass/Fail indication, complete the following steps:

- **a** Toggle the **Limit** soft key between **On** and **Off** to enable and disable the limit.
- **b** Press the **High Limit** soft key.
- **c** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
- **d** Press the **dBm** soft key.
- **e** Press the **Low Limit** soft key.
- **f** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
- **g** Press the **dBm** soft key.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
See “Using save” on page 32 for more information.

6

Chapter 6 Using GSM/GPRS/EDGE Signal Analyzer

This chapter provides instructions for using the GSM/GPRS/EDGE Signal Analyzer function (option 022) with GSM//GPRS/EDGE OTA Analyzer function (option 042). Topics discussed in this chapter are as follows:

Introduction

The Global System for Mobile Communications (GSM) is a digital cellular standard that uses Time Division Multiple Access (TDMA) multiplexing scheme and Gaussian Minimum Shift Keying (GMSK) modulation. The Enhanced Data Rates for GSM Evolution (EDGE) is an enhancement to GSM that promises to deliver multimedia and other broadband applications. It uses TDMA and $3\pi/8$ 8PSK (phase shift keying) modulation.

This instrument performs measurements using the methods and limits as defined in the 3GPP TS 51.021 Base Station System (BSS) equipment specification: Radio Aspects V8.9.0 (2003-06). The Pass/Fail indictor helps you to determine base station performance easily.

This instrument provides the following measurement tools for GSM/GPRS/EDGE system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask (SEM)
  - Spurious Emissions
- Power vs. Time
  - Power vs. Time (Slot)
  - Power vs. Time (Frame)
- Modulation Analysis
  - Constellation
- Auto Measure
- Over The Air (OTA)
  - Channel Scanner
  - Frequency Scanner
  - Multipath Profile
  - Modulation Analyzer

Display overview

Figure 29 provides descriptions for each segment of the measurement screen.

Figure 29 GSM signal analyzer measurement screen

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the power amplifier output port of BTS.

Figure 30 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 31 Indirect connection

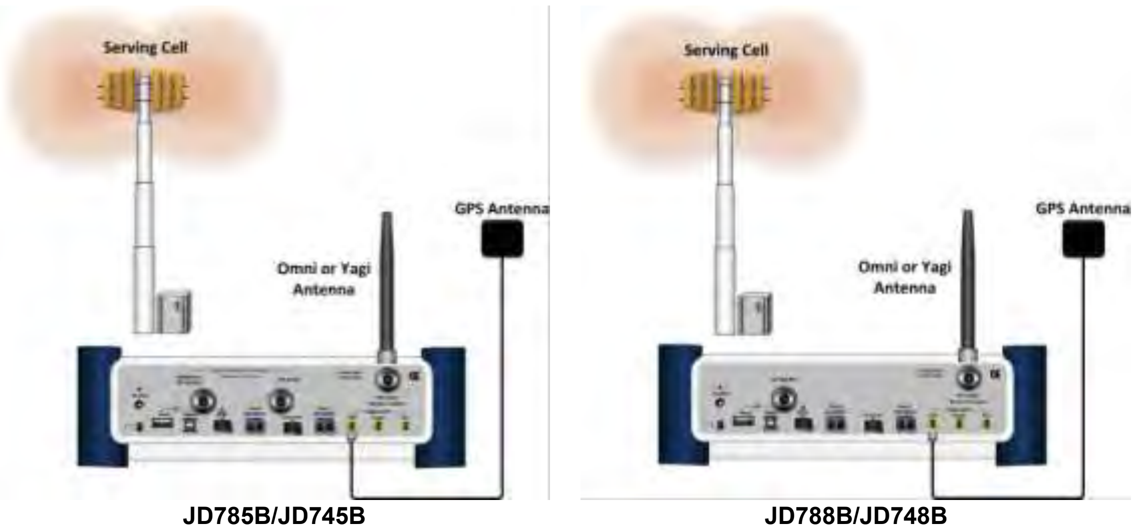
> **CAUTION**
> The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 32 OTA connection



> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **GSM** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   – **Spectrum**
   – **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, or **Spurious Emissions**
   – **Power vs Time > Power vs Time (Slot)** or **Power vs Time (Frame)**
   – **Constellation**
   – **Auto Measure**
   – **OTA > Channel Scanner**, **Frequency Scanner**, **Multipath Profile**, or **Modulation Analyzer**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Press the **Channel Number** soft key.

5 Enter a value by using the numeric keys. You can also use the rotary knob.
6 Press the **Enter** soft key.
7 The instrument automatically displays the corresponding center frequency value for the selected channel number.
8 *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   a Press the **Channel Step** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Press the **Enter** soft key.

NOTE
This frequency setting is not used in the Spurious Emissions mode.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1 Press the **AMP/SCALE** hard key.
2 Press the **Auto Scale** soft key.
Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1 Press the **AMP/SCALE** hard key.
2 To set the maximum reference value on the Y-axis manually, complete the following steps:
   a Press the **Reference Level** soft key.
   b Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   c Press the **dBm** soft key or the **ENTER** hard key.
   This unit key name changes according to the setting in the **Units** menu.
3 To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

NOTE
It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
      a Select **Attenuation > Manual**.
      b Press the **Attenuation Value** soft key to set the level.
      c Enter a value in fives by using the numeric keys.
      d Press the **dB** soft key or the **ENTER** hard key.
   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases accordingly.

Optional. **To change the scale unit:**

1 Select **More (1/2) > Units**.

2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

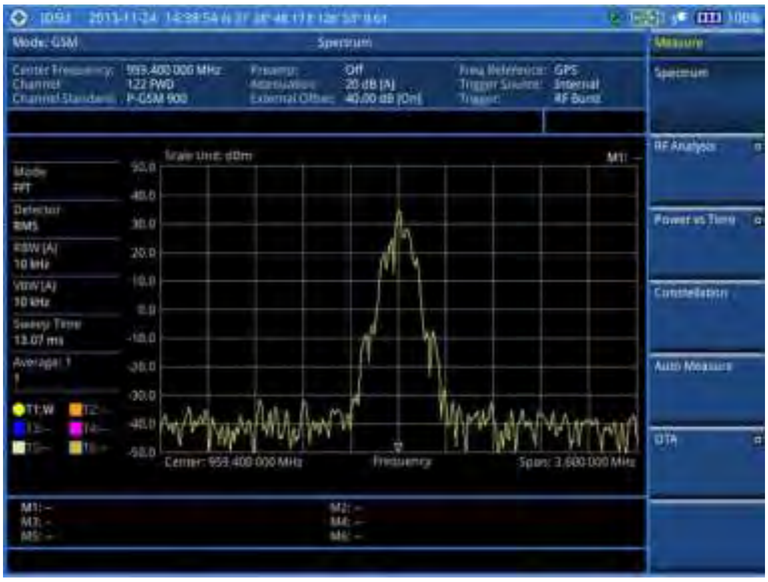
1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the following choices:

To set the trigger level	Select
When using the RF burst (wideband) trigger	RF Burst
To free burst if there is a frequency burst signal	Internal FB
To training sequence code	RF Burst & TS
To external trigger reference	External
To the free trigger	Free

Conducting spectrum measurements

If you have configured test parameters as described in the “Configuring test parameters” on page 107, your measurement result is displayed on the screen as like the following example, Figure 33.

Figure 33 Spectrum measurement screen with GSM signal analyzer



Setting measure setup

Procedure

Optional. **To set the delay, complete the following steps:**

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Miscellaneous** soft key.
3. Press the **Delay** soft key to set the amount of delay in µs.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**.
   The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5. *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.
6. *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
   The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measures in-channel power for GSM/GPRS and EDGE systems, which use dynamic power control to ensure that each link is maintained with minimum power. It gives two fundamental benefits of keeping overall system interference to a minimum level and of maximizing battery life in the case of mobile stations. It determines the power delivered to the antenna system on the RF channel under test. The instrument acquires a GSM/GPRS or EDGE signal in the time domain. The average power level above the threshold is then computed and displayed.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 107, you can continue your measurement.

Procedure

Optional. **To set the delay, complete the following steps:**

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Miscellaneous** soft key.
3. Press the **Delay** soft key to set the amount of delay in µs.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Press the **µs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 34 Channel power measurement with GSM signal analyzer

Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 117 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement.

Procedure

Optional. **To set the delay, complete the following steps:**

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Miscellaneous** soft key.
3. Press the **Delay** soft key to set the amount of delay in µs.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Press the **µs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Figure 35 Occupied bandwidth measurement with GSM signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 117 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of-band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The JD700B series indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement.

Procedure

Optional. **To set the delay, complete the following steps:**

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Miscellaneous** soft key.
3. Press the **Delay** soft key to set the amount of delay in µs.

4 Enter a value by using the numeric keys. You can also use the rotary knob.
5 Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 36 SEM measurement with GSM signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 117 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.

- **b** Press the **Enter** soft key.
- **c** Press the **Start Frequency** soft key to set up the frequency range.
- **d** Enter a value by using the numeric keys. You can also use the rotary knob.
- **e** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **f** Press the **Stop Frequency** soft key to set up the frequency range.
- **g** Enter a value by using the numeric keys. You can also use the rotary knob.
- **h** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

3 Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.

4 To set up the test limits for Pass/Fail indication, complete the following steps:

- **a** Press the **Start Limit** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:

- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Press the **PREV** hard key.

7 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

Measurement example

Figure 37 Spurious emissions measurement with GSM signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 117 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit, Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACLR	ACLR	(On/Off only)
Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the Beep soft key between On and Off to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting power vs. time measurements

The Power vs. Time measurement measures the mean transmission power during the useful part of GSM bursts and verifies that the power ramp fits within the defined mask. It also lets you view the rise, fall, and useful part of the GSM burst.

This measurement provides masks for both of Base Transceiver Station (BTS) and Mobile Station (MS). The timing masks are referenced to the transition from the bit 13 to the bit 14 of the mid-amble training sequence. For GMSK measurements, the 0 dB reference is determined by measuring the mean transmitted power during the useful part of the burst.

Power vs. time (slot)

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Detect Mode** soft key, and then select the signal standard option: **Auto**, **GSM**, or **EDGE**. Auto is set by default. The instrument applies a mask automatically based on the selected mode.
3. *Optional*. To set the delay, complete the following steps:
   a. Press the **Miscellaneous** soft key.
   b. Press the **Delay** soft key to set the amount of delay in μs.
   c. Enter a value by using the numeric keys. You can also use the rotary knob.
   d. Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit for burst power

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **PvsT Test Limits** soft key.
3. Press the **Burst Power** soft key to set the limit in the Power vs. Time (Slot) measurement.
4. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
5. Set the upper threshold:
   a. Press the **High Limit** soft key.
   b. Enter a value for the upper limit, and then press the **dBm** unit soft key.
6. Set the lower threshold:
   a. Press the **Low Limit** soft key.
   b. Enter a value for the lower limit, and then press the **dBm** unit soft key.
7. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
8. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 38 Power vs. time (slot) measurement with GSM signal analyzer

Figure 39 Power vs. time (slot) measurement with GSM signal analyzer

Power vs. time (frame)

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Detect Mode** soft key, and then select the signal standard option: **Auto**, **GSM**, or **EDGE**. Auto is set by default. The instrument applies a mask automatically based on the selected mode.
3. *Optional*. To set the delay, complete the following steps:

- **a** Press the **Miscellaneous** soft key.
- **b** Press the **Delay** soft key to set the amount of delay in µs.
- **c** Enter a value by using the numeric keys. You can also use the rotary knob.
- **d** Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit for frame average power

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **PvsT Test Limits** soft key.
3. Press the **Frame Avg Power** soft key to set the limit in the Power vs. Time (Frame) measurement.
4. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
5. Set the upper threshold:
   - **a** Press the **High Limit** soft key.
   - **b** Enter a value for the upper limit.
   - **c** Press the **dBm** unit soft key.
6. Set the lower threshold:
   - **a** Press the **Low Limit** soft key.
   - **b** Enter a value for the lower limit.
   - **c** Press the **dBm** unit soft key.
7. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
8. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Measurement example

Figure 40 Power vs. time (frame) measurement with GSM signal analyzer

Conducting constellation measurements

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Detect Mode** soft key, and then select the signal standard option: **Auto**, **GSM**, or **EDGE**. Auto is set by default. The instrument applies a mask automatically based on the selected mode.
3. Toggle the **PSK Constellation** soft key between **On** and **Off** to enable or disable the PSK constellation observation.

NOTE
The PSK constellation must be turned on to analyze EDGE signals.

4. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Miscellaneous** soft key.
   - **b** Press the **Delay** soft key to set the amount of delay in μs.
   - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **d** Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit for constellation

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Modulation Test Limits** soft key to set the limits in the Constellation measurement.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit, Low Limit
Phase error rms	Phase Error RMS	High Limit, Low Limit
Phase error peak	Phase Error Peak	High Limit, Low Limit
Error vector magnitude rms	EVM RMS	High Limit
Error vector magnitude peak	EVM Peak	High Limit
I/Q origin offset of the I and Q error (magnitude squared) offset from the origin	IQ Origin Offset	High Limit
Carrier to interference (C/I) ratio	C/I	Low Limit

4. *Optional.* You can enable alarm sound that goes off if the measurement falls outside of the limit.

Toggle the Beep soft key between On and Off to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 41 Constellation measurement (PSK off) with GSM signal analyzer

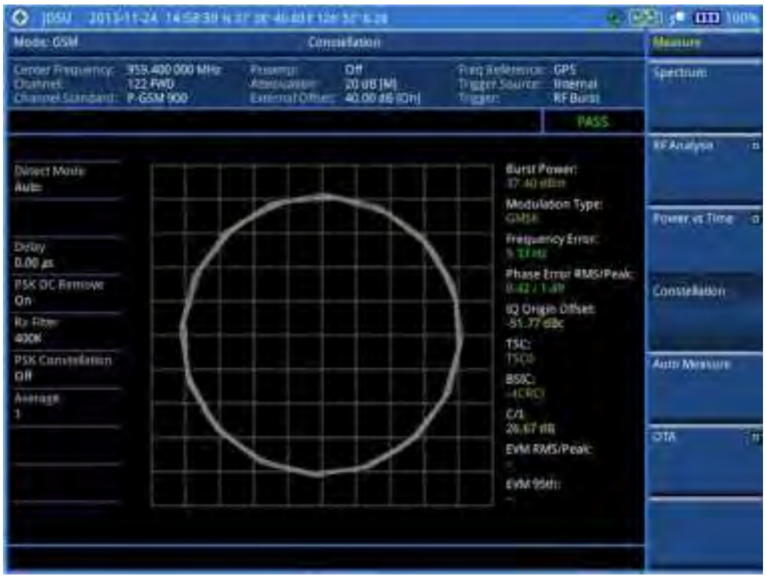
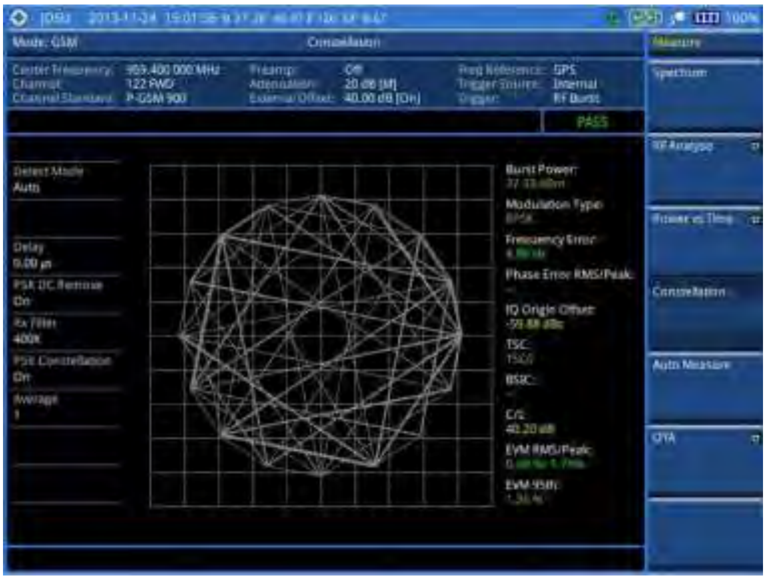


Figure 42 Constellation measurement (PSK on) with GSM signal analyzer



NOTE
Measurement items such as IQ Origin Offset, C/I, EVM RMS/Peak and EVM 95th are applicable only to EDGE signal measurements.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit for auto measure

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **PvsT Test Limits** soft key, and then enable test limits as desired.
4. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument’s limit settings in Auto Measure.
   – **Scenario:** Runs a test with a programmed scenario in JDViewer. The Scenario menu becomes activated.
3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   – **Now:** Lets the instrument run a test only once.
   – **Schedule:** Lets the instrument repeat tests as defined in the Set Timing. The Set Timing menu becomes activated.
5. To define a schedule for an auto measurement, complete the following steps:
   a. Press the **Set Timing** soft key.
   b. Press the **Start Time (HH:MM)** soft key.
   c. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d. Press the **Stop Time (HH:MM)** soft key.
   e. Enter the time in the HH:MM format, and then press the **Enter** soft key.

   f. Press the **Time Interval** soft key.
   g. Enter the amount of time in minutes, and then press the **Enter** soft key.
6. To set external offset, complete the following steps:
   a. Toggle the **External Offset** soft key and select **On**.
   b. Enter a value by using the numeric keys, and then press the **dB** soft key.
7. To save your settings and results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See “Using save” on page 32 for more information.
8. Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
9. To stop running the test, press the **Abort** soft key.
10. To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
    – **Screen**: You can view each measurement screen as the test progresses.
    – **Results**: You can view a measurement result table as the test progresses.
    – **Settings**: You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1. Toggle the **Display** soft key and select the display option:
   – **Result:**: You can view the result table. The Display Result menu becomes activated.
   – **Settings:** You can view the measurement settings for the auto measurement.
2. Toggle the **Display Result** soft key and select the display result option:
   – **Full:** You can view detailed measurement readings with the pass/fail indication.
   – **Quick:** You can view only the Pass/Fail results.
3. To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Conducting GSM OTA measurements

This Over-The-Air (OTA) measurement has channel scanner, frequency scanner, multipath profile, and modulation analyzer screens. The GSM OTA has a function to display channel power and related information up to 128 GSM down link signals. This channel scanner can quickly identifies improper power levels that affect network performance. The transmitter performance can be made on a base station from the convenience of your vehicle without taking the base station out of service. It helps you to determine testing area's RF environmental condition with the multipath profile.

Channel scanner

Setting channel

Procedure

1. Press the **FREQ/DIST** hard key.
2. To select the standard channel, complete the following steps:

- **a** Press the **Channel Std** soft key. The standard channel window appears. See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
- **b** Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
- **c** Press the **Select** soft key or the rotary knob to confirm the selection.

3 To set the starting channel to be scanned, complete the following steps:

- **a** Press the **Channel Number** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **Enter** soft key.

4 To set the amount of channel increment in scanning channels, complete the following steps:

- **a** Press the **Channel Step** soft key.
- **b** Enter a value by suing the numeric keys. You can also use the rotary knob.
- **c** Press the **Enter** soft key.

5 To set the number of channels to be displayed, complete the following steps:

- **a** Press the **# of Channels** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **Enter** soft key.

Setting zoom position

You can set the starting channel for the Zoom In Window.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Zoom Position** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Setting limit for OTA channel scanner

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Limit Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Limit Line** soft key between **On** and **Off** to display or dismiss the limit line.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 43 Channel scanner measurement with GSM OTA signal analyzer

Frequency scanner

Setting frequency

Procedure

1. Press the **FREQ/DIST** hard key.
2. To set the starting frequency to be scanned, complete the following steps:
   - a. Press the **Start Frequency** soft key.
   - b. Enter a value by using the numeric keys. You can also use the rotary knob.
   - c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. To set the amount of frequency increment in scanning frequencies, complete the following steps:
   - a. Press the **Frequency Step** soft key.
   - b. Enter a value by suing the numeric keys. You can also use the rotary knob.
   - c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
4. To set the number of frequencies to be displayed, complete the following steps:
   - a. Press the **# of Frequencies** soft key.
   - b. Enter a value by using the numeric keys. You can also use the rotary knob.
   - c. Press the **Enter** soft key.

Setting zoom position

You can set the starting channel for the Zoom Window.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Zoom Position** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Setting limit for OTA frequency scanner

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Limit Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Limit Line** soft key between **On** and **Off** to display or dismiss the limit line.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 44 Frequency scanner measurement with GSM OTA signal analyzer

Multipath profile

The Multipath Profile let you determine RF environmental conditions of testing area. The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Detect Mode** soft key, and then select the signal standard option: **Auto**, **GSM**, or **EDGE**. Auto is set by default. The instrument applies a mask automatically based on the selected mode.
3. *Optional*. To set the delay, complete the following steps:

- **a** Press the **Miscellaneous** soft key.
- **b** Press the **Delay** soft key to set the amount of delay in µs.
- **c** Enter a value by using the numeric keys. You can also use the rotary knob.
- **d** Press the **µs** soft key.

4 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 45 Multipath profile measurement with GSM OTA signal analyzer

Modulation analyzer

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 107, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Detect Mode** soft key, and then select the signal standard option: **Auto**, **GSM**, or **EDGE**. Auto is set by default. The instrument applies a mask automatically based on the selected mode.

3 *Optional*. To set the delay, complete the following steps:

- **a** Press the **Miscellaneous** soft key.
- **b** Press the **Delay** soft key to set the amount of delay in µs.
- **c** Enter a value by using the numeric keys. You can also use the rotary knob.
- **d** Press the **µs** soft key.

4 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit for modulation analyzer

Procedure

1. Press the ***LIMIT*** hot key.
2. Select the test item(s) and set the limit(s):

To set the limit for	Select	Set
Frame average power	Frame Average Power	High Limit, Low Limit
Frequency error	Frequency Error	High Limit, Low Limit
Burst power	Burst Power	High Limit, Low Limit
ACLR	ACLR	(On/Off only)
Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

3. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
4. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 46 Modulation analyzer measurement with GSM OTA signal analyzer

Chapter 7 Using WCDMA/HSPA+ Signal Analyzer

This chapter provides instructions for using the WCDMA/HSPA+ Signal Analyzer function (option 023) with the WCDMA/HSPA+ OTA Analyzer function (option 043). Topics discussed in this chapter are as follows:

Introduction

This WCDMA/HSPA+ Signal Analyzer can be used to test a WCDMA transmitter including HSDPA/HSPA+ signals to check the base station's compliance with following standards documentation.

- 3GPP TS 25.104 Base Station radio transmission and reception
- 3GPP TS 25.141 Base Station (BS) conformance test
- 3GPP TS 25.211 Physical channel and mapping of transport channels onto physical channels
- 3GPP TS 25.212 Multiplexing and channel coding
- 3GPP TS 25.213 Spreading and modulation

The instrument automatically makes standard defined measurements using the measurement methods and limits as defined in the standards. Detailed measurement results allow you to analyze WCDMA and HSPA+ system performance. You may alter the measurement parameters for specialized analysis. Pass/Fail testing with standard defined or user defined upper and lower limits and the Pass/Fail indictor help you to determine base station performance easily.

This instrument provides the following measurement tools for WCDMA/HSPA+ system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask (SEM)
  - Adjacent Channel Leakage power Ratio (ACLR)
  - Multi-ACLR
  - Spurious Emissions
- Modulation Analysis
  - Constellation
  - Code Domain Power
  - Relative Code Domain Error
  - Codogram
  - Received Code Strength Indicator (RCSI)
  - CDP Table
- Auto Measure
- Power Statistics CCDF
- Over The Air (OTA)
  - Channel Scanner
  - Scramble Scanner
  - Multipath Profile
  - Code Domain Power
  - Route Map

Display overview

Figure 47 provides descriptions for each segment of the measurement screen.

Figure 47 WCDMA/HSPA+ signal analyzer measurement screen

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the power amplifier output port of BTS.

Figure 48 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 49 Indirect connection

JD785B/JD745B **JD788B/JD748B**

> **CAUTION**
> The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 50 OTA connection

JD785B/JD745B **JD788B/JD748B**

> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **WCDMA** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   - **Spectrum**
   - **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACLR**, **Multi-ACLR**, or **Spurious Emissions**
   - **Modulation > Constellation**, **Code Domain Power**, **Relative Code Domain Error**, **Codogram**, **RCSI**, or **CDP Table**
   - **Auto Measure**
   - **Power Statistics CCDF**
   - **OTA > Channel Scanner**, **Scramble Scanner**, **Multipath Profile**, **Code Domain Power**, or **Route Map**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.

4. Press the **Channel Number** soft key.
5. Enter a value by using the numeric keys. You can also use the rotary knob.
6. Press the **Enter** soft key.
7. The instrument automatically displays the corresponding center frequency value for the selected channel number.
8. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   - **a** Press the **Channel Step** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Enter** soft key.

> **NOTE**
> This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.

> **NOTE**
> In the measurements such as **Code Domain Power**, **Codogram**, and **RCSI**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.
   - **b** Press the **Attenuation Value** soft key to set the level.
   - **c** Enter a value in fives by using the numeric keys.
   - **d** Press the **dB** soft key or the **ENTER** hard key.

   – To couple the input attenuator's level with your reference level setting, select **Attenuation >**

Couple.
As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes.

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.

4 Press the **dB** soft key to complete the entry.

To turn the external offset off:

1 Press the **AMP/SCALE** hard key.

2 Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1 Press the **BW/AVG** hard key.

2 Press the **Average** soft key.

3 Enter a value between 1 and 100 as needed by using the numeric keys.

4 Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1 Press the ***SWEEP*** hot key.

2 Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.

3 *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1 Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

1 Press the ***TRIGGER*** hot key.

2 Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Table 11 Standards of external clock operation

Clock	Type	Reference	Port	Switching Standard
External Reference	Internal	Internal 10 MHz		Default
	External	External Ref Clock	Ext Ref (SMA)	Manual switching (Input signal level >-3 dBm)
	GPS	GPS Clock	GPS (SMA)	Automatic switching (GPS signal received)
Trigger	Internal	Internal Trigger		Default
	External	External Trigger	Trigger (SMA)	Manual switching
	GPS	GPS	GPS (SMA)	Manual switching

Figure 51 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option from the choices: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, and **GPS**.

> **NOTE**
> When a GPS antenna is connected and locked, GPS coordinates (longitude and latitude) are displayed on the screen and frequency reference is automatically set to GPS in the **System > Freq Reference**.

Table 12 External reference indicators

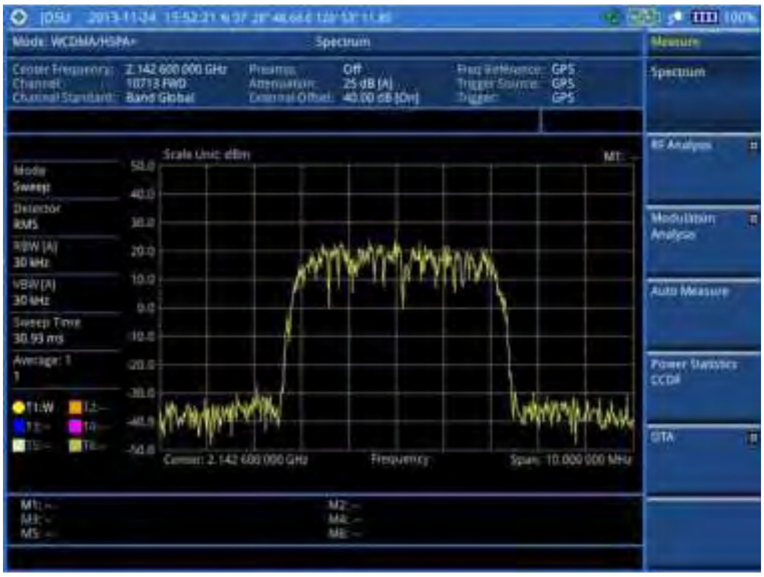
Type	Indicator	Description
Internal	(green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.
External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.

GPS	 (yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	 (grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

If you have configured test parameters as described in the “Configuring test parameters” on page 134, your measurement result is displayed on the screen as like the following example, Figure 52.

Figure 52 Spectrum measurement screen with WCDMA signal analyzer



Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal’s maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal’s minimum response only (unlimited or for a certain amount of time)	Min Hold	m

Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 To select the detection option, press the **More (1/2) > Detectors**, and then do one of the following:

To display	Select
Random noise better than the peak without missing signals	Normal
The highest value in each data point	Peak
The root mean squared average power across the spectrum	RMS
The lowest value in each data point	Negative Peak
The center value in each data point	Sample

6 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

7 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. This procedure measures the total power within the defined channel for WCDMA. This measurement is applied to design, characterize, evaluate, and verify transmitters and their components or devices for base stations and mobile stations.

The channel power measurement identifies the channel power within a specified bandwidth (default is 5 MHz, as per the 3GPP WCDMA technical specifications) and the power spectral density (PSD) in dBm/Hz.

After configuring test parameters as described in the “Configuring test parameters” on page 134, your measurement result is displayed on the screen as like the following example, Figure 53.

Figure 53 Channel power measurement with WCDMA/HSPA+ signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 147 for more information.

Occupied bandwidth

The 3GPP specifications require the occupied bandwidth (OBW) of a transmitted WCDMA signal to be less than 5 MHz, where occupied bandwidth is defined as the bandwidth containing 99% of the total channel power. In this measurement, the total power of the displayed span is measured. Then the power is measured inward from the right and left extremes until 0.5% of the power is accounted for each of the upper and lower part of the span and the calculated difference is the occupied bandwidth.

The spectrum shape of a WCDMA signal can give a useful qualitative insight into the transmitter’s operation. Any distortion to the spectrum shape might be an indication of degradation of the transmitter's performance.

After configuring test parameters as described in the “Configuring test parameters” on page 134, your measurement result is displayed on the screen as like the following example, Figure 54.

Figure 54 Occupied bandwidth measurement with WCDMA/HSPA+ signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 147 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can set the mask type according to the output power of the base station be tested. Your measurement result is displayed on the screen as like the following example, Figure 55.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Mask Type** soft key.
3. Select the mask type option: **– 31 dBm**, **31 – 39 dBm**, **39 – 43 dBm**, or **49 dBm –**.

Figure 55 SEM measurement with WCDMA/HSPA+ signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 147 for more information.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP WCDMA specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

After configuring test parameters as described in the “Configuring test parameters” on page 134, your measurement result is displayed on the screen as like the following example, Figure 56.

Figure 56 ACLR measurement with WCDMA/HSPA+ signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 147 for more information.

Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting frequency for Multi-ACLR

You can set the frequency with either frequency or channel number.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the frequency, do one of the following:

- To set the center frequency, complete the following steps:
  - **a** Toggle the **Unit** soft key and select **Freq**.
  - **b** Press the **Lowest Frequency** soft key to set the starting center frequency.
  - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **d** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
  - **e** Press the **Highest Frequency** soft key to set the stopping center frequency.
  - **f** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- To set the channel number, complete the following steps:
  - **a** Toggle the **Unit** soft key and select **Channel**.
  - **b** To select the standard channel, press the **Channel Std** soft key and then select the band to be measured.
  - **c** Press the **Lowest Channel** soft key to set the starting channel.
  - **d** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **e** Press the **Enter** soft key.
  - **f** Press the **Highest Channel** soft key to set the stopping channel.
  - **g** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **h** Press the **Enter** soft key.

After configuring test parameters, your measurement result is displayed on the screen as like the following example, **Figure 57**.

Figure 57 Multi-ACLR measurement with WCDMA/HSPA+ signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 147 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.
4. To set up the test limits for Pass/Fail indication, complete the following steps:
   a. Press the **Start Limit** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:

- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Press the **PREV** hard key.

7 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

After configuring test parameters as described in the “Configuring test parameters” on page 134, your measurement result is displayed on the screen as like the following example, Figure 58.

Figure 58 Spurious emissions measurement with WCDMA/HSPA+ signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 147 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit, Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACLR	ACLR	(On/Off only)
Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Conducting modulation measurements

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

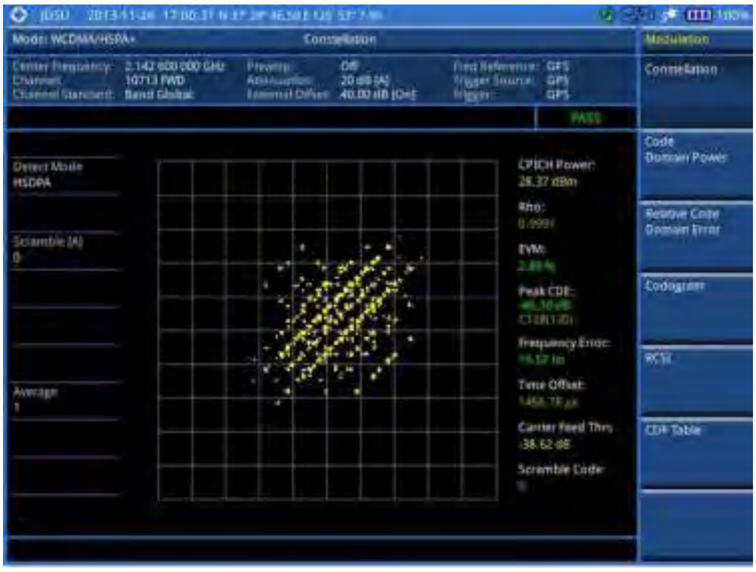
After configuring test parameters as described in the "Configuring test parameters" on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the scramble code, complete the following steps:
   - **a** Toggle the **Scramble** soft key between **Auto** and **Manual**.
   - **b** Enter a value by using the numeric keys to set manually.
   - **c** Press the **Enter** soft key.
3. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.
4. To set the threshold, complete the following steps:
   - **a** Press the **Threshold** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **Enter** soft key.

Measurement example

Figure 59 Constellation measurement with WCDMA/HSPA+ signal analyzer



> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for modulation tests" on page 158 for more information.

Code domain power

The Code Domain Power (CDP) measures the distribution of power across the set of code channels, normalized to the total power. It helps to verify that each code channel is operating at its proper level and to identify problems throughout the transmitter design from coding to the RF section. System imperfections such as amplifier non-linearity will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. *Optional*. To set the scramble code, complete the following steps:
   a. Toggle the **Scramble** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. *Optional*. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.
4. To set the S-CCPCH information of the system to be tested, complete the following steps:
   a. Press the **S-CCPCH** soft key.
   b. Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**,

128, or **256**.

- **d** Press the **Spread Code** soft key to set the spread code.
- **e** Enter a value by using the numeric keys.
- **f** Press the **Enter** soft key.

5 To set the PICH information of the system to be tested, complete the following steps:

- **a** Press the **PICH** soft key.
- **b** Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
- **c** Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
- **d** Press the **Spread Code** soft key to set the spread code.
- **e** Enter a value by using the numeric keys.
- **f** Press the **Enter** soft key.

6 *Optional*. To set the threshold, complete the following steps:

- **a** Press the **Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

Measurement example

Figure 60 Code domain power measurement with WCDMA/HSPA+ signal analyzer

1) Full screen

2) Full screen with constellation

3) Zoomed screen (Width 64)

4) Zoomed screen with constellation (Width 64)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 158 for more information.

Setting display

You can view your measurement results in a different view option.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **View** soft key and select the display option:
   – **Zoom:** You can view the result in detail with zoom-in window.
   The Position and Width menus become activated.
   – **Full:** You can view the full measurement result.
3. To define the zoom start position and width, complete the following steps:
   a Press the **Position** soft key.
   b Enter a value of the position by using the numeric keys.
   c Press the **Enter** soft key.
   d Press the **Width** soft key, and then select the Walsh code option: **32**, **64**, **128**, or **256**.
4. Toggle the **Constellation** soft key between **On** and **Off** to enable or disable the constellation chart on the Code Domain Power screen.
5. Toggle the **Control Channel** soft key and select the control channel mode option:
   – **Normal:** You can view the relative ratio of each control channel vs. total power.
   – **Delta:** You can view the relative ratio of each control channel vs. CPICH channel.

Relative code domain power

The Relative Code Domain Error (RCDE) measurement provides relative code domain error analysis that is particularly required by HSPA+.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. *Optional*. To set the scramble code, complete the following steps:
   a Toggle the **Scramble** soft key between **Auto** and **Manual**.
   b Enter a value by using the numeric keys to set manually.
   c Press the **Enter** soft key.
3. *Optional*. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.

> **NOTE**
> It is recommended that you select **HSPA+** for RCDE testing.

4 To set the S-CCPCH information of the system to be tested, complete the following steps:

- **a** Press the **S-CCPCH** soft key.
- **b** Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
- **c** Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
- **d** Press the **Spread Code** soft key to set the spread code.
- **e** Enter a value by using the numeric keys.
- **f** Press the **Enter** soft key.

5 To set the PICH information of the system to be tested, complete the following steps:

- **a** Press the **PICH** soft key.
- **b** Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
- **c** Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
- **d** Press the **Spread Code** soft key to set the spread code.
- **e** Enter a value by using the numeric keys.
- **f** Press the **Enter** soft key.

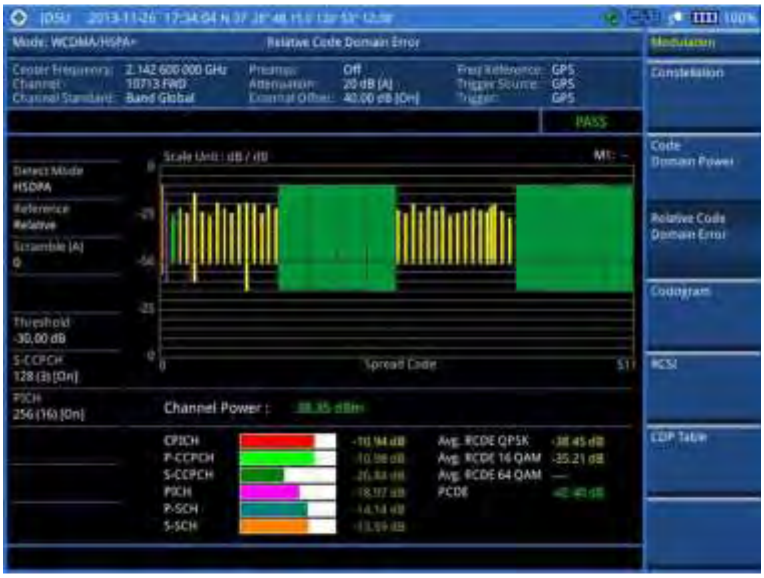
6 *Optional*. To set the threshold, complete the following steps:

- **a** Press the **Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

7 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 61 Relative code domain error with WCDMA/HSPA+ signal analyzer



> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 158 for more information.

Setting display

You can view your measurement results in a different view option.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **View** soft key and select the display option:
   - **Zoom:** You can view the result in detail with zoom-in window.
     The Position and Width menus become activated.
   - **Full:** You can view the full measurement result.
3. To define the zoom start position and width, complete the following steps:
   a. Press the **Position** soft key.
   b. Enter a value of the position by using the numeric keys.
   c. Press the **Enter** soft key.
   d. Press the **Width** soft key, and then select the Walsh code option: **32**, **64**, **128**, or **256**.
4. Toggle the **Constellation** soft key between **On** and **Off** to enable or disable the constellation chart on the Code Domain Power screen.
5. Toggle the **Control Channel** soft key and select the control channel mode option:
   - **Normal:** You can view the relative ratio of each control channel vs. total power.
   - **Delta:** You can view the relative ratio of each control channel vs. CPICH channel.

Codogram

The Codogram displays how the code level is changing over time and makes it easier for you to view traffic channels as they initiate and terminate and to track traffic channels call levels over time. The Codogram measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. *Optional*. To set the scramble code, complete the following steps:
   a. Toggle the **Scramble** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. *Optional*. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.
4. To set the S-CCPCH information of the system to be tested, complete the following steps:
   a. Press the **S-CCPCH** soft key.
   b. Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
   d. Press the **Spread Code** soft key to set the spread code.
   e. Enter a value by using the numeric keys.
   f. Press the **Enter** soft key.
5. To set the PICH information of the system to be tested, complete the following steps:

- **a** Press the **PICH** soft key.
- **b** Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
- **c** Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
- **d** Press the **Spread Code** soft key to set the spread code.
- **e** Enter a value by using the numeric keys.
- **f** Press the **Enter** soft key.

6 *Optional*. To set the threshold, complete the following steps:

- **a** Press the **Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

7 To set the time interval, complete the following steps:

- **a** Press the **Time Interval** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

8 To place the time cursor to analyze your measurements, complete the following steps:

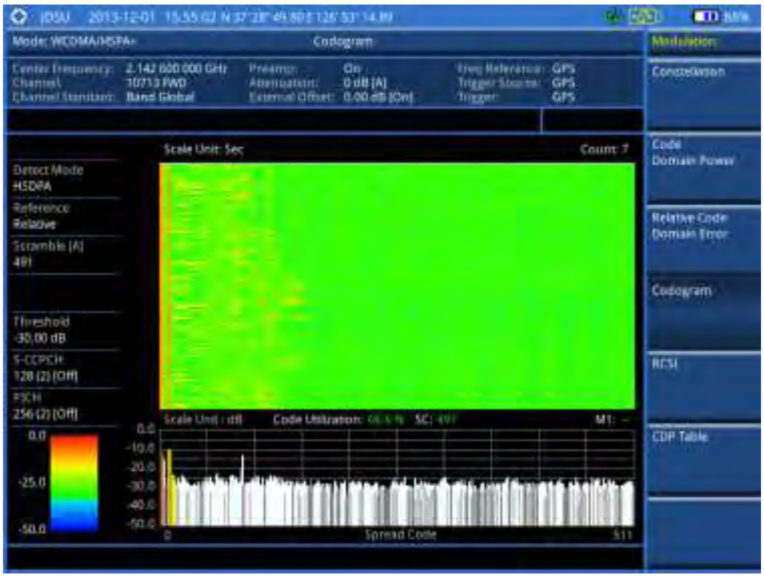
- **a** Toggle the **Time Cursor** soft key between **On** and **Off** to enable or disable the time cursor.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

> **NOTE**
> When the time cursor is enabled, the measurement is put on hold and information about the time cursor is displayed.

9 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 62 Codogram in full view with WCDMA/HSPA+ signal analyzer



Setting display

You can view your measurement results in a different view option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Toggle the **View** soft key and select the display option:

– **Zoom:** You can view the result in detail with zoom-in window.
The Position and Width menus become activated.

– **Full:** You can view the full measurement result.

3 To define the zoom start position and width, complete the following steps:

a Press the **Position** soft key.

b Enter a value of the position by using the numeric keys.

c Press the **Enter** soft key.

d Press the **Width** soft key, and then select the Walsh code option: **32**, **64**, **128**, or **256**.

RCSI

The Received Code Strength indicator (RCSI) is used to track the code channels such as CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH, and S-SCH. It is particularly useful to observe signal fluctuations of the dedicated control channels over the time. The RCSI measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 *Optional*. To set the scramble code, complete the following steps:

a Toggle the **Scramble** soft key between **Auto** and **Manual**.

b Enter a value by using the numeric keys to set manually.

c Press the **Enter** soft key.

3 *Optional*. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.

4 To set the S-CCPCH information of the system to be tested, complete the following steps:

a Press the **S-CCPCH** soft key.

b Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
Setting this on makes the S-CCPCH in the Alarm Code menu activated.

c Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.

d Press the **Spread Code** soft key to set the spread code.

e Enter a value by using the numeric keys.

f Press the **Enter** soft key.

5 To set the PICH information of the system to be tested, complete the following steps:

a Press the **PICH** soft key.

b Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
Setting this on makes the PICH in the Alarm Code menu activated.

c Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.

d Press the **Spread Code** soft key to set the spread code.

  - **e** Enter a value by using the numeric keys.
  - **f** Press the **Enter** soft key.

6 *Optional*. To set the threshold, complete the following steps:
  - **a** Press the **Threshold** soft key.
  - **b** Enter a value by using the numeric keys.
  - **c** Press the **Enter** soft key.

7 Press the **Alarm Code** soft key, and then select the alarm code option: **None**, **CPICH**, **P-CCPCH**, **S-CCPCH**, **PICH**, **P-SCH**, or **S-SCH**.

> **NOTE**
> The alarm codes S-CCPCH and PICH become activated in case that you have enabled the S-CCPCH and PICH respectively.

8 To set the alarm mask, complete the following steps:
  - **a** Press the **Set Mask** soft key.
  - **b** Enter a value by using the numeric keys.
  - **c** Press the **Enter** soft key.

9 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 63 RCSI measurement with WCDMA/HSPA+ signal analyzer

Setting display

You can view your measurement results in a different view option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Toggle the **View** soft key and select the display option:
  - **Zoom:** You can view the result in detail with zoom-in window.
    The Position and Width menus become activated.
  - **Full:** You can view the full measurement result.

3. To define the zoom start position and width, complete the following steps:
   a. Press the **Position** soft key.
   b. Enter a value of the position by using the numeric keys.
   c. Press the **Enter** soft key.
   d. Press the **Width** soft key, and then select the Walsh code option: **32**, **64**, **128**, or **256**.

CDP Table

The CDP Table is used to look at a numeric and textual description of all the active code channels in the signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. *Optional*. To set the scramble code, complete the following steps:
   a. Toggle the **Scramble** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. *Optional*. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.
4. To set the S-CCPCH information of the system to be tested, complete the following steps:
   a. Press the **S-CCPCH** soft key.
   b. Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
   d. Press the **Spread Code** soft key to set the spread code.
   e. Enter a value by using the numeric keys.
   f. Press the **Enter** soft key.
5. To set the PICH information of the system to be tested, complete the following steps:
   a. Press the **PICH** soft key.
   b. Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
   d. Press the **Spread Code** soft key to set the spread code.
   e. Enter a value by using the numeric keys.
   f. Press the **Enter** soft key.
6. *Optional*. To set the threshold, complete the following steps:
   a. Press the **Threshold** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.

Measurement example

Figure 64 CDP Table measurement with WCDMA/HSPA+ signal analyzer

Setting display

If the CDP table spans over to the next page(s), you can change pages up and down to view your measurement results.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Select **Page Up** or **Page Down** as needed.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Modulation Test Limits** soft key to set the limits.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
Error vector magnitude	EVM	High Limit
Peak code domain error	PCDE	High Limit
Carrier feed through	Carrier Feed Through	High Limit
Correlated power in coded channel	CPICH	High Limit [Abs|Rel] Low Limit [Abs|Rel]
Highest level among inactive channels	Max Inactive	High Limit
Relative code domain error	RCDE	High Limit (QPSK)

	High Limit (16 QAM) High Limit (64 QAM)

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

NOTE
The Carrier Feed Through is a result of the RF carrier signal feeding through the I/Q modulator and riding on the output circuitry without being modulated.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit for auto measure

You can set test limits for test item(s) in the auto measurement.

Procedure

1 Press the ***LIMIT*** hot key.

2 Press the **RF Test Limits** soft key, and then enable test limits as desired.

3 Press the **Modulation Test Limits** soft key, and then enable test limits as desired.

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Toggle the **Configuration** soft key and select the configuration option:

– **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument’s limit settings in Auto Measure.

– **Scenario:** Runs a test with a programmed scenario in JDViewer. The Scenario menu becomes activated.

3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   - **Now:** Lets the instrument run a test only once.
   - **Schedule:** Lets the instrument repeat tests as defined in the Set Timing. The Set Timing menu becomes activated.
5. To define a schedule for an auto measurement, complete the following steps:
   a. Press the **Set Timing** soft key.
   b. Press the **Start Time (HH:MM)** soft key.
   c. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d. Press the **Stop Time (HH:MM)** soft key.
   e. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   f. Press the **Time Interval** soft key.
   g. Enter the amount of time in minutes, and then press the **Enter** soft key.
6. To set external offset, complete the following steps:
   a. Toggle the **External Offset** soft key and select **On**.
   b. Enter a value by using the numeric keys, and then press the **dB** soft key.
7. To save your settings and results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See "Using save" on page 32 for more information.
8. Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
9. To stop running the test, press the **Abort** soft key.
10. To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
    - **Screen:** You can view each measurement screen as the test progresses.
    - **Results:** You can view a measurement result table as the test progresses.
    - **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1. Toggle the **Display** soft key and select the display option:
   - **Result:** You can view the result table.
     The Display Result menu becomes activated.
   - **Settings:** You can view the measurement settings for the auto measurement.
2. Toggle the **Display Result** soft key and select the display result option:
   - **Full:** You can view detailed measurement readings with the pass/fail indication.
   - **Quick:** You can view only the Pass/Fail results.
3. To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Performing power statistics CCDF measurement

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 134, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CCDF Length** soft key to set the length of the CCDF.
3. Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Measurement example

Figure 65 CCDF measurement with WCDMA/HSPA+ signal analyzer

Conducting WCDMA/HSPA+ OTA measurements

This Over The Air (OTA) measurement has channel scanner, scramble scanner, multipath profile, code domain power, and route map screens. Scramble scanner displays six scrambling codes and powers to inform neighbor cells existence and its power. The multipath profile graph helps you to determine testing area's RF environmental condition. The code domain power shows not only modulation performance metric but also amplifier capacity and code utilization metric. The amplifier capacity (code utilization) measurement is an estimate of the amount of power amplifier capacity (code utilization) that is being used expressed in percent of maximum.

Channel scanner

Setting channel/frequency

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. Press the **Index** soft key, and then enter an index number by turning the rotary knob or using the numeric keys.
4. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
      See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
5. To set the channel number for the selected index, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
6. The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
8. To add more channels to be scanned, repeat steps **3-6**.
9. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Index** soft key, and then enter an index number by turning the rotary knob or using the numeric keys.
4. To set the center frequency for the selected index, complete the following steps:
   a. Press the **Center Frequency** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. To add more channels to be scanned, repeat steps **3-5**.
7. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Setting limit for OTA channel scanner

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Limit Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.

4 Toggle the **Limit Line** soft key between **On** and **Off** to display or dismiss the limit line.

5 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

6 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 66 Channel scanner measurement with WCDMA/HSPA+ OTA signal analyzer

Scramble scanner

The WCDMA/HSPA+ mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has a unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

Measurement example

Figure 67 Scramble scanner measurement with WCDMA/HSPA+ OTA signal analyzer

Multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Measurement example

Figure 68 Multipath profile measurement with WCDMA/HSPA+ OTA signal analyzer

Code domain power

Channels with high correlation factors are determined to be active channels and are indicated as such on the display. Once the channels are decoded, the analyzer determines the power of each channel relative to the total signal power.

This measurement helps to verify that each code channel is operating at its proper level and helps to identify problems throughout the transmitter design from the coding to the RF section. System imperfections, such as the non-linearity of amplifiers, will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters, you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the scramble code, complete the following steps:
   a. Toggle the **Scramble** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. Press the **Detect Mode** soft key, and then select the signal standard option: **WCDMA**, **HSDPA**, or **HSPA+**. HSDPA is set by default.
4. To set the threshold, complete the following steps:
   a. Press the **Threshold** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
5. To set the S-CCPCH information of the system to be tested, complete the following steps:
   a. Press the **S-CCPCH** soft key.
   b. Toggle the **S-CCPCH** soft key between **On** and **Off** to enable or disable the S-CCPCH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
   d. Press the **Spread Code** soft key to set the spread code.
   e. Enter a value by using the numeric keys.
   f. Press the **Enter** soft key.
6. To set the PICH information of the system to be tested, complete the following steps:
   a. Press the **PICH** soft key.
   b. Toggle the **PICH** soft key between **On** and **Off** to enable or disable the PICH.
   c. Press the **Spread Factor** soft key, and then select the spread factor option: **4**, **8**, **16**, **32**, **64**, **128**, or **256**.
   d. Press the **Spread Code** soft key to set the spread code.
   e. Enter a value by using the numeric keys.
   f. Press the **Enter** soft key.
7. To set the maximum amplifier power, complete the following steps:
   a. Press the **Max Amplifier Power** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **dBm** soft key.
8. To set the CPICH power, complete the following steps:
   a. Press the **More (1/2)** soft key.

- **b** Press the **CPICH** soft key.
- **c** Enter a value by using the numeric keys.
- **d** Press the **dBm** soft key.

9 To set the threshold for CPICH dominance, complete the following steps:

- **a** Press the **CPICH Dominance >** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

> **NOTE**
> Recommended value is 10. Color of the CPICH Dominance indicator on the screen bases on this setting.

10 To set the threshold for multipath power, complete the following steps:

- **a** Press the **Multipath Power <** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

> **NOTE**
> Recommended value is one. Color of the multipath power indicator on the screen bases on this setting.

11 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 69 Code domain power measurement with WCDMA/HSPA+ OTA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication.

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping.
   Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 134.
3. To load your map file, complete the following steps:
   a. Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument’s display. You must save your map file (`.mcf`) into the “**SavedMap**” folder of your USB drive so that you can load them onto your instrument.

   b. Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
   See “Using load” on page 34 for more information.
4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.
>
> With the **Full** setting, you can view all the collected points of the route without the loaded map.

   – To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.
6. Press the **Plot Item** soft key, and then select the measurement option: **CPICH Power** or **Ec/Io**.
7. Toggle the **Plot** soft key and select **Start**.
8. Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

9. Toggle the **Plot** soft key and select **Stop** to stop plotting.
10. Press the ***SAVE/LOAD*** hot key to save the result.
    See “Using save” on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the four different color indicators for CPICH power or Ec/Io.

Procedure

1. Press the ***LIMIT*** hot key.

2 Select the plot items and set the limits as needed:

To set the limit for	Select	Set
CPICH Power	CPICH Power	Excellent, Very Good, Good, Fair, Poor (dBm)
CPICH Ec/Io	Ec/Io	Good, Fair, Poor (dB)

3 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings.
See "Using save" on page 32 for more information.

Measurement example

Figure 70 Route map measurement with WCDMA/HSPA+ OTA signal analyzer

1) CPICH Power

2) CPICH Ec/Io

Chapter 8 Using LTE - FDD Signal Analyzer

This chapter provides instructions for using the LTE - FDD Signal Analyzer (option 028) and LTE-Advanced FDD Analyzer (option 030) with the LTE - FDD OTA Analyzer (option 048). Topics discussed in this chapter are as follows:

Introduction

The LTE (Long-Term Evolution) Signal Analyzer of the JD700B series performs power and spectrum measurements as well as modulation analysis to test the proper transmitter performance of FDD LTE systems. It performs conformance testing according to the following standards providing a simple Pass/Fail indication on each test.

- 3GPP TS 36.104. Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) Radio Transmission and Reception
- 3GPP TS 36.141. Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) Conformance Testing
- 3GPP TS 36.211. Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation
- 3GPP TS 36.212. Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and Channel Coding
- 3GPP TS 36.213 V8.2.0. Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures

This instrument provides the following measurement tools for FDD LTE system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - Adjacent Channel Leakage power Ratio (ACLR)
  - Multi-ACLR
  - Spurious Emissions
- Power vs. Time (Frame)
- Modulation Analysis
  - Constellation
  - Data Channel
  - Control Channel
  - Subframe
  - Frame
  - Time Alignment Error
  - Data Allocation Map
- Auto Measure:
  - Conformance Test
  - Maintenance Test
  - Signal Performance Test
  - DAS Test

- Power Statistics CCDF
- Carrier Aggregation
- Over The Air (OTA)
  - Channel Scanner
  - ID Scanner
  - Multipath Profile
  - Control Channel
  - Datagram
  - Route Map

Display overview

Figure 71 provides descriptions for each segment of the measurement screen.

Figure 71 LTE - FDD signal analyzer measurement screen

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 72 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 73 Indirect connection

CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1 Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.

2 Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 74 OTA connection

JD785B/JD745B JD788B/JD748B

CAUTION
If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **LTE - FDD** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   – **Spectrum**
   – **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACLR**, **Multi-ACLR**, or **Spurious Emissions**
   – **Power vs Time (Frame)**
   – **Modulation Analysis > Constellation**, **Data Channel**, **Control Channel**, **Subframe**, **Frame**, **Time Alignement Error**, or **Data Allocation Map**
   – **Auto Measure > Conformance Test**, **Maintenance Test**, **Signal Perfomance**, or **DAS Test**
   – **Power Statistics CCDF**
   – **More (1/2) > Carrier Aggregation**
   – **More (1/2) > OTA > Channel Scanner**, **ID Scanner**, **Multipath Profile**, **Control Channel**, **Datagram**, or **Route Map**

NOTE
The **Carrier Aggregation** soft key is activated if the license for the option 030 LTE-Advanced FDD is installed.

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   - **a** Press the **Frequency Step** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.

> **NOTE**
> Selecting **Channel** sets the standard channel to **Band Global** automatically so that you can set the **Channel Number** without choosing a standard channel band from the list.

3. Press the **Channel Number** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Press the **Enter** soft key.
6. The instrument automatically displays the corresponding center frequency value for the selected channel number.
7. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   - **a** Press the **Channel Step** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Enter** soft key.

> **NOTE**
> This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   a. Press the **Reference Level** soft key.
   b. Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   c. Press the **dBm** soft key or the **ENTER** hard key.

> **NOTE**
> In the measurements such as **Control Channel**, **Subframe**, and **Frame**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
      a. Select **Attenuation > Manual**.
      b. Press the **Attenuation Value** soft key to set the level.
      c. Enter a value in fives by using the numeric keys.
      d. Press the **dB** soft key or the **ENTER** hard key.
   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**. As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.

4 Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Figure 75 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option from the choices: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, and **GPS**.

Table 13 External reference indicators

Type	Indicator	Description
Internal	(green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.
External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

Setting measure setup

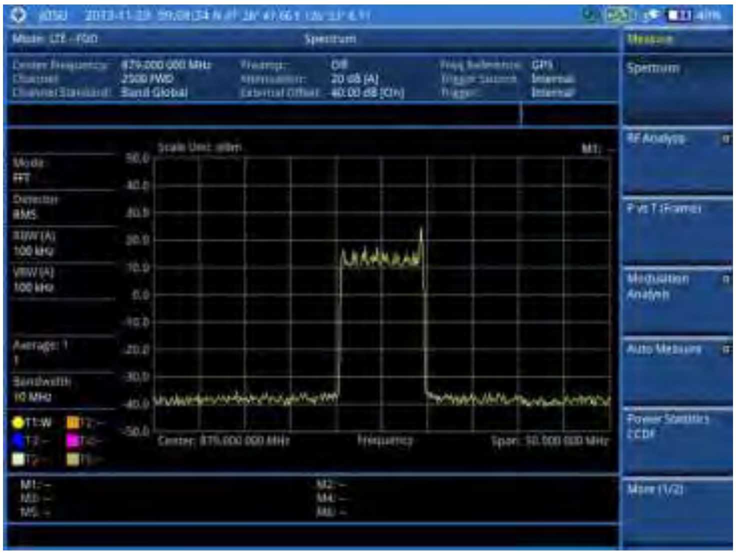
After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Bandwidth** soft key.
3. Select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

Your measurement result is displayed on the screen as like the following example, Figure 76.

Figure 76 Spectrum measurement screen with LTE - FDD signal analyzer



Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**.
   The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

> **NOTE**
> For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5. *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.
6. *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
   The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power and power spectral density (PSD) of the signal in the LTE channel bandwidth.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Bandwidth** soft key.
3. Select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

Measurement example

Figure 77 Channel power measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Bandwidth** soft key.
3. Select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**,

5 MHz, **10 MHz**, **15 MHz**, and **20 MHz**.

Measurement example

Figure 78 Occupied bandwidth measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 To select the mask type, complete the following steps:

   a Press the **Mask Type** soft key.

   b Select the mask type option, from the following choices:

   – **Wide Area BS Category A**

   – **Wide Area BS Category B**

   – **Local Area BS**

   – **Home BS**

Measurement example

Figure 79 SEM measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

ACLR

The Adjacent Channel Leakage power Ratio (ACLR) measures the amount of interference or power in an adjacent frequency channel according to the standards.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Bandwidth** soft key.

3 Select the nominal channel bandwidth to be measured, from the following choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

Measurement example

Figure 80 ACLR measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   - **a** Press the **Bandwidth** soft key.
   - **b** Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To set the frequency, do one of the following:
   - To set the center frequency, complete the following steps:
     - **a** Toggle the **Unit** soft key and select **Freq**.
     - **b** Press the **Lowest Frequency** soft key to set the starting center frequency.
     - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **d** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
     - **e** Press the **Highest Frequency** soft key to set the stopping center frequency.
     - **f** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

- To set the channel number, complete the following steps:
  - **a** Toggle the **Unit** soft key and select **Channel**.

> **NOTE**
> Selecting **Channel** sets the standard channel to **Band Global** automatically so that you can set the **Channel Number** without choosing a standard channel band from the list.

  - **b** Press the **Lowest Channel** soft key to set the starting channel.
  - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **d** Press the **Enter** soft key.
  - **e** Press the **Highest Channel** soft key to set the stopping channel.
  - **f** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **g** Press the **Enter** soft key.

Measurement example

Figure 81 Multi-ACLR measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.
4. To set up the test limits for Pass/Fail indication, complete the following steps:
   a. Press the **Start Limit** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the **dBm** soft key.
   d. Press the **Stop Limit** soft key.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Select the **dBm** soft key.
5. To set up the other parameters, complete the following steps:
   a. Select **More (1/2) > Attenuation** to set up the attenuation value.
   b. Enter a value in the multiple of five.
   c. Press the **dB** soft key or the **ENTER** hard key.
   d. Press the **RBW** soft key.
   e. Enter a value by using the numeric keys.
   f. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   g. Press the **VBW** soft key.
   h. Enter a value by using the numeric keys.
   i. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **PREV** hard key.
7. Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8. Set the number of measurements to be averaged:
   a. Press the **Average** soft key.
   b. Enter a value between 1 and 100.
   c. Press the **Enter** soft key.

Measurement example

Figure 82 Spurious emissions measurement with LTE - FDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 186 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACLR	ACLR	(On/Off only)
Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting power vs. time (frame) measurements

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in an LTE signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
4. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

Measurement example

Figure 83 Power vs. time (frame) measurement with LTE – FDD signal analyzer

Conducting modulation measurements

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:

a Press the **Bandwidth** soft key.

b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 To select the subframe number to be measured, complete the following steps:

a Press the **Subframe No** soft key.

b Enter a value by using the numeric keys. You can also use the rotary knob.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

c Press the **Enter** soft key.

4 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

– **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.

- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.

6 *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

7 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

- To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
- To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
- Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.
- To set the threshold for PDSCH, complete the following steps:
  - **a** Press the **PDSCH Threshold** soft key.
  - **b** Enter a value by using the numeric keys.
  - **c** Press the **dB** soft key.
- Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 84 Constellation measurement with LTE - FDD signal analyzer

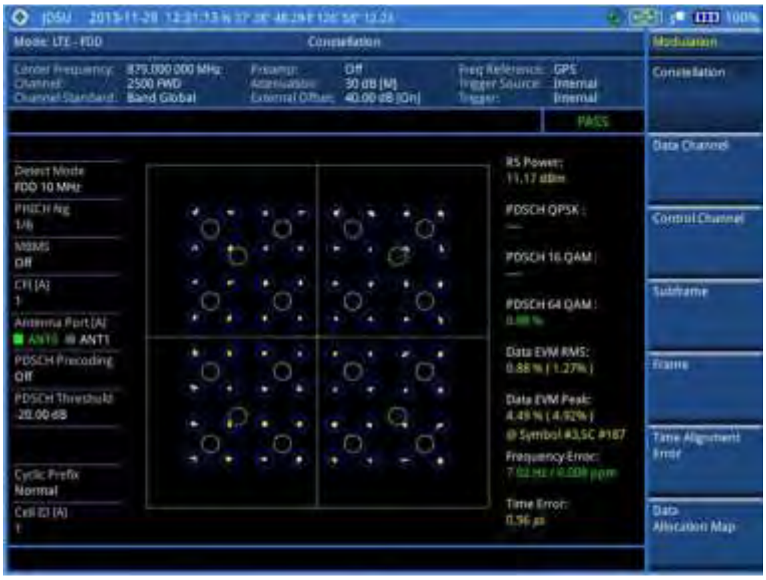


Figure 85 Constellation measurement with LTE - FDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Data channel

The Data Channel measures the constellation for the specified resource block as well as the modulation accuracy of each PDSCH at the specified subframe.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you

can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

   > **NOTE**
   > For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

   c. Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.
6. *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.
7. Toggle the **Event Hold** soft key between **On** and **Off** to enable or disable the event hold feature. When enabled, the display line for the PDSCH threshold appears.
   When an event occurs, the measurement is put on hold until you press the **HOLD** hot key.
8. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   – To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
   – To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See "Appendix E – Cyclic prefix table" on page 534 for OFDM parameter details by different bandwidth.
   – Press the **PDSCH Modulation Type** soft key, and then select the modulation type option:

Auto, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

– To set the threshold for PDSCH, complete the following steps:

a Press the **PDSCH Threshold** soft key.

b Enter a value by using the numeric keys, and then press the **dB** soft key.

– Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 86 Data channel measurement with LTE - FDD signal analyzer

Figure 87 Data channel measurement with LTE - FDD signal analyzer (MBMS On)

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Using marker

You can use the **MARKER** hard key to place a marker on a resource block and display the IQ diagram for the selected resource block.

Procedure

1. Press the **MARKER** hard key.
2. Press the **RB Number** soft key to select the resource block to be marked.
3. Enter the resource block number by using the numeric keys.
4. Press the **Enter** soft key.
   The marker appears on the selected resource block.
5. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the result of the selected resource block.

Control channel

The Control Channel measures the constellation for the specified control channel as well as modulation accuracy of the control channel at the specified subframe.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

   NOTE
   For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

   c. Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs

in a subframe.

– **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.

6 *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

7 Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:

– **Single:** Testing on one single antenna connected to your JD700B series with a cable.

– **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.

8 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

– To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

– To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table.

– To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– To set the threshold for PDCCH, complete the following steps:

a Press the **PDCCH Threshold** soft key.

a Enter a value by using the numeric keys.

b Press the **dB** soft key.

– Toggle the **PDCCH Mode** soft key and select **REG** to calculate EVM based on Resource Element Group or **Avg** to calculate EVM after adding up all the PDCCH signals from one subframe.

Measurement example

Figure 88 Control channel measurement with LTE - FDD signal analyzer

Figure 89 Control channel measurement with LTE - FDD signal analyzer (MBMS On)

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Using marker

You can use the **MARKER** hard key to place a marker on a control channel and display the IQ diagram for the selected channel.

Procedure

1. Press the **MARKER** hard key.
2. Press the **Channel** soft key to select the channel to be displayed in the IQ diagram.
   The channel P-SS is selected by default.
3. Turn the rotary knob to move the highlight from one to another in the channel summary table.
4. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the result of the selected channel.

Subframe

The Subframe measures the modulation accuracy of all the data and control channels at the specified subframe (1 ms).

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   - **a** Press the **Bandwidth** soft key.
   - **b** Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   - **a** Press the **Subframe No** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.

   > **NOTE**
   > For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

   - **c** Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.
6. *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.
7. Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:
   – **Single:** Testing on one single antenna connected to your JD700B series with a cable.
   – **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.

8 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

– To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

– To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table and either PMCH or PDSCH appears as well depending on the detected channel.

– To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

– To set the threshold for PDSCH, complete the following steps:

  a Press the **PDSCH Threshold** soft key.

  b Enter a value by using the numeric keys.

  c Press the **dB** soft key.

– To set the threshold for PDCCH, complete the following steps:

  a Press the **PDCCH Threshold** soft key.

  b Enter a value by using the numeric keys.

  c Press the **dB** soft key.

– Toggle the **PDCCH Mode** soft key and select **REG** to calculate EVM based on Resource Element Group or **Avg** to calculate EVM after adding up all the PDCCH signals from one subframe.

– Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 90 Subframe measurement with LTE - FDD signal analyzer

1) Regular view

2) Chart view

Figure 91 Subframe measurement with LTE - FDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Setting display

You can use the **TRACE/DISPLAY** hard key to view the RE and RS power at the symbol.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **Chart** soft key between **On** and **Off** to display or dismiss the chart.
   If this setting is on, the **MARKER** hard key is activated.

Using marker

If you turn the Chart view on, you can use the **MARKER** hard key to place the marker at a specific symbol.

Procedure

1. Press the **MARKER** hard key.
2. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the marker on the chart.
3. Press the **Symbol** soft key to select the symbol number, to which the marker is placed.
4. Enter a value by using the numeric keys.
5. Press the **Enter** soft key.

Frame

The Frame measures the modulation accuracy of all the data and control channels at the frame (10 ms).

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
4. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.
5. *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.
6. Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:
   – **Single:** Testing on one single antenna connected to your JD700B series with a cable.
   – **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.
7. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   – To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. If this setting is on, the measurement items MBSFN RS, PMCH QPSK, PMCH 16 QAM, and PMCH 64 QAM appear in the result table.
   – To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
   – Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

- To set the threshold for PDSCH, complete the following steps:
  - **a** Press the **PDSCH Threshold** soft key.
  - **b** Enter a value by using the numeric keys.
  - **c** Press the **dB** soft key.
- To set the threshold for PDCCH, complete the following steps:
  - **a** Press the **PDCCH Threshold** soft key.
  - **b** Enter a value by using the numeric keys.
  - **c** Press the **dB** soft key.
- Toggle the **PDCCH Mode** soft key and select **REG** to calculate EVM based on Resource Element Group or **Avg** to calculate EVM after adding up all the PDCCH signals from one subframe.
- Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 92 Frame measurement with LTE - FDD signal analyzer

Figure 93 Frame measurement with LTE - FDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Time alignment error

In eNode B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
4. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

– To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

Measurement example

Figure 94 Time alignment error measurement with LTE - FDD signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Data allocation map

The Data Allocation Map function represents data allocation as a frame.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 To set the nominal channel bandwidth to be measured, complete the following steps:
  a Press the **Bandwidth** soft key.
  b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3 To select the subframe number to be measured, complete the following steps:

- **a** Press the **Subframe No** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

- **c** Press the **Enter** soft key.

4 To set the threshold for PDSCH, complete the following steps:

- **a** Press the **PDSCH Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **dB** soft key.

5 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

- To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
- To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

Measurement example

Figure 95 Data allocation map measurement with LTE - FDD signal analyzer

Figure 96 Data allocation map measurement with LTE - FDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 206 for more information.

Using marker

You can use the **MARKER** hard key to place the marker at a specific resource block and subframe.

Procedure

1 Press the **MARKER** hard key.

2 Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the marker on the

chart.

3 To select the resource block number, complete the following steps:
  a Press the **RB Number** soft key.
  b Enter the resource block number to select by using the numeric keys. You can also use the rotary knob to move the marker side by side.
  c Press the **Enter** soft key.

4 To select the subframe block number, complete the following steps:
  a Press the **Subframe No** soft key.
  b Enter the subframe number to select by using the numeric keys. You can also use the rotary knob to move the marker up and down.
  c Press the **Enter** soft key.

Setting limit for modulation tests

Procedure

1 Press the ***LIMIT*** hot key.
2 Press the **Modulation Test Limits** soft key to set the limits.
3 Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
PDSCH error vector magnitude if MBMS is off	EVM > PDSCH EVM	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
PMCH error vector magnitude if MBMS is on and a PMCH is detected	EVM > PMCH EVM	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
RMS for data error vector magnitude	EVM > Data EVM RMS	High Limit
Peak for data error vector magnitude	EVM> Data EVM Peak	High Limit
RS error vector magnitude	EVM > RS EVM	High Limit
P-SS error vector magnitude	EVM > P-SS EVM	High Limit
S-SS error vector magnitude	EVM > S-SS EVM	High Limit
Downlink RS power	Power > DL RS Power	High Limit Low Limit
P-SS power	Power > P-SS Power	High Limit Low Limit
S-SS power	Power > S-SS Power	High Limit Low Limit
PBCH power	Power > PBCH Power	High Limit Low Limit
Subframe power	Power > Subframe Power	High Limit Low Limit
OFDM symbol power	Power > OFDM Symbol Power	High Limit Low Limit

Frame average power	Power > Frame Avg Power	High Limit Low Limit
Time alignment error for MIMO	Time Alignment Error > MIMO	High Limit
Time alignment error for aggregation of component carriers (intra-band contiguous, intra-band non-contiguous, and inter-band)	Time Alignment Error > Carrier Aggregation	Intra Cont Intra Non-cont Inter Band
Time error	Time Error	High Limit Low Limit
I-Q origin offset	IQ Origin Offset	High Limit

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Performing auto measurements

Conformance test

The Conformance Test is to test if eNode-B meets some specified standards that have been developed for verification. Its test procedure and test setups have been developed by 3GPP. Test results can be saved as a `.csv` file type.

Setting limit for conformance test

You can set test limits for test item(s) in the auto measurement. Turning the test limit on for a test item makes the test item included in the conformance test.

Procedure

1 Press the ***LIMIT*** hot key.

2 To set the limit for BTS output power, complete the following steps:
- a Press the **BTS Output Power** soft key.
- b Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.
- c Press the **High Limit** soft key.
- d Enter a value for the upper limit.
- e Press the **dBm** unit soft key.
- f Press the **Low Limit** soft key.
- g Enter a value for the lower limit.
- h Press the **dBm** unit soft key.

3 To set the limit for total power dynamic, complete the following steps:
- a Press the **Total Power Dynamic** soft key.
- b Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.
- c Press the **Low Limit** soft key.
- d Enter a value for the lower limit.
- e Press the **dBm** unit soft key.

4 To verify signal quality, press the **Signal Quality** soft key, and then do the following as needed:

To set the limit for	Select	Set
Frequency error	Frequency Error > Test Limits [E-TM2|E-TM3.1|E-TM3.2|E-TM3.3]	High Limit Low Limit
Error vector magnitude	EVM > Test Limits [E-TM2|E-TM3.1|E-TM3.2|E-TM3.3]	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
Time alignment error	Time Alignment Error	High Limit
RS power	RS Power	High Limit Low Limit

5 To verify unwanted emissions, press the **Unwanted Emissions** soft key, and then do the following as needed:

To set the limit for	Select	Set
Occupied bandwidth	Occupied BW	High Limit
Adjacent channel power ratio	ACLR	
Spectrum emission mask	SEM	Mask Type
Spurious emissions	Spurious Emissions	Range Table

6 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

7 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After setting frequency as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Bandwidth** soft key.
3. Select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
4. Press the **Sector** soft key, and then select the sector option: **Alpha**, **Beta**, or **Gamma**.
5. To set external offset, complete the following steps:
   - **a** Toggle the **External Offset** soft key and select **On**.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dB** soft key.
6. To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.
7. Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
8. When prompted on the screen, connect the cable from the **Spectrum Analyzer RF In** port of the instrument either to **Antenna Port 0** or **Antenna Port 1** of the eNode-B, and then change the TM mode on the eNode-B side.
9. Press the **Continue** soft key to continue testing.
10. Repeat the steps 8-9 until completion of the test.

A conformance test report appears at the end of the test.

11 *Optional*. To stop running the test, press the **Abort** soft key.

Maintenance test

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 20 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

Following settings are required only when you run the Auto Measure Maintenance Test on the instrument using “Current” configuration setting. Additional settings are not required when you run Auto Measure using a scenario generated in the PC application software, JDViewer.

Setting limit for maintenance test

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

NOTE
You can use the **Allowed % Change** soft key for each test item to compare two measurement values displayed in the result table. This requires setting the **Display** mode to **Compare** in advance.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   - **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument’s limit settings in Auto Measure.
   - **Scenario:** Runs a test with a programmed scenario in JDViewer. The Scenario menu becomes activated.
3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   - **Now:** Lets the instrument run a test only once.
   - **Schedule:** Lets the instrument repeat tests as defined in the Set Timing.

The Set Timing menu becomes activated.

5 To define a schedule for an auto measurement, complete the following steps:
   - **a** Press the **Set Timing** soft key.
   - **b** Press the **Start Time (HH:MM)** soft key.
   - **c** Enter the time in the HH:MM format, and then press the **Enter** soft key.
   - **d** Press the **Stop Time (HH:MM)** soft key.
   - **e** Enter the time in the HH:MM format, and then press the **Enter** soft key.
   - **f** Press the **Time Interval** soft key.
   - **g** Enter the amount of time in minutes, and then press the **Enter** soft key.

6 Press the **Settings** soft key, and then set the following as needed:
   - **a** Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
   - **b** Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
     - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
     - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
   - **c** Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**.
     This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - **d** Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**.
     If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   - **e** Toggle the **External Offset** soft key and select **On**.
   - **f** Enter a value by using the numeric keys, and then press the **dB** soft key.
   - **g** To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the Subframe No with the same PMCH subframe number.
   - **h** To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

7 To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

8 Press the **Run Test** soft key to start to run a test.
The Auto Measure Results window appears at the end of the test.

9 To stop running the test, press the **Abort** soft key.

10 To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
   - **Screen:** You can view each measurement screen as the test progresses.
   - **Results:** You can view a measurement result table as the test progresses.
   - **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1 Toggle the **Display** soft key and select the display option:
   - **Result:** You can view the result table.
     The Display Result menu becomes activated.

- **Settings:** You can view the measurement settings for the auto measurement.

2. Toggle the **Display Result** soft key and select the display result option:
   - **Full:** You can view detailed measurement readings with the pass/fail indication.
   - **Quick:** You can view only the Pass/Fail results.
   - **Compare:** You can compare two measurement values for each test time with the Allowed % Change setting on. You can view results vs. factory-defined or user-defined references.
3. To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.
4. Press the **Replace Reference** soft key to replace existing reference values for comparison with new measurement data.
5. Press the **Load From** soft key to select the location from which references file to be loaded.

Signal performance test

Unlike the other auto measurement tests, the Signal Performance Test runs measurements continuously.

Setting limit for signal performance test

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits > Channel Power** soft key, and then set the limits for the channel power. Other RF test items are not used in the signal performance test.
3. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
3. Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

4 Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**.
If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

6 Toggle the **RF Profile** soft key between **On** and **Off** to turn on or off the RF profiling such as channel power and subframe frequency error.

7 Toggle the **Modulation Profile** soft key between **On** and **Off** to turn on or off the modulation profiling such as P-SS, S-SS, Data - QPSK, Data – 16 QAM, and Data – 64 QAM.

8 Toggle the **MIMO Profile** soft key between **On** and **Off** to turn on or off the MIMO profiling such as TX1 - RS0, TX2 - RS1, and time alignment error.

9 Toggle the **External Offset** soft key and select **On** to set the external offset value.

10 To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

DAS test

The Distributed Antenna System (DAS) testing enables you to check the degradation of performance in the signal transmission from a radio band to antennas distributed from it. You can save measurement values at both the radio band and antennas and then compare results with percentage of changes. You can also save test results in the `.csv` file format for ease of analysis.

Setting measure setup

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Settings** soft key and then set the following;

- a Press the **Bandwidth** soft key and then select the nominal channel bandwidth to be measured from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
- b Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**.
  This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- c Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
  - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
  - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
- d Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**.
  If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- e Toggle the **External Offset** soft key and select **On** to set the external offset value.
- f To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**.
- g To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

3 To save your settings, go to ***SAVE/LOAD*** **> Save > Save Setup** and then perform functions as you desire. See “Using save” on page 32 for more information.

4 Press the **Continue** soft key to do the reference test first or press the **Skip Reference Test** soft key if you already saved test results from the radio band under test.

5 Press the **FREQ/DIST** hard key and then set the frequency to be measured. See “Setting frequency” on page 235 for more information.

6. Press the **PREV** hard key.
7. Press the **Limit** soft key and then set the limits and allowed percentage change for each test item. See “Maintenance test” on page 271 for more information on setting limits.
8. Keep pressing the **PREV** hard key until you see the Run Test soft key.
9. Press the **Run Test** soft key.
   The instrument runs specified tests to gather reference measurement values. The measurement table appears when the reference test is done.
10. Press the **Continue** soft key to run the testing on an antenna (Ant 1).
11. *Optional*. To change the settings such as **External Offset**, press the **Settings** and then change the settings as needed.
12. Press the **Continue** soft key.
    The instrument runs the testing on Ant 1. The Ant 1 tab appears with the updated result table when the test is done.
13. To run the testing on the next antenna (Ant 2), press the **Run Test** soft key and then repeat the steps **11-12**. You can do the testing on up to 10 distributed antennas for one radio band.
14. To view test results for each antenna, press the **Select Antenna** soft key and then select the antenna tab number to display on the screen.
15. *Optional*. Press the **Delete** Test soft key to delete the selected antenna tab.
16. *Optional*. Press the **Retest Reference** soft key to obtain reference measurement values again.
17. *Optional*. To save your measurement results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

Measurement Example

Figure 97 DAS measurement with LTE - FDD signal analyzer

Performing power statistics CCDF measurements

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you

can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CCDF Length** soft key to set the length of the CCDF.
3. Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Measurement example

Figure 98 CCDF measurement with LTE - FDD signal analyzer

Performing carrier aggregation measurements

Carrier aggregation enables a maximum of five multiple LTE carriers to be used together in order to provide high data rate required for LTE-Advanced. Component carriers to be aggregated can be intra-band contiguous, intra-band non-contiguous, or inter-band. The JD700B series provides carrier aggregation measurements supporting for all the different modes with carrier aggregation bands added to the channel standard. This functionality is activated if the license for the option 030 LTE-Advanced FDD is installed.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To configure parameters for up to 5 component carriers, complete the following steps:
   a. Press the **CA Configuration** soft key.
      The component carrier configuration window appears.
   b. Press the **CA Range** soft key.
   c. Enter the number of the component carrier to be set between one and five.
   d. Press the **Enter** soft key.
   e. Toggle the **Turn On** soft key and then select **On** to set parameters and view the results for the selected component carrier on the screen or **Off** to turn it off.
   f. Set the following parameters as needed:
      – **Center Frequency**, **Channel**, **Bandwidth**, **Cell ID**, **CFI**, **PHICH Ng**, **Antenna Port**, **MBMS On/Off**, **Cyclic Prefix**, and **PDSCH Modulation Type**
   g. To set more component carriers, repeat the steps **c**-**f**.
3. Press the ***MEASURE SETUP*** hot key again
4. Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:
   – **Single:** Testing on one single antenna connected to your JD700B series with a cable.
   – **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.
5. To select the subframe number to be measured, do one of the following:
   – If the **EVM Detection Mode** is set to **Single**, press the **Subframe No** soft key and then set the subframe number.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

   – If the **EVM Detection Mode** is set to **Combine**, toggle the **Subframe No** soft key, and then select **0** or **5**.
6. To set the threshold for PDSCH, complete the following steps:
   a. Press the **PDSCH Threshold** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **dB** soft key.
7. Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.
8. To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**.
   This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

Setting display

You can use the **TRACE/DISPLAY** hard key to select modulation analysis or spectrum analysis.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **Display** soft key and select **MA** for modulation analysis or **SA** for spectrum analysis.
   The screen changes according to the selected option.

Measurement example

Figure 99 Carrier aggregation measurement with LTE - FDD signal analyzer (MA)

Figure 100 Carrier aggregation measurement with LTE - FDD signal analyzer (SA)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for modulation tests" on page 206 for more information.

Using marker

You can use the **MARKER** hard key to place the marker at a specific channel.

Procedure

1 Press the **MARKER** hard key.

2. Toggle the **IQ Diagram** soft key between **On** and **Off** to display or dismiss data on the IQ diagram for each component carrier.
3. Press the **Channel** soft key to select the channel to be displayed on the IQ diagram.
4. Use the rotary knob to move and select an item under EVM.

Conducting LTE - FDD OTA measurements

The FDD LTE Over The Air (OTA) measurement has Channel Scanner, ID Scanner, Multipath Profile, Datagram, and Control Channel screens. The ID Scanner displays key parameters such as RSRP, RSRQ, RS-SINR, and S-SS RSSI. The Multipath Profile enables you to determine RF environmental conditions of testing area. The OTA Control Channel provides summary of all control channels including RS power variation over time.

Channel scanner

The Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

Setting channel/frequency

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
5. To set the channel number for the selected index, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
6. The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
8. To add more channels to be scanned, repeat steps **3-6**.
9. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.

4 To set the center frequency for the selected index, complete the following steps:

- **a** Press the **Center Frequency** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

5 To set the integration bandwidth for the selected index, complete the following steps:

- **a** Press the **Integration Bandwidth** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 To add more channels to be scanned, repeat steps **3-5**.

7 Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Setting number of antenna ports

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Toggle the **MIMO** soft key and select **2x2** or **4x4**.
This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

Measurement example

Figure 101 Channel scanner measurement with LTE - FDD OTA signal analyzer

ID scanner

The LTE mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

The ID Scanner shows key parameters such as RSRP (Reference Signal Received Power) and RSRQ (Reference Signal Received Quality) that predict the downlink coverage quickly.

- RSRPs from entire cells help to rank between the different cells as input for handover and cell reselection decisions.

- RSRQ provides additional information when RSRP is not sufficient to make a reliable handover or cell reselection decision.

All of the parameters for OTA ID scanner can be plotted on map data such as Google Maps and Google Earth by using JDViewer.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 173, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:

  a Press the **Bandwidth** soft key.

  b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

  – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

  – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See "Appendix E – Cyclic prefix table" on page 534 for OFDM parameter details by different bandwidth.

4 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See "Using save" on page 32 for more information.

Measurement example

Figure 102 ID scanner measurement with LTE - FDD OTA signal analyzer

Multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. Toggle the **Display** soft key and select **RS** or **Sync**.
   The RS Window soft key becomes activated if RS is selected.
4. Press the **RS Window** soft key, if RS is selected, and then select the RS window option: **2 μs**, **4 μs**, or **8 μs**.
5. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 103 Multipath profile measurement with LTE - FDD OTA signal analyzer

Control channel

DL RS power is the resource element power of Downlink Reference Symbol. The absolute DL RS power is indicated on the BCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the BCH and the DL RS power at the BS antenna connector.

The OTA Control Channel provides summary of all control channels including RS power trend over time. GPS coordinates (latitude and longitude) will be displayed on the screen if a GPS antenna is connected and locked to the GPS satellites.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

c Press the **Enter** soft key.

4 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
- To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 030 LTE-Advanced FDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
- To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table.
- To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

6 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Setting limit for OTA control channel

Procedure

1 Press the ***LIMIT*** hot key.

2 Select the test item(s) and set the limit(s) as needed:

To set the limit for	Select	Set
P-SS error vector magnitude	P-SS EVM	High Limit
S-SS error vector magnitude	S-SS EVM	High Limit
RS error vector magnitude	RS EVM > RS0 EVM RS EVM > RS1 EVM RS EVM > RS2 EVM RS EVM > RS3 EVM	High Limit
Frequency error	Frequency Error	High Limit Low Limit
Time error	Time Error	High Limit Low Limit
Time alignment error	Time Alignment Error	High Limit

3 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting display

You can use the **TRACE/DISPLAY** hard key to select the display option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Toggle the **Display** soft key and select **Power** or **EVM**.
The screen changes according to the selected option.

Measurement example

Figure 104 Control channel measurement with LTE - FDD OTA signal analyzer

Datagram

The OTA Datagram is a time-varying spectral representation that shows how the power of a signal varies with time. The power allocated to the specific resource block will be represented with an amplitude axis (in dBm) and the waterfall diagram will show the trend of past resource block power over certain period. Using a marker function facilitates analysis of accumulated resource block power for data utilization.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 173, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:

  a Press the **Bandwidth** soft key.

  b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3. To select the subframe number to be measured, complete the following steps:
   - **a** Press the **Subframe No** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. To set the threshold for PDSCH, complete the following steps:
   - **a** Press the **PDSCH Threshold** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dB** soft key.
6. To set the time cursor at a specific position, complete the following steps:
   - **a** Toggle the **Time Cursor** soft key and select **On**.
   - **b** Turn the rotary knob to move the time cursor. You can also enter a value and then press the **Enter** soft key.

> **NOTE**
> Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

7. To start a new measurement, press the **Reset/Restart** soft key.
8. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   - To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 030 LTE-Advanced FDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
9. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 105 Datagram measurement with LTE - FDD signal analyzer

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping.
   Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 173.
3. To load your map file, complete the following steps:
   a. Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument’s display. You must save your map file (`.mcf`) into the “**SavedMap**” folder of your USB drive so that you can load them onto your instrument.

   b. Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
   See “Using load” on page 34 for more information.

4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.

With the **Full** setting, you can view all the collected points of the route without the loaded map.

– To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.

6 Press the **Plot Item** soft key, and then select the measurement option: **RSRP**, **RSRQ**, **RS-SINR**, **S-SS RSSI**, **P-SS Power**, **S-SS Power**, or **S-SS Ec/Io**.

NOTE
The instrument collects the strongest Cell ID’s data to plot points.

7 Press the **Bandwidth** soft key to set the nominal channel bandwidth to be measured, and then select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

8 Toggle the **Plot** soft key and select **Start** to start plotting.

9 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

NOTE
For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

10 Toggle the **Plot** soft key and select **Stop** to stop plotting.

11 Press the ***SAVE/LOAD*** hot key to save the result.
See “Using save” on page 32 for more information.

NOTE
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit for route map

You can set the thresholds for each test item.

Procedure

1 Press the ***LIMIT*** hot key.

2 Select the plot items and set the limits as needed:

To set the limit for	Select	Set
RSRP	RSRP	Excellent, Very Good, Good, Fair, Poor (dBm)
RSRQ	RSRQ	Good, Fair, Poor (dB)
RS-SINR	RS-SINR	Good, Fair, Poor (dB)
S-SS RSSI	S-SS RSSI	Excellent, Very Good, Good, Fair, Poor (dBm)
P-SS Power	P-SS Power	Excellent, Very Good, Good, Fair, Poor (dBm)
S-SS Power	S-SS Power	Excellent, Very Good, Good, Fair, Poor (dBm)
S-SS Ec/Io	S-SS Ec/Io	Good, Fair, Poor (dB)

3 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
See “Using save” on page 32 for more information.

Measurement example

Figure 106 Route map measurement with LTE - FDD OTA signal analyzer

1) RSRP

2) RSRQ

3) RS-SINR

4) S-SS RSSI

5) P-SS Power

6) S-SS Power

7) S-SS Ec/Io

Chapter 9 Using LTE - TDD Signal Analyzer

This chapter provides instructions for using the LTE - TDD Signal Analyzer (option 029) and LTE-Advanced TDD Analyzer (option 031) with the LTE - TDD OTA Analyzer (option 049). Topics discussed in this chapter are as follows:

Introduction

The LTE (Long-Term Evolution) Signal Analyzer of the JD700B series performs power and spectrum measurements as well as modulation analysis to test the proper transmitter performance of TDD LTE systems. It performs conformance testing according to the following standards providing a simple Pass/Fail indication on each test.

- 3GPP TS 36.104. Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) Radio Transmission and Reception
- 3GPP TS 36.141. Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) Conformance Testing
- 3GPP TS 36.211. Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation
- 3GPP TS 36.212. Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and Channel Coding
- 3GPP TS 36.213 V8.2.0. Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures

This instrument provides the following measurement tools for TDD LTE system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - Adjacent Channel Leakage power Ratio (ACLR)
  - Multi-ACLR
  - Spurious Emissions
- Power vs. Time: Slot and Frame
- Modulation Analysis
  - Constellation
  - Data Channel
  - Control Channel
  - Subframe
  - Time Alignment Error
  - Data Allocation Map
- Auto Measure
  - Conformance Test
  - Maintenance Test
  - Signal Performance Test
  - DAS Test
- Power Statistics CCDF
- Carrier Aggregation

- Over The Air (OTA)
  - Channel Scanner
  - ID Scanner
  - Multipath Profile
  - Control Channel
  - Datagram
  - Route Map

Display overview

Figure 107 provides descriptions for each segment of the measurement screen.

Figure 107 LTE - TDD signal analyzer measurement screen

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 108 Direct connection

JD785B/JD745B JD788B/JD748B

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 109 Indirect connection

JD785B/JD745B JD788B/JD748B

CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1 Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2 Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 110 OTA connection

JD785B/JD745B **JD788B/JD748B**

> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **LTE - TDD** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   – **Spectrum**
   – **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACLR**, **Multi-ACLR**, or **Spurious Emissions**
   – **Power vs Time > Power vs Time (Slot)** or **Power vs Time (Frame)**
   – **Modulation Analysis > Constellation**, **Data Channel**, **Control Channel**, **Subframe**, **Time Alignement Error**, or **Data Allocation Map**
   – **Auto Measure > Conformance Test**, **Maintenance Test**, **Signal Perfomance**, or **DAS Test**
   – **Power Statistics CCDF**
   – **More (1/2) > Carrier Aggregation**
   – **More (1/2) > OTA > Channel Scanner**, **ID Scanner**, **Multipath Profile**, **Control Channel**, **Datagram**, or **Route Map**

> **NOTE**
> The **Carrier Aggregation** soft key is activated if the license for the option 031 LTE-Advanced TDD is installed.

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.

> **NOTE**
> Selecting **Channel** sets the standard channel to **Band Global** automatically so that you can set the **Channel Number** without choosing a standard channel band from the list.

3. Press the **Channel Number** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Press the **Enter** soft key.
6. The instrument automatically displays the corresponding center frequency value for the selected channel number.
7. To define the amount of channel increment for the rotary knob, complete the following steps:
   a. Press the **Channel Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.

> **NOTE**
> This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.

Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.

> **NOTE**
> In the measurements such as **Control Channel**, and **Subframe**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.
   - **b** Press the **Attenuation Value** soft key to set the level.
   - **c** Enter a value in fives by using the numeric keys.
   - **d** Press the **dB** soft key or the **ENTER** hard key.

   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Figure 111 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, or **GPS**.

Table 14 External reference indicators

Type	Indicator	Description
Internal	 (green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.

External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

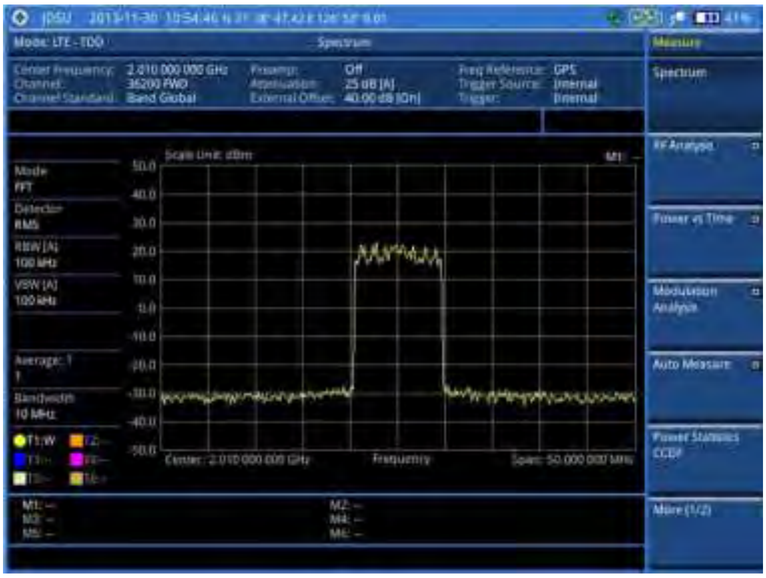
2 To set the nominal channel bandwidth to be measured, complete the following steps:
   - a Press the **Bandwidth** soft key.
   - b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 To select the subframe number to be measured, complete the following steps:
   - a Press the **Subframe No** soft key.
   - b Enter a value by using the numeric keys. You can also use the rotary knob.
   - c Press the **Enter** soft key.

4 Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

Your measurement result is displayed on the screen as like the following example, Figure 112.

Figure 112 Spectrum measurement screen with LTE - TDD signal analyzer



Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the Select Trace soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.

3 Toggle the **Trace View** soft key and select **On**.

4 Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

6 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power and power spectral density (PSD) of the signal in the LTE channel bandwidth.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:
   a Press the **Bandwidth** soft key.
   b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 To select the subframe number to be measured, complete the following steps:
   a Press the **Subframe No** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Press the **Enter** soft key.

4 Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

Measurement example

Figure 113 Channel power measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 248 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
4. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

Measurement example

Figure 114 Occupied bandwidth measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 248 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the mask type, complete the following steps:
   a. Press the **Mask Type** soft key.
   b. Select the mask type option, from the following choices:

- **Wide Area BS Category A**
- **Wide Area BS Category B**
- **Local Area BS**
- **Home BS**

4 To select the subframe number to be measured, complete the following steps:

- **a** Press the **Subframe No** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **Enter** soft key.

5 Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

Measurement example

Figure 115 SEM measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 248 for more information.

ACLR

The Adjacent Channel Leakage power Ratio (ACLR) measures the amount of interference or power in an adjacent frequency channel according to the standards.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
4. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

Measurement example

Figure 116 ACLR measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 248 for more information.

Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To set the frequency, do one of the following:
   – To set the center frequency, complete the following steps:
      a. Toggle the **Unit** soft key and select **Freq**.
      b. Press the **Lowest Frequency** soft key to set the starting center frequency.
      c. Enter a value by using the numeric keys. You can also use the rotary knob.
      d. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
      e. Press the **Highest Frequency** soft key to set the stopping center frequency.
      f. Enter a value by using the numeric keys. You can also use the rotary knob.
      g. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   – To set the channel number, complete the following steps:
      a. Toggle the **Unit** soft key and select **Channel**.

> **NOTE**
> Selecting **Channel** sets the standard channel to **Band Global** automatically so that you can set the **Channel Number** without choosing a standard channel band from the list.

      b. Press the **Lowest Channel** soft key to set the starting channel.
      c. Enter a value by using the numeric keys. You can also use the rotary knob.
      d. Press the **Enter** soft key.
      e. Press the **Highest Channel** soft key to set the stopping channel.
      f. Enter a value by using the numeric keys. You can also use the rotary knob.
      g. Press the **Enter** soft key.

Measurement example

Figure 117 Multi-ACLR measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 248 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.
4. To set up the test limits for Pass/Fail indication, complete the following steps:
   a. Press the **Start Limit** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the **dBm** soft key.
   d. Press the **Stop Limit** soft key.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Select the **dBm** soft key.
5. To set up the other parameters, complete the following steps:
   a. Select **More (1/2) > Attenuation** to set up the attenuation value.
   b. Enter a value in the multiple of five.
   c. Press the **dB** soft key or the **ENTER** hard key.
   d. Press the **RBW** soft key.
   e. Enter a value by using the numeric keys.
   f. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   g. Press the **VBW** soft key.
   h. Enter a value by using the numeric keys.
   i. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **PREV** hard key.
7. Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

NOTE
The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

Measurement example

Figure 118 Spurious emissions measurement with LTE - TDD signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 248 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1 Press the ***LIMIT*** hot key.

2 Press the **RF Test Limits** soft key.

3 Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit, Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACLR	ACLR	(On/Off only)

Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting power vs. time measurements

The Power vs. Time measurement measures the modulation envelope in the time domain, showing the signal rise and fall shape of LTE signal and the power of each time slot in an LTE signal.

Power vs. time (slot)

The Power vs. Time (Slot) in LTE - TDD Signal Analyzer measures the modulation envelope in the time domain, showing the signal rise and fall shapes of LTE signal.

> **NOTE**
> In this measurement, desirable level of the input power is lower than -10 dBm. If the input power to be measured is -10 dBm or higher, it is highly recommended that you use an external attenuator.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:
   - a Press the **Bandwidth** soft key.
   - b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

3 To select the slot number to be measured, complete the following steps:
   - a Press the **Slot No** soft key.
   - b Enter a value by using the numeric keys. You can also use the rotary knob.
   - c Press the **Enter** soft key.

4 Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   - To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not

installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
- To set the delay, complete the following steps:
  a Press the **Delay** soft key to set the amount of delay in μs.
  b Enter a value by using the numeric keys. You can also use the rotary knob.
  c Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit for power vs. time tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **PvsT Test Limits** soft key.
3. Select the test item(s) and set the limit(s):

To set the limit for	Select	Set
Slot average power	Slot Avg Power	High Limit, Low Limit
Off power	Off Power	High Limit
Transition period	Transition Period	High Limit

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 119 Power vs. time (slot) measurement with LTE – TDD signal analyzer

1) Off to on

2) On to off

Power vs. time (frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in an LTE signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
4. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not

installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– To set the delay, complete the following steps:

  a Press the **Delay** soft key to set the amount of delay in μs.

  b Enter a value by using the numeric keys. You can also use the rotary knob.

  c Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 120 Power vs. time (frame) measurement with LTE – TDD signal analyzer

Conducting modulation measurements

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

   c. Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.
6. *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.
7. Press the **Uplink-Downlink Configuration** soft key, and then select the number of uplink/downlink between one and six.
8. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   – To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
   – To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
   – To set the delay, complete the following steps:
      a. Press the **Delay** soft key to set the amount of delay in μs.
      b. Enter a value by using the numeric keys. You can also use the rotary knob.
      c. Press the **μs** soft key.

> **NOTE**

> The Delay setting is used only when there is a time offset in the signals to be measured.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

– To set the threshold for PDSCH, complete the following steps:

  a Press the **PDSCH Threshold** soft key.

  b Enter a value by using the numeric keys.

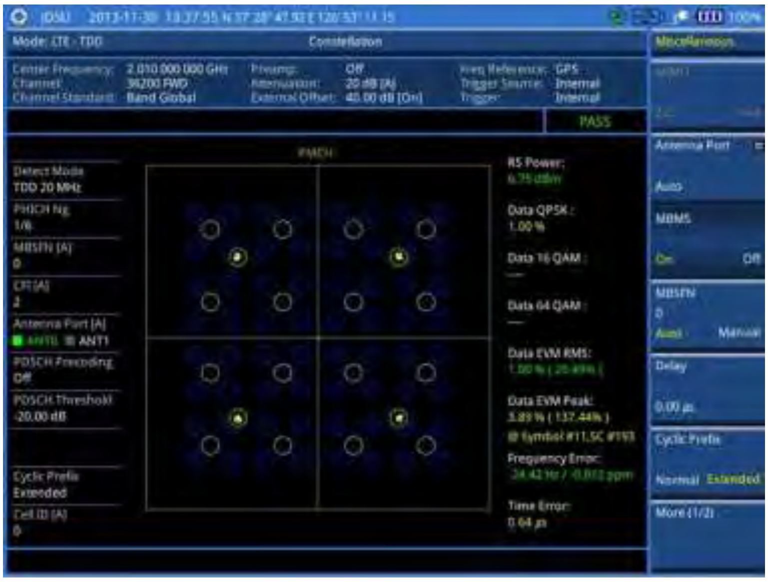
  c Press the **dB** soft key.

– Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 121 Constellation measurement with LTE - TDD signal analyzer

Figure 122 Constellation measurement with LTE - TDD signal analyzer (MBMS On)



> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 268 for more information.

Data channel

The Data Channel measures the constellation for the specified resource block as well as the modulation accuracy of each PDSCH at the specified subframe.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

   > **NOTE**
   > For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

   c. Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.

6 *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

7 Toggle the **Event Hold** soft key between **On** and **Off** to enable or disable the event hold feature.
When enabled, the display line for the PDSCH threshold appears.
When an event occurs, the measurement is put on hold until you press the **HOLD** hot key.

> **NOTE**
> You can view detailed current resource block on the I-Q diagram, particularly in a dynamic field environment.

8 Press the **More (1/2) > Uplink-Downlink Configuration** soft key, and then select the number of uplink/downlink between one and six.

9 *Optional*. Press the **More (1/2) > Miscellaneous** soft key, and then do the following as needed:

- To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
- To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
- To set the delay, complete the following steps:
  - **a** Press the **Delay** soft key to set the amount of delay in μs.
  - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
- Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.
- To set the threshold for PDSCH, complete the following steps:

- **a** Press the **PDSCH Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **dB** soft key.

– Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 123 Data channel measurement with LTE - TDD signal analyzer

Figure 124 Data channel measurement with LTE - TDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 268 for more information.

Using marker

You can use the **MARKER** hard key to place a marker on a resource block and display the IQ diagram for the selected resource block.

Procedure

1. Press the **MARKER** hard key.
2. Press the **RB Number** soft key to select the resource block to be marked.
3. Enter the resource block number by using the numeric keys.
4. Press the **Enter** soft key.
   The marker appears on the selected resource block.
5. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the result of the selected resource block.

Control channel

The Control Channel measures the constellation for the specified control channel as well as modulation accuracy of the control channel at the specified subframe.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

   > **NOTE**
   > For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

   c. Press the **Enter** soft key.
4. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or

3 in other bandwidths.

6 *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

7 Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:

– **Single:** Testing on one single antenna connected to your JD700B series with a cable.

– **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.

8 Press the **Uplink-Downlink Configuration** soft key, and then select the number of uplink/downlink between one and six.

9 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

– To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

– To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table.

– To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

– To set the delay, complete the following steps:

a Press the **Delay** soft key to set the amount of delay in μs.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– To set the threshold for PDCCH, complete the following steps:

a Press the **PDCCH Threshold** soft key.

b Enter a value by using the numeric keys.

c Press the **dB** soft key.

– Toggle the **PDCCH Mode** soft key and select **REG** to calculate EVM based on Resource Element Group or **Avg** to calculate EVM after adding up all the PDCCH signals from one subframe.

Measurement example

Figure 125 Control channel measurement with LTE - TDD signal analyzer

Figure 126 Control channel measurement with LTE - TDD signal analyzer (MBMS On)

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for modulation tests" on page 268 for more information.

Using marker

You can use the **MARKER** hard key to place a marker on a resource block and display the IQ diagram for the selected resource block.

Procedure

1 Press the **MARKER** hard key.

2 Press the **Channel** soft key to select the channel to be displayed in the IQ diagram. The channel P-SS is selected by default.
3 Turn the rotary knob to move the highlight from one to another in the channel summary table.
4 Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the result of the selected channel.

Subframe

The Subframe measures the modulation accuracy of all the data and control channels at the specified subframe (1 ms).

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 To set the nominal channel bandwidth to be measured, complete the following steps:
   a Press the **Bandwidth** soft key.
   b Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3 To select the subframe number to be measured, complete the following steps:
   a Press the **Subframe No** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.

NOTE
For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

   c Press the **Enter** soft key.
4 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5 *Optional*. Toggle the **CFI** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
   – **Manual:** Sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.
6 *Optional*. Press the **PHICH Ng** soft key, and then select the option for the number of PHICH groups (Ng): **1/6**, **1/2**, **1, 2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.
7 Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:
   – **Single:** Testing on one single antenna connected to your JD700B series with a cable.
   – **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.
8 Press the **Uplink-Downlink Configuration** soft key, and then select the number of

uplink/downlink between one and six.

9 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

– To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

– To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table and either PMCH or PDSCH appears as well depending on the detected channel.

– To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

– To set the delay, complete the following steps:

  a Press the **Delay** soft key to set the amount of delay in µs.

  b Enter a value by using the numeric keys. You can also use the rotary knob.

  c Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

– To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

– Press the **PDSCH Modulation Type** soft key, and then select the modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **E-TM3.3**, **E-TM3.2**, **E-TM3.1**, **E-TM2**, **E-TM1.2**, and **E-TM1.1**. If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

– To set the threshold for PDSCH, complete the following steps:

  a Press the **PDSCH Threshold** soft key.

  b Enter a value by using the numeric keys.

  c Press the **dB** soft key.

– To set the threshold for PDCCH, complete the following steps:

  a Press the **PDCCH Threshold** soft key.

  b Enter a value by using the numeric keys.

  c Press the **dB** soft key.

– Toggle the **PDCCH Mode** soft key and select **REG** to calculate EVM based on Resource Element Group or **Avg** to calculate EVM after adding up all the PDCCH signals from one subframe.

– Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.

Measurement example

Figure 127 Subframe measurement with LTE - TDD signal analyzer

1) Regular view

2) Chart view

Figure 128 Subframe measurement with LTE - TDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 268 for more information.

Setting display

You can use the **TRACE/DISPLAY** hard key to view your measurement result with the chart.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **Chart** soft key between **On** and **Off** to display or dismiss the chart. If this setting is on, the **MARKER** hard key is activated.

Using marker

If you turn the Chart view on, you can use the **MARKER** hard key to place the marker at a specific symbol.

Procedure

1. Press the **MARKER** hard key.
2. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the marker on the chart.
3. Press the **Symbol** soft key to select the symbol number, to which the marker is placed.
4. Enter a value by using the numeric keys.
5. Press the **Enter** soft key.

Time alignment error

In eNode B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   - **a** Press the **Bandwidth** soft key.
   - **b** Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
4. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   - To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   - To set the delay, complete the following steps:
     - **a** Press the **Delay** soft key to set the amount of delay in μs.
     - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

   - To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See "Appendix E – Cyclic prefix table" on page 534 for OFDM parameter details by different bandwidth.

Measurement example

Figure 129 Time alignment error measurement with LTE - TDD signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for modulation tests" on page 268 for more information.

Data allocation map

The Data Allocation Map function represents data allocation as a mapping.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

   > **NOTE**
   > For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

   c. Press the **Enter** soft key.

4 To set the threshold for PDSCH, complete the following steps:
   - **a** Press the **PDSCH Threshold** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dB** soft key.

5 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   - To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   - To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, either PMCH or PDSCH appears on the screen depending on the detected channel.
   - To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
   - To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

Measurement example

Figure 130 Data allocation map measurement with LTE - TDD signal analyzer

Figure 131 Data allocation map measurement with LTE - TDD signal analyzer (MBMS On)

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 268 for more information.

Using marker

You can use the **MARKER** hard key to place the marker at a specific resource block and subframe.

Procedure

1. Press the **MARKER** hard key.
2. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the marker on the chart.
3. To select the resource block number, complete the following steps:
   a. Press the **RB Number** soft key.
   b. Enter the resource block number to select by using the numeric keys. You can also use the rotary knob to move the marker side by side.
   c. Press the **Enter** soft key.
4. To select the subframe block number, complete the following steps:
   a. Press the **Subframe No** soft key.
   b. Enter the subframe number to select by using the numeric keys. You can also use the rotary knob to move the marker up and down.
   c. Press the **Enter** soft key.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Modulation Test Limits** soft key to set the limits.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
PDSCH error vector magnitude if MBMS is off	EVM > PDSCH EVM	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
PMCH error vector magnitude if MBMS is on and a PMCH is detected	EVM > PMCH EVM	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
RMS for data error vector magnitude	EVM > Data EVM RMS	High Limit
Peak for data error vector magnitude	EVM> Data EVM Peak	High Limit
RS error vector magnitude	EVM > RS EVM	High Limit
P-SS error vector magnitude	EVM > P-SS EVM	High Limit
S-SS error vector magnitude	EVM > S-SS EVM	High Limit
Downlink RS power	Power > DL RS Power	High Limit Low Limit
P-SS power	Power > P-SS Power	High Limit Low Limit
S-SS power	Power > S-SS Power	High Limit Low Limit
PBCH power	Power > PBCH Power	High Limit Low Limit
Subframe power	Power > Subframe Power	High Limit Low Limit
OFDM symbol power	Power > OFDM Symbol Power	High Limit Low Limit
Time alignment error for MIMO	Time Alignment Error > MIMO	High Limit
Time alignment error for aggregation of component carriers (intra-band contiguous, intra-band non-contiguous, and inter-band)	Time Alignment Error > Carrier Aggregation	Intra Cont Intra Non-cont Inter Band
Time error	Time Error	High Limit Low Limit
I-Q origin offset	IQ Origin Offset	High Limit

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Performing auto measurements

Conformance test

The Conformance Test is to test if eNode-B meets some specified standards that have been developed for verification. Its test procedure and test setups have been developed by 3GPP. Test results can be saved as a `.csv` file type.

Setting limit for conformance test

You can set test limits for test item(s) in the auto measurement. Turning the test limit on for a test item makes the test item included in the conformance test.

Procedure

1. Press the ***LIMIT*** hot key.
2. To set the limit for BTS output power, complete the following steps:
   a. Press the **BTS Output Power** soft key.
   b. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.
   c. Press the **High Limit** soft key.
   d. Enter a value for the upper limit.
   e. Press the **dBm** unit soft key.
   f. Press the **Low Limit** soft key.
   g. Enter a value for the lower limit.
   h. Press the **dBm** unit soft key.
3. To set the limit for total power dynamic, complete the following steps:
   a. Press the **Total Power Dynamic** soft key.
   b. Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.
   c. Press the **Low Limit** soft key.
   d. Enter a value for the lower limit.
   e. Press the **dBm** unit soft key.
4. To set the limit for on/off power, press the **On/Off Power** soft key, and then do the following as needed:

To set the limit for	Select	Set
Off power	Off Power	High Limit
Transition period	Transition Period	High Limit

5. To verify signal quality, press the **Signal Quality** soft key, and then do the following as needed:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
Error vector magnitude	EVM	High Limit (QPSK) High Limit (16 QAM) High Limit (64 QAM)
Time alignment error	Time Alignment Error	High Limit
RS power	RS Power	High Limit Low Limit

6. To verify unwanted emissions, press the **Unwanted Emissions** soft key, and then do the

following as needed:

To set the limit for	Select	Set
Occupied bandwidth	Occupied BW	High Limit
Adjacent channel power ratio	ACLR	
Spectrum emission mask	SEM	Mask Type
Spurious emissions	Spurious Emissions	Range Table

7 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

8 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Setting measure setup

After setting frequency as described in the "Configuring test parameters" on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Bandwidth** soft key.
3. Select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
4. Press the **Sector** soft key, and then select the sector option: **Alpha**, **Beta**, or **Gamma**.
5. To set external offset, complete the following steps:
   - **a** Toggle the **External Offset** soft key and select **On**.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dB** soft key.
6. To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See "Using save" on page 32 for more information.
7. Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
8. When prompted on the screen, connect the cable from the **Spectrum Analyzer RF In** port of the instrument either to **Antenna Port 0** or **Antenna Port 1** of the eNode-B, and then change the TM mode on the eNode-B side.
9. Press the **Continue** soft key to continue testing.
10. Repeat the steps **8-9** until completion of the test.
    A conformance test report appears at the end of the test.
11. *Optional*. To stop running the test, press the **Abort** soft key.

Maintenance test

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 20 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

Following settings are required only when you run the Auto Measure Maintenance Test on the instrument using "Current" configuration setting. Additional settings are not required when you run Auto Measure using a scenario generated in the PC application software, JDViewer.

Setting limit for maintenance test

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **PvsT Test Limits** soft key, and then enable test limits as desired.
4. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

> **NOTE**
> You can use the **Allowed % Change** soft key for each test item to compare two measurement values displayed in the result table. This requires setting the **Display** mode to **Compare** in advance.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument’s limit settings in Auto Measure.
   – **Scenario:** Runs a test with a programmed scenario in JDViewer.
   The Scenario menu becomes activated.
3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   – **Now:** Lets the instrument run a test only once.
   – **Schedule:** Lets the instrument repeat tests as defined in the Set Timing.
   The Set Timing menu becomes activated.
5. To define a schedule for an auto measurement, complete the following steps:
   a Press the **Set Timing** soft key.
   b Press the **Start Time (HH:MM)** soft key.
   c Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d Press the **Stop Time (HH:MM)** soft key.
   e Enter the time in the HH:MM format, and then press the **Enter** soft key.
   f Press the **Time Interval** soft key.
   g Enter the amount of time in minutes, and then press the **Enter** soft key.
6. Press the **Settings** soft key, and then set the following:
   a Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
   b Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

c Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

d Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

e Toggle the **External Offset** soft key and select **On**.

f Enter a value by using the numeric keys, and then press the **dB** soft key.

g To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the Subframe No with the same PMCH subframe number.

h To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.

7. To save your settings and results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See “Using save” on page 32 for more information.
8. Press the **Run Test** soft key to start to run a test. The Auto Measure Results window appears at the end of the test.
9. To stop running the test, press the **Abort** soft key.
10. To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
    - **Screen:** You can view each measurement screen as the test progresses.
    - **Results:** You can view a measurement result table as the test progresses.
    - **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1. Toggle the **Display** soft key and select the display option:
    - **Result:** You can view the result table. The Display Result menu becomes activated.
    - **Settings:** You can view the measurement settings for the auto measurement.
2. Toggle the **Display Result** soft key and select the display result option:
    - **Full:** You can view detailed measurement readings with the pass/fail indication.
    - **Quick:** You can view only the Pass/Fail results.
    - **Compare:** You can compare two measurement values for each test time with the Allowed % Change setting on. You can view results vs. factory-defined or user-defined references.
3. To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.
4. Press the **Replace Reference** soft key to replace existing reference values for comparison with new measurement data.
5. Press the **Load From** soft key to select the location from which references file to be loaded.

Signal performance test

Unlike the other auto measurement tests, the Signal Performance Test runs measurements continuously.

Setting limit for signal performance test

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits > Channel Power** soft key, and then set the limits for the channel power. Other RF test items are not used in the signal performance test.
3. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
3. Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
4. Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
5. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured, from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
6. Toggle the **RF Profile** soft key between **On** and **Off** to turn on or off the RF profiling such as channel power and subframe frequency error.
7. Toggle the **Modulation Profile** soft key between **On** and **Off** to turn on or off the modulation profiling such as P-SS, S-SS, Data - QPSK, Data – 16 QAM, and Data – 64 QAM.
8. Toggle the **MIMO Profile** soft key between **On** and **Off** to turn on or off the MIMO profiling such as TX1 - RS0, TX2 - RS1, and time alignment error.
9. Toggle the **External Offset** soft key and select **On** to set the external offset value.
10. To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

DAS test

The Distributed Antenna System (DAS) testing enables you to check the degradation of performance in the signal transmission from a radio band to antennas distributed from it. You can save measurement values at both the radio band and antennas and then compare results with percentage of changes. You can also save test results in the `.csv` file format for ease of analysis.

Setting measure setup

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Settings** soft key and then set the following;
   - **a** Press the **Bandwidth** soft key and then select the nominal channel bandwidth to be measured from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
   - **b** Press the **MIMO** soft key, and then select the antenna number option: **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   - **c** Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
     - **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
     - **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
   - **d** Press the **Antenna Port** soft key, and then select the option: **Auto**, **0**, **1**, **2**, or **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   - **e** Toggle the **External Offset** soft key and select **On** to set the external offset value.
   - **f** To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**.
   - **g** To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
3. To save your settings, go to ***SAVE/LOAD*** **> Save > Save Setup** and then perform functions as you desire. See “Using save” on page 32 for more information.
4. Press the **Continue** soft key to do the reference test first or press the **Skip Reference Test** soft key if you already saved test results from the radio band under test.
5. Press the **FREQ/DIST** hard key and then set the frequency to be measured. See “Setting frequency” on page 235 for more information.
6. Press the **PREV** hard key.
7. Press the **Limit** soft key and then set the limits and allowed percentage change for each test item. See “Maintenance test” on page 271 for more information on setting limits.
8. Keep pressing the **PREV** hard key until you see the Run Test soft key.
9. Press the **Run Test** soft key. The instrument runs specified tests to gather reference measurement values. The measurement table appears when the reference test is done.
10. Press the **Continue** soft key to run the testing on an antenna (Ant 1).
11. *Optional*. To change the settings such as **External Offset**, press the **Settings** and then change the settings as needed.
12. Press the **Continue** soft key. The instrument runs the testing on Ant 1. The Ant 1 tab appears with the updated result table when the test is done.
13. To run the testing on the next antenna (Ant 2), press the **Run Test** soft key and then repeat the steps **11-12**. You can do the testing on up to 10 distributed antennas for one radio band.
14. To view test results for each antenna, press the **Select Antenna** soft key and then select the antenna tab number to display on the screen.

15 *Optional*. Press the **Delete** Test soft key to delete the selected antenna tab.

16 *Optional*. Press the **Retest Reference** soft key to obtain reference measurement values again.

17 *Optional*. To save your measurement results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

Measurement example

Figure 132 DAS measurement with LTE - TDD signal analyzer

Performing power statistics CCDF measurements

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **CCDF Length** soft key to set the length of the CCDF.

3 Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.

4 Press the **Enter** soft key.

Measurement example

Figure 133 CCDF measurement with LTE - TDD signal analyzer

Performing carrier aggregation measurements

Carrier aggregation enables a maximum of five multiple LTE carriers to be used together in order to provide high data rate required for LTE-Advanced. Component carriers to be aggregated can be intra-band contiguous, intra-band non-contiguous, or inter-band. The JD700B series provides carrier aggregation measurements supporting for all the different modes with carrier aggregation bands added to the channel standard. This functionality is activated if the license for the option 031 LTE-Advanced TDD is installed.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To configure parameters for up to 5 component carriers, complete the following steps:
   a. Press the **CA Configuration** soft key.
      The component carrier configuration window appears.
   b. Press the **CA Range** soft key.
   c. Enter the number of the component carrier to be set between one and five.
   d. Press the **Enter** soft key.
   e. Toggle the **Turn On** soft key and then select **On** to set parameters and view the results for the selected component carrier on the screen or **Off** to turn it off.
   f. Set the following parameters as needed:
      – **Center Frequency**, **Channel**, **Bandwidth**, **Cell ID**, **CFI**, **PHICH Ng**, **Antenna Port**, **MBMS On/Off**, **Cyclic Prefix**, and **PDSCH Modulation Type**

   g. To set more component carriers, repeat the steps **c-f**.
3. Press the ***MEASURE SETUP*** hot key again.
4. Toggle the **EVM Detection Mode** soft key and select **Single** or **Combine** as desired:
   – **Single:** Testing on one single antenna connected to your JD700B series with a cable.
   – **Combine:** Testing on multiple antennas connected to your JD700B series with a 2x1 or 4x1 combiner or an antenna.
5. To select the subframe number to be measured, do one of the following:
   – If the **EVM Detection Mode** is set to **Single**, press the **Subframe No** soft key and then set the subframe number.

> **NOTE**
> For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

   – If the **EVM Detection Mode** is set to **Combine**, toggle the **Subframe No** soft key and then select **0** or **5**.
6. To set the threshold for PDSCH, complete the following steps:
   a. Press the **PDSCH Threshold** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **dB** soft key.
7. Toggle the **PDSCH Precoding** soft key between **On** and **Off** to enable or disable the PDSCH precoding.
8. To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**.
   This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

Setting display

You can use the **TRACE/DISPLAY** hard key to select modulation analysis or spectrum analysis.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Toggle the **Display** soft key and select **MA** for modulation analysis or **SA** for spectrum analysis.
   The screen changes according to the selected option.

Measurement example

Figure 134 Carrier aggregation measurement with LTE - TDD signal analyzer (MA)

Figure 135 Carrier aggregation measurement with LTE - TDD signal analyzer (SA)

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 268 for more information.

Using marker

You can use the **MARKER** hard key to place the marker at a specific channel.

Procedure

1 Press the **MARKER** hard key.

2. Toggle the **Marker View** soft key between **On** and **Off** to display or dismiss the marker.
3. Press the **Channel** soft key to select the channel to be displayed on the IQ diagram.
4. Use the rotary knob to move and select an item under EVM.

Conducting LTE - TDD OTA measurements

The TDD LTE Over The Air (OTA) measurement has Channel Scanner, ID Scanner, Multipath Profile, Datagram, and Control Channel screens. The ID Scanner displays key parameters such as RSRP, RSRQ, RS-SINR, and S-SS RSSI. The Multipath Profile enables you to determine RF environmental conditions of testing area. The OTA Control Channel provides summary of all control channels including RS power variation over time.

Channel scanner

The Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

Setting channel/frequency

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To select the standard channel, complete the following steps:
   - a. Press the **Channel Std** soft key. The standard channel window appears. See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   - b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   - c. Press the **Select** soft key or the rotary knob to confirm the selection.
5. To set the channel number for the selected index, complete the following steps:
   - a. Press the **Channel Number** soft key.
   - b. Enter a value by using the numeric keys. You can also use the rotary knob.
   - c. Press the **Enter** soft key.
6. The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:
   - a. Press the **Integration Bandwidth** soft key.
   - b. Enter a value by using the numeric keys. You can also use the rotary knob.
   - c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
8. To add more channels to be scanned, repeat steps **3-6**.
9. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.

4 To set the center frequency for the selected index, complete the following steps:
   a Press the **Center Frequency** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5 To set the integration bandwidth for the selected index, complete the following steps:
   a Press the **Integration Bandwidth** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6 To add more channels to be scanned, repeat steps **3-5**.
7 Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Setting number of antenna ports

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Toggle the **MIMO** soft key and select **2x2** or **4x4**.
This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.

Measurement example

Figure 136 Channel scanner measurement with LTE - TDD OTA signal analyzer

ID scanner

The LTE mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

The ID Scanner shows key parameters such as RSRP (Reference Signal Received Power) and RSRQ (Reference Signal Received Quality) that predict the downlink coverage quickly.

- RSRPs from entire cells help to rank between the different cells as input for handover and cell reselection decisions.

- RSRQ provides additional information when RSRP is not sufficient to make a reliable handover or cell reselection decision.

All of the parameters for OTA ID scanner can be plotted on map data such as Google Maps and Google Earth by using JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 137 ID scanner measurement with LTE - TDD OTA signal analyzer

Multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. Toggle the **Display** soft key and select **RS** or **Sync**.
   The RS Window soft key becomes activated if RS is selected.
4. Press the **RS Window** soft key, if RS is selected, and then select the RS window option: **2 µs**, **4 µs**, or **8 µs**.
5. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 138 Multipath profile measurement with LTE - TDD OTA signal analyzer

Control channel

DL RS power is the resource element power of Downlink Reference Symbol. The absolute DL RS power is indicated on the BCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the BCH and the DL RS power at the BS antenna connector.

The OTA Control Channel provides summary of all control channels including RS power trend over time. GPS coordinates (latitude and longitude) will be displayed on the screen if a GPS antenna is connected and locked to the GPS satellites.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the nominal channel bandwidth to be measured, complete the following steps:
   - a. Press the **Bandwidth** soft key.
   - b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.
3. To select the subframe number to be measured, complete the following steps:
   - a. Press the **Subframe No** soft key.
   - b. Enter a value by using the numeric keys. You can also use the rotary knob.

NOTE
For MBMS testing, this subframe number must be neither 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel’s subframe number.

c. Press the **Enter** soft key.

4. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:
   – **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
   – **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.
5. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to test on MIMO channels.
   – To assign a antenna port number automatically or manually, press the **Antenna Port** soft key and select the option: **Auto**, **0**, **1**, **2**, and **3**. If the option 031 LTE-Advanced TDD is not installed or if the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
   – To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.
   – To turn the Multimedia Broadcast Multicast Service (MBMS) feature on or off, toggle the **MBMS** soft key and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe No** with the same PMCH subframe number. If this setting is on, the measurement item “MBSFN RS” appears in the result table.
   – To set the Multicast Broadcast Single Frequency Network (MBSFN) detection automatically or manually for MBMS testing, toggle the **MBSFN** soft key and select **Auto** or **Manual**. An automatically detected or manually entered MBSFN ID appears on the screen.
6. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Setting limit for OTA control channel

Procedure

1. Press the ***LIMIT*** hot key.
2. Select the test item(s) and set the limit(s) as needed:

To set the limit for	Select	Set
P-SS error vector magnitude	P-SS EVM	High Limit
S-SS error vector magnitude	S-SS EVM	High Limit
RS error vector magnitude	RS EVM > RS0 EVM RS EVM > RS1 EVM RS EVM > RS2 EVM RS EVM > RS3 EVM	High Limit
Frequency error	Frequency Error	High Limit Low Limit
Time error	Time Error	High Limit Low Limit
Time alignment error	Time Alignment Error	High Limit

3. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting display

You can use the **TRACE/DISPLAY** hard key to select the display option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Toggle the **Display** soft key and select **Power** or **EVM**.
The screen changes according to the selected option.

Measurement example

Figure 139 Control channel measurement with LTE - TDD OTA signal analyzer

Datagram

The OTA Datagram is a time-varying spectral representation that shows how the power of a signal varies with time. The power allocated to the specific resource block will be represented with an amplitude axis (in dBm) and the waterfall diagram will show the trend of past resource block power over certain period. Using a marker function facilitates analysis of accumulated resource block power for data utilization.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 234, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the nominal channel bandwidth to be measured, complete the following steps:

- **a** Press the **Bandwidth** soft key.
- **b** Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**,

and **20 MHz**.

3 To select the subframe number to be measured, complete the following steps:

- **a** Press the **Subframe No** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **Enter** soft key.

4 *Optional*. Toggle the **Cell ID** soft key and select **Auto** or **Manual** as desired:

- **Auto:** Lets the instrument detect the Cell ID for the LTE signal automatically.
- **Manual:** Sets a specific Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 *Optional*. To set the threshold for PDSCH, complete the following steps:

- **a** Press the **PDSCH Threshold** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **dB** soft key.

6 To set the time cursor at a specific position, complete the following steps:

- **a** Toggle the **Time Cursor** soft key and select **On**.
- **b** Turn the rotary knob to move the time cursor. You can also enter a value and then press the **Enter** soft key.

> **NOTE**
> Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

7 To start a new measurement, press the **Reset/Restart** soft key.

8 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

- To select the number of antenna ports, toggle the **MIMO** soft key and select **2x2** or **4x4**. This MIMO (Multiple Input Multiple Output) setting is activated only if the option 031 LTE-Advanced TDD is installed with a license number. If not, the instrument sets this option to 2x2 by default. A 2x1 or 4x1 RF combiner is also required to able to test on MIMO channels.
- To select the cyclic prefix, toggle the **Cyclic Prefix** soft key and select **Normal** or **Extended**. See “Appendix E – Cyclic prefix table” on page 534 for OFDM parameter details by different bandwidth.

9 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 140 Datagram measurement with LTE - TDD signal analyzer

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping.
   Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 234.
3. To load your map file, complete the following steps:
   a. Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument’s display. You must save your map file (`.mcf`) into the “**SavedMap**” folder of your USB drive so that you can load them onto your instrument.

   b. Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
   See “Using load” on page 34 for more information.
4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.

With the **Full** setting, you can view all the collected points of the route without the loaded map.

– To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.

6 Press the **Plot Item** soft key, and then select the measurement option: **RSRP**, **RSRQ**, **RS-SINR**, **S-SS RSSI**, **P-SS Power**, **S-SS Power**, or **S-SS Ec/Io**.

NOTE
The instrument collects the strongest Cell ID's data to plot points.

7 Press the **Bandwidth** soft key to set the nominal channel bandwidth to be measured, and then select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**.

8 Toggle the **Plot** soft key and select **Start** to start plotting.

9 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

NOTE
For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

10 Toggle the **Plot** soft key and select **Stop** to stop plotting.

11 Press the ***SAVE/LOAD*** hot key to save the result.
See "Using save" on page 32 for more information.

NOTE
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit for route map

You can set the thresholds for each test item.

Procedure

1 Press the ***LIMIT*** hot key.

2 Select the plot items and set the limits as needed:

To set the limit for	Select	Set
RSRP	RSRP	Excellent, Very Good, Good, Fair, Poor (dBm)
RSRQ	RSRQ	Good, Fair, Poor (dB)
RS-SINR	RS-SINR	Good, Fair, Poor (dB)
S-SS RSSI	S-SS RSSI	Excellent, Very Good, Good, Fair, Poor (dBm)
P-SS Power	P-SS Power	Excellent, Very Good, Good, Fair, Poor (dBm)
S-SS Power	S-SS Power	Excellent, Very Good, Good, Fair, Poor (dBm)
S-SS Ec/Io	S-SS Ec/Io	Good, Fair, Poor (dB)

3 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
See "Using save" on page 32 for more information.

Measurement example

Figure 141 Route map measurement with LTE - TDD OTA signal analyzer

1) **RSRP**

2) **RSRQ**

3) RS-SINR

4) S-SS RSSI

5) P-SS Power

6) S-SS Power

7) S-SS Ec/Io

10

Chapter 10 Using CDMA Signal Analyzer

This chapter provides instructions for using the CDMA Signal Analyzer function (option 020) with the CDMA OTA Analyzer function (option 040). Topics discussed in this chapter are as follows:

Introduction

This CDMA Signal Analyzer can be used to test a CDMA transmitter including cdmaOne and cdma2000 signals to check the base station's compliance with following standards documentation.

- 3GPP2 C.S0002 Physical Layer Standard for cdma2000 Spread Spectrum Systems
- 3GPP2 C.S0010 Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Station

This instrument automatically makes standard defined measurements using the measurement methods and limits as defined in the standards. Detailed measurement results allow you to analyze cdmaOne and cdma2000 system performance.

- cdmaOne uses dual BPSK (Binary Phase-Shifting Key) for the forward link and OQPSK (Offset Quadrature Phase Shift Keying) for the reverse link.
- cdma2000 uses QPSK (Quadrature Phase Shift Keying) modulation for the forward link and QPSK modulation with HPSK spreading for the reverse link. Both forward and reverse links may have several channels, and individual characteristics for each channel. The chip rate depends on the mode selected.

You may alter the measurement parameters for specialized analysis. Pass/Fail testing with standard defined or user defined upper and lower limits and the Pass/Fail indictor help you to determine base station performance easily.

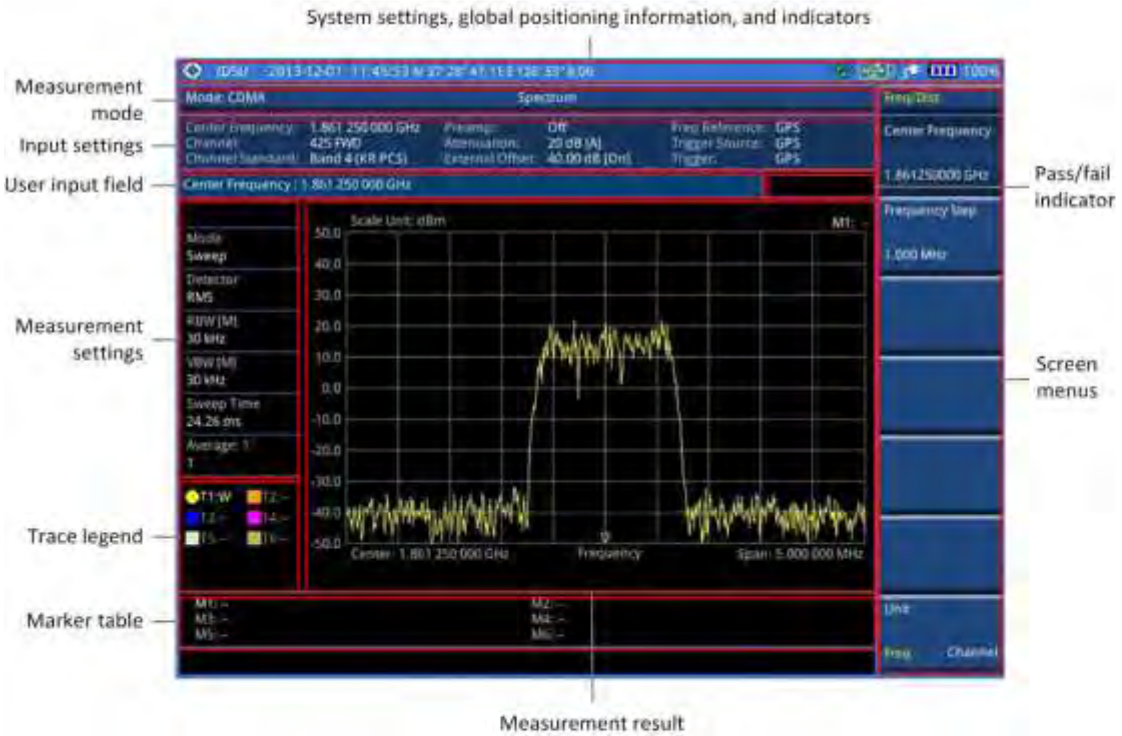
This instrument provides the following measurement tools for CDMA system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask (SEM)
  - Adjacent Channel Power Ratio (ACPR)
  - Multi-ACPR
  - Spurious Emissions
- Modulation Analysis
  - Constellation
  - Code Domain Power
  - Codogram
  - Received Code Strength Indicator (RCSI)
  - CDP Table
- Auto Measure
- Power Statistics CCDF
- Over The Air (OTA)
  - Channel Scanner
  - PN Scanner
  - Multipath Profile
  - Code Domain Power
  - Route Map

Display overview

Figure 142 provides descriptions for each segment of the measurement screen.

Figure 142 CDMA signal analyzer measurement screen



Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 143 Direct connection

Indirect connection

Procedure

1. Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 144 Indirect connection

> **CAUTION**
> The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

> **NOTE**
> For accurate PN Offset and Time Offset measurements with the CDMA Signal Analyzer function, a PP2S should be connected to the External Trigger. Without a GPS connection, measurement results could be invalid numbers.

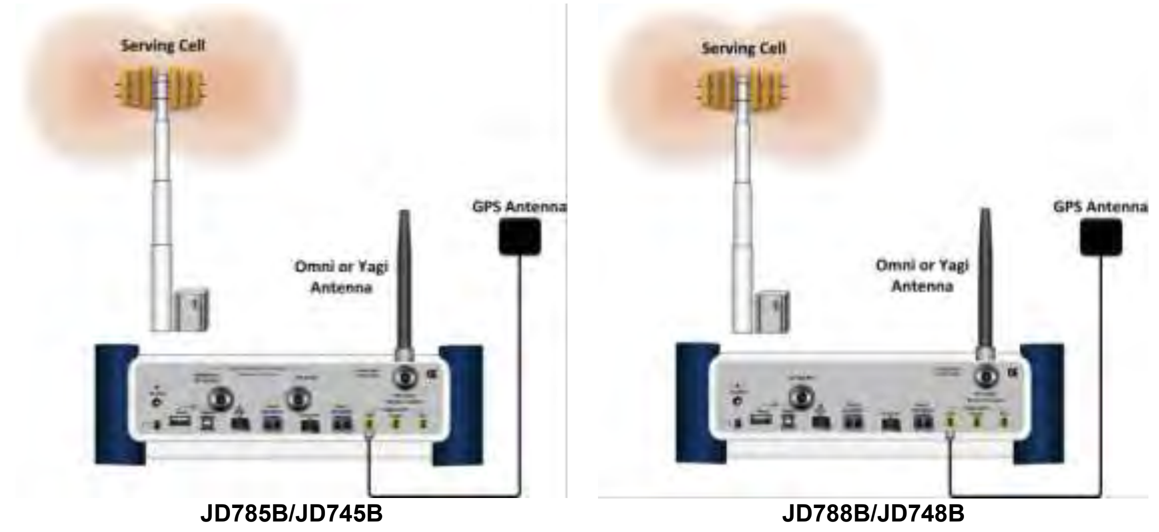
Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Figure 145 OTA connection



Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **CDMA** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   – **Spectrum**
   – **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACPR**, **Multi-ACPR**, or **Spurious Emissions**
   – **Modulation > Constellation**, **Code Domain Power**, **Codogram**, **RCSI**, or **CDP Table**
   – **Auto Measure**
   – **Power Statistics CCDF**
   – **OTA > Channel Scanner**, **PN Scanner**, **Multipath Profile**, **Code Domain Power**, or **Route Map**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.

3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See "Appendix C – Band, frequency & channel standard"" on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Press the **Channel Number** soft key.
5. Enter a value by using the numeric keys. You can also use the rotary knob.
6. Press the **Enter** soft key.
7. The instrument automatically displays the corresponding center frequency value for the selected channel number.
8. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   a. Press the **Channel Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.

NOTE
This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   a. Press the **Reference Level** soft key.
   b. Enter a value by using the numeric keys or the rotary knob with 10 dB increments.

c. Press the **dBm** soft key or the **ENTER** hard key.
This unit key name changes according to the setting in the Units menu.

> **NOTE**
> In the measurements such as **Code Domain Power**, **Codogram**, and **RCSI**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
      a. Select **Attenuation > Manual**.
      b. Press the **Attenuation Value** soft key to set the level.
      c. Enter a value in fives by using the numeric keys.
      d. Press the **dB** soft key or the **ENTER** hard key.
   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases acoordingly.

***Optional*. To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.

2 Toggle the **Preamp** soft key and select **On** or **Off** as needed.

NOTE
You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1 Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements. Connecting an external trigger is necessary for accurate modulation measurements on CDMA systems.

Procedure

1 Press the ***TRIGGER*** hot key.
2 Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Table 15 Standards of external clock operation

Clock	Type	Reference	Port	Switching Standard
External Reference	Internal	Internal 10 MHz		Default
	External	External Ref Clock	Ext Ref (SMA)	Manual switching (Input signal level >-3 dBm)
	GPS	GPS Clock	GPS (SMA)	Automatic switching (GPS signal received)
Trigger	Internal	Internal Trigger		Default
	External	External Trigger	Trigger (SMA)	Manual switching
	GPS	GPS	GPS (SMA)	Manual switching

Figure 146 Connection ports for external reference clock

Procedure

1 Connect an external reference or a GPS antenna to the JD700B series.

2 Press the ***SYSTEM*** hot key.

3 Press the **Freq Reference** soft key, and then select the reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, or **GPS**.

NOTE
When a GPS antenna is connected and locked, GPS coordinates (longitude and latitude) are displayed on the screen and frequency reference is automatically set to GPS in the **System > Freq Reference**.

Table 16 External reference indicators

Type	Indicator	Description
Internal	(green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.
External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

If you have configured test parameters as described in the "Configuring test parameters" on page 297, your measurement result is displayed on the screen as like the following example, Figure 147.

Figure 147 Spectrum measurement screen with CDMA signal analyzer

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.

3 Toggle the **Trace View** soft key and select **On**.

4 Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 To select the detection option, press the **More (1/2) > Detectors**, and then do one of the following:

To display	Select
Random noise better than the peak without missing signals	Normal
The highest value in each data point	Peak
The root mean squared average power across the spectrum	RMS
The lowest value in each data point	Negative Peak
The center value in each data point	Sample

6 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

7 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

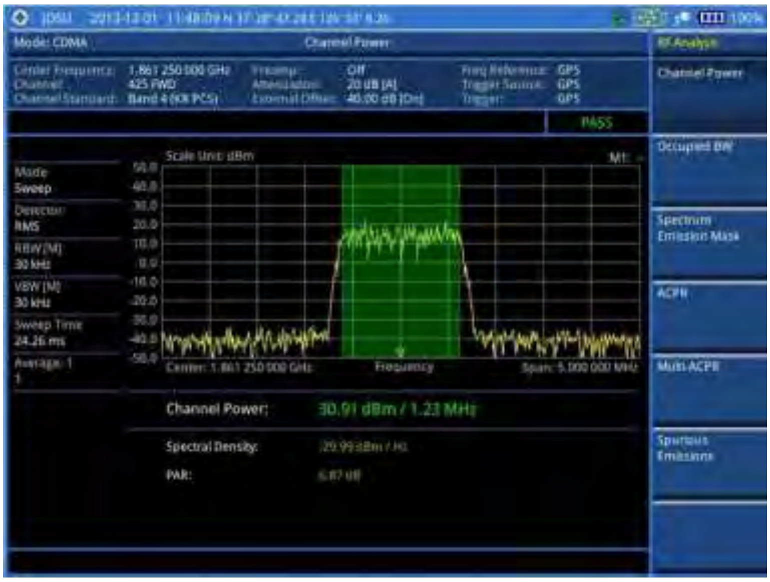
Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density (PSD) and peak to average ratio (PAR) of the signal within the channel bandwidth (1.23 MHz for cdmaOne).

After configuring test parameters as described in the "Configuring test parameters" on page 297, your measurement result is displayed on the screen as like the following example, Figure 148.

Figure 148 Channel power measurement with CDMA signal analyzer



> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 310 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

After configuring test parameters as described in the "Configuring test parameters" on page 297, your measurement result is displayed on the screen as like the following example, Figure 149.

Figure 149 Occupied bandwidth measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 310 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP2 specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, your measurement result is displayed on the screen as like the following example, Figure 150.

Figure 150 SEM measurement with CDMA signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 310 for more information.

ACPR

The Adjacent Channel Power Ratio (ACPR) is defined as the ratio of the average power in the adjacent frequency channel (or offset) to the average power in the transmitted frequency channel. It may be expressed as the ratio of the integrated signal power in the adjacent channel to the integrated signal power in the main channel.

After configuring test parameters as described in the “Configuring test parameters” on page 297, your measurement result is displayed on the screen as like the following example, Figure 151.

Figure 151 ACPR measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 310 for more information.

Multi-ACPR

The Multi-ACPR measurement is used to perform multi-channel ACPR measurements with as many channels as possible. It helps you to measure ACPR in multi-channel transmitting base station environment.

Setting frequency for Multi-ACPR

You can set the frequency with either frequency or channel number.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the frequency, do one of the following:
   – To set the center frequency, complete the following steps:
     a. Toggle the **Unit** soft key and select **Freq**.
     b. Press the **Lowest Frequency** soft key to set the starting center frequency.
     c. Enter a value by using the numeric keys. You can also use the rotary knob.
     d. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
     e. Press the **Highest Frequency** soft key to set the stopping center frequency.
     f. Enter a value by using the numeric keys. You can also use the rotary knob.
     g. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   – To set the channel number, complete the following steps:
     a. Toggle the **Unit** soft key and select **Channel**.
     b. To select the standard channel, press the **Channel Std** soft key and then select the band to be measured.
     c. Press the **Lowest Channel** soft key to set the starting channel.
     d. Enter a value by using the numeric keys. You can also use the rotary knob.
     e. Press the **Enter** soft key.
     f. Press the **Highest Channel** soft key to set the stopping channel.
     g. Enter a value by using the numeric keys. You can also use the rotary knob.
     h. Press the **Enter** soft key.

After configuring test parameters, your measurement result is displayed on the screen as like the following example, Figure 152.

Figure 152 Multi-ACPR measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 310 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.
4. To set up the test limits for Pass/Fail indication, complete the following steps:
   a. Press the **Start Limit** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.

- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:

- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Press the **PREV** hard key.

7 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

After configuring test parameters as described in the “Configuring test parameters” on page 297, your measurement result is displayed on the screen as like the following example, Figure 153.

Figure 153 Spurious emissions measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 310 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACPR	ACPR	(On/Off only)
Multi-ACPR	Multi-ACPR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting modulation measurements

In order to make accurate measurements of time offset and PN, you must connect an external trigger before making a modulation measurement.

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.

3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 154 Constellation measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 317 for more information.

Code domain power

The Code Domain Power (CDP) measures the distribution of power across the set of code channels, normalized to the total power. It helps to verify that each code channel is operating at its proper level and to identify problems throughout the transmitter design from coding to the RF section. System imperfections such as amplifier non-linearity will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:

- **a** Toggle the **PN Offset** soft key between **Auto** and **Manual**.
- **b** Enter a value by using the numeric keys to set manually.
- **c** Press the **Enter** soft key.

3 To set the incremental step for the PN offset, complete the following steps:

- **a** Press the **PN Increment** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

4 To set the threshold between Auto and Manual, complete the following steps:

- **a** Press the **Threshold** soft key. Its default setting is -27 dB.
- **b** Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
- **c** Press the **Enter** soft key.

5 Toggle the **Q-Paging** soft key between **On** and **Off** to enable or disable the quick page channel that indicates the power of Quick Page Walsh code 80.

6 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 155 Code domain power measurement with CDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 317 for more information.

Setting display

You can view your measurement results in a different view option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the **Code Order** soft key, and then select the code order option from the following choices:

- **Hadamard:** To assign the number based on Walsh code order and display the measured code power according to the assigned number in sequence.

– **Bit Reverse:** Code number in binary bit is reversed relative to the Hadamard method.

3 Toggle the **Base Code Length** soft key and select the base Walsh code number: **64** or **128**.

Codogram

The Codogram displays how the code level is changing over time and makes it easier for you to view traffic channels as they initiate and terminate and to track traffic channels call levels over time. The Codogram measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the Pseudo-Noise (PN) offset, complete the following steps:

  a Toggle the **PN Offset** soft key between **Auto** and **Manual**.

  b Enter a value by using the numeric keys to set manually.

  c Press the **Enter** soft key.

3 To set the incremental step for the PN offset, complete the following steps:

  a Press the **PN Increment** soft key.

  b Enter a value by using the numeric keys.

  c Press the **Enter** soft key.

4 To set the threshold between Auto and Manual, complete the following steps:

  a Press the **More (1/2) > Threshold** soft key. Its default setting is -27 dB.

  b Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.

  c Press the **Enter** soft key.

5 Toggle the **More (1/2) > Q-Paging** soft key between **On** and **Off** to enable or disable the quick page channel that indicates the power of Quick Page Walsh code 80.

6 To set the time interval, complete the following steps:

  a Press the **Time Interval** soft key.

  b Enter a value by using the numeric keys.

  c Press the **Enter** soft key.

7 To place the time cursor to analyze your measurements, complete the following steps:

  a Toggle the **Time Cursor** soft key between **On** and **Off** to enable or disable the time cursor.

  b Enter a value by using the numeric keys.

  c Press the **Enter** soft key.

> **NOTE**
> When the time cursor is enabled, the measurement is put on hold and information about the time cursor is displayed.

8 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 156 Codogram in full view with CDMA signal analyzer

Setting display

You can view your measurement results in a different view option.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the **Code Order** soft key, and then select the code order option from the following choices:

- **Hadamard:** To assign the number based on Walsh code order and display the measured code power according to the assigned number in sequence.
- **Bit Reverse:** Code number in binary bit is reversed relative to the Hadamard method.

3 Toggle the **Base Code Length** soft key and select the base Walsh code number: **64** or **128**.

RCSI

The Received Code Strength Indicator (RCSI) is used to track the power variation of cdmaOne or cdma2000 control channels such as Pilot, Paging, Sync, and Q-Paging over time. The RCSI measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the Pseudo-Noise (PN) offset, complete the following steps:

   a Toggle the **PN Offset** soft key between **Auto** and **Manual**.

   b Enter a value by using the numeric keys to set manually.

   c Press the **Enter** soft key.

3 To set the incremental step for the PN offset, complete the following steps:

   a Press the **PN Increment** soft key.

   b Enter a value by using the numeric keys.

   c Press the **Enter** soft key.

4 To set the threshold between Auto and Manual, complete the following steps:

   a Press the **Threshold** soft key. Its default setting is -27 dB.

   b Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.

   c Press the **Enter** soft key.

5 Toggle the **Q-Paging** soft key between **On** and **Off** to enable or disable the quick page channel that indicates the power of Quick Page Walsh code 80.

6 Press the **Alarm Code** soft key, and then select the alarm code option: **None**, **Pilot**, **Page**, **Sync**, or **Quick Page**.

7 To set the alarm mask, complete the following steps:

   a Press the **Set Mask** soft key.

   b Enter a value by using the numeric keys.

   c Press the **[dB|dBm]** soft key.

8 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 157 RCSI measurement with CDMA signal analyzer

Setting display

You can view your measurement results in a different view option.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Code Order** soft key, and then select the code order option from the following choices:
   – **Hadamard:** To assign the number based on Walsh code order and display the measured code power according to the assigned number in sequence.
   – **Bit Reverse:** Code number in binary bit is reversed relative to the Hadamard method.
3. Toggle the **Base Code Length** soft key and select the base Walsh code number: **64** or **128**.

CDP Table

The CDP Table is used to look at a numeric and textual description of all the active code channels in the signal.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.
   b. Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   c. Press the **Enter** soft key.
5. Toggle the **Q-Paging** soft key between **On** and **Off** to enable or disable the quick page channel that indicates the power of Quick Page Walsh code 80.

Measurement example

Figure 158 CDP Table measurement with CDMA signal analyzer

Setting display

If the CDP table spans over to the next page(s), you can change pages up and down to view your measurement results.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Code Order** soft key, and then select the code order option from the following choices:
   - **Hadamard:** To assign the number based on Walsh code order and display the measured code power according to the assigned number in sequence.
   - **Bit Reverse:** Code number in binary bit is reversed relative to the Hadamard method.
3. Toggle the **Base Code Length** soft key and select the base Walsh code number: **64** or **128**.
4. Select **Page Up** or **Page Down** as needed to scroll the screen up and down.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the Modulation Test Limits soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
Time offset	Time Offset	High Limit Low Limit
Waveform quality (Rho)	Rho	Low Limit

Carrier feed through	Carrier Feed Through	High Limit
Pilot power	Pilot Power	High Limit [Abs|Rel] Low Limit [Abs|Rel]
Highest level among inactive channels	Max Inactive	High Limit

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

NOTE
The Time Offset compares the PN offset timing with the overall system time and the instrument checks the start of PN offset in comparison to either the GPS signal or the even second clock signal.

NOTE
The Rho measures the modulation quality for a CDMA transmitter along with EVM and Walsh Channel Power. It includes all errors occurred along the transmitter chain such as base band filtering, abnormality of I/Q modulator and distortion in power amplifier. A perfect Rho value is 1.0 indicating that all of the power is being transmitted correctly.

NOTE
The Carrier Feed Through is a result of the RF carrier signal feeding through the I/Q modulator and riding on the output circuitry without being modulated.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit for auto measure

You can set test limits for test item(s) in the auto measurement.

Procedure

1 Press the ***LIMIT*** hot key.

2 Press the **RF Test Limits** soft key, and then enable test limits as desired.

3 Press the **Modulation Test Limits** soft key, and then enable test limits as desired.

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 297, you

can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument's limit settings in Auto Measure.
   – **Scenario:** Runs a test with a programmed scenario in JDViewer.
   The Scenario menu becomes activated.
3 To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4 Toggle the **Test Time** soft key and select the test time option:
   – **Now:** Lets the instrument run a test only once.
   – **Schedule:** Lets the instrument repeat tests as defined in the Set Timing.
   The Set Timing menu becomes activated.
5 To define a schedule for an auto measurement, complete the following steps:
   a Press the **Set Timing** soft key.
   b Press the **Start Time (HH:MM)** soft key.
   c Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d Press the **Stop Time (HH:MM)** soft key.
   e Enter the time in the HH:MM format, and then press the **Enter** soft key.
   f Press the **Time Interval** soft key.
   g Enter the amount of time in minutes, and then press the **Enter** soft key.
6 To set external offset, complete the following steps:
   a Toggle the **External Offset** soft key and select **On**.
   b Enter a value by using the numeric keys, and then press the **dB** soft key.
7 To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See “Using save” on page 32 for more information.
8 Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
9 To stop running the test, press the **Abort** soft key.
10 To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
   – **Screen:** You can view each measurement screen as the test progresses.
   – **Results:** You can view a measurement result table as the test progresses.
   – **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1 Toggle the **Display** soft key and select the display option:
   – **Result:** You can view the result table.
   The Display Result menu becomes activated.
   – **Settings:** You can view the measurement settings for the auto measurement.

2 Toggle the **Display Result** soft key and select the display result option:
   – **Full:** You can view detailed measurement readings with the pass/fail indication.
   – **Quick:** You can view only the Pass/Fail results.

3 To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Performing power statistics CCDF measurements

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **CCDF Length** soft key to set the length of the CCDF.
3 Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.
4 Press the **Enter** soft key.

Measurement example

Figure 159 CCDF measurement with CDMA signal analyzer

Conducting CDMA OTA measurements

This Over The Air (OTA) measurement has channel scanner, PN scanner, multipath profile, and Code Domain power screens. It is used to verify CDMA transmitter performance at any location providing reflective measurements and identifying signals providing from different sites. The Code Domain power shows not only modulation performance metric but also amplifier capacity and code utilization metric. The Amplifier capacity (code utilization) measurement is an estimate of the amount of power amplifier capacity (code utilization) that is being used expressed in percent of maximum.

Channel scanner

Setting channel/frequency

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
      See "Appendix C – Band, frequency & channel standard" on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
5. To set the channel number for the selected index, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
6. The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
8. To add more channels to be scanned, repeat steps **3-6**.
9. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To set the center frequency for the selected index, complete the following steps:
   a. Press the **Center Frequency** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. To add more channels to be scanned, repeat steps **3-5**.

7 Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Setting measure setup

After configuring other test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
3. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Setting limit for OTA channel scanner

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Limit Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Limit Line** soft key between **On** and **Off** to display or dismiss the limit line.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 160 Channel scanner measurement with CDMA OTA signal analyzer

PN scanner

Each access network sector has a unique PN offset. The PN Scanner is used to identify all the active PNs in an area.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
3. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 161 PN scanner measurement with CDMA OTA signal analyzer

Multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the incremental step for the PN offset, complete the following steps:

  a Press the **PN Increment** soft key.

  b Enter a value by using the numeric keys.

  c Press the **Enter** soft key.

3 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 162 Multipath profile measurement with CDMA OTA signal analyzer

Code domain power

Channels with high correlation factors are determined to be active channels and are indicated as such on the display. Once the channels are decoded, the analyzer determines the power of each channel relative to the total signal power.

This measurement helps to verify that each code channel is operating at its proper level and helps to identify problems throughout the transmitter design from the coding to the RF section. System imperfections, such as the non-linearity of amplifiers, will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters as described in “Configuring test parameters” on page 297, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.

   - **b** Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   - **c** Press the **Enter** soft key.
5. Toggle the **Q-Paging** soft key between **On** and **Off** to enable or disable the quick page channel that indicates the power of Quick Page Walsh code 80.
6. To set the maximum amplifier power, complete the following steps:
   - **a** Press the **Max Amplifier Power** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dBm** soft key.
7. To set the pilot power, complete the following steps:
   - **a** Press the **Pilot Power** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **dBm** soft key.
8. To set the threshold for pilot dominance, complete the following steps:
   - **a** Press the **More (1/2) > Pilot Dominance >** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **Enter** soft key.

> **NOTE**
> Recommended value is 10. Color of the Pilot Dominance indicator on the screen bases on this setting.

9. To set the threshold for multipath power, complete the following steps:
   - **a** Press the **More (1/2) > Multipath Power <** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **Enter** soft key.

> **NOTE**
> Recommended value is one. Color of the multipath power indicator on the screen bases on this setting.

10. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 163 Code domain power measurement with CDMA OTA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication.

Setting display

You can view your measurement results in a different view option.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Code Order** soft key, and then select the code order option from the following choices:
   – **Hadamard:** To assign the number based on Walsh code order and display the measured code power according to the assigned number in sequence.
   – **Bit Reverse:** Code number in binary bit is reversed relative to the Hadamard method.
3. Toggle the **Base Code Length** soft key and select the base Walsh code number: **64** or **128**.

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping.
   Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 297.
3. To load your map file, complete the following steps:

a Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument's display. You must save your map file (`.mcf`) into the "**SavedMap**" folder of your USB drive so that you can load them onto your instrument.

b Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
See "Using load" on page 34 for more information.

4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen. With the **Full** setting, you can view all the collected points of the route without the loaded map.

   – To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.
6. Press the **Plot Item** soft key, and then select the measurement option: **Pilot Power** or **Ec/Io**.
7. To set the incremental step for the PN offset, complete the following steps:
   a Press the **PN Increment** soft key.
   b Enter a value by using the numeric keys.
   c Press the **Enter** soft key.
8. Toggle the **Plot** soft key and select **Start**.
9. Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

10. Toggle the **Plot** soft key and select **Stop** to stop plotting.
11. Press the ***SAVE/LOAD*** hot key to save the result.
See "Using save" on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the four different color indicators for Pilot power or Ec/Io.

Procedure

1. Press the ***LIMIT*** hot key.
2. To set the limits for pilot power if you have selected Pilot for the plot item, complete the following steps:
   a Press the **Pilot Power** soft key.
   a Press the **Excellent** soft key to set its threshold.
   b Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
   c Press the **Very Good** soft key to set its threshold.

- **d** Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
- **e** Press the **Good** soft key to set its threshold.
- **f** Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
- **g** Press the **Fair** soft key to set its threshold.
- **h** Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.
- **i** Press the **Poor** soft key to set its threshold.
- **j** Enter a value, and then press the **dBm** soft key. You can also use the rotary knob.

3 To set the limits for Ec/Io if you have selected as for the plot item , complete the following steps:

- **a** Press the **Ec/Io** soft key.
- **b** Press the **Good** soft key to set its threshold.
- **c** Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
- **d** Press the **Fair** soft key to set its threshold.
- **e** Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
- **f** Press the **Poor** soft key to set its threshold.
- **g** Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.

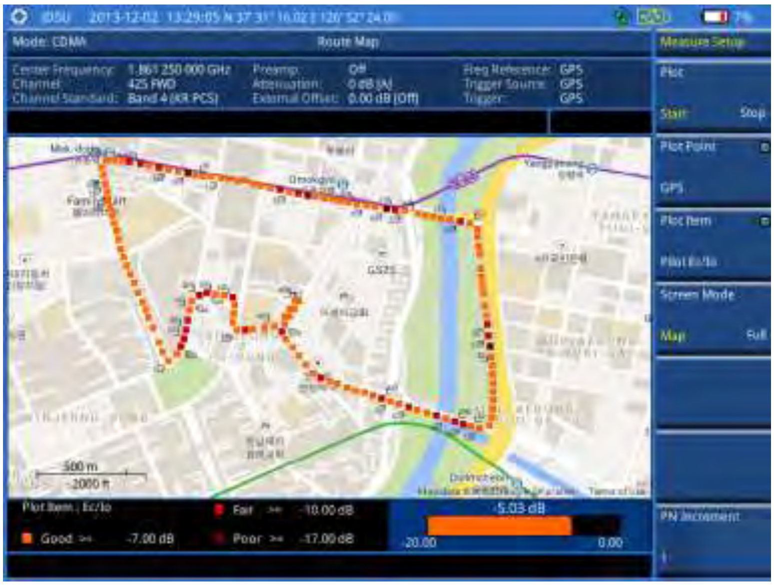
4 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings.
See “Using save” on page 32 for more information.

Measurement example

Figure 164 Route map measurement with CDMA OTA signal analyzer

1) Pilot Power

2) **Pilot Ec/Io**



Chapter 11 Using EV-DO Signal Analyzer

This chapter provides instructions for using the EV-DO Signal Analyzer function (option 021) with the EV-DO OTA Analyzer function (option 041). Topics discussed in this chapter are as follows:

Introduction

The EV-DO Signal Analyzer of the JD700B series performs power and spectrum measurements as well as modulation analysis to test the proper transmitter performance of EV-DO systems. It performs conformance testing according to the following standards providing a simple Pass/Fail indication on each test.

- 3GPP2 C.S0024-B. cdma2000 High Rate Packet Data Air Interface Specification
- 3GPP2 C.S0032-B. Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network

You may alter the measurement parameters for specialized analysis. Pass/Fail testing with standard defined or user defined upper and lower limits and the Pass/Fail indictor help you to determine base station performance easily.

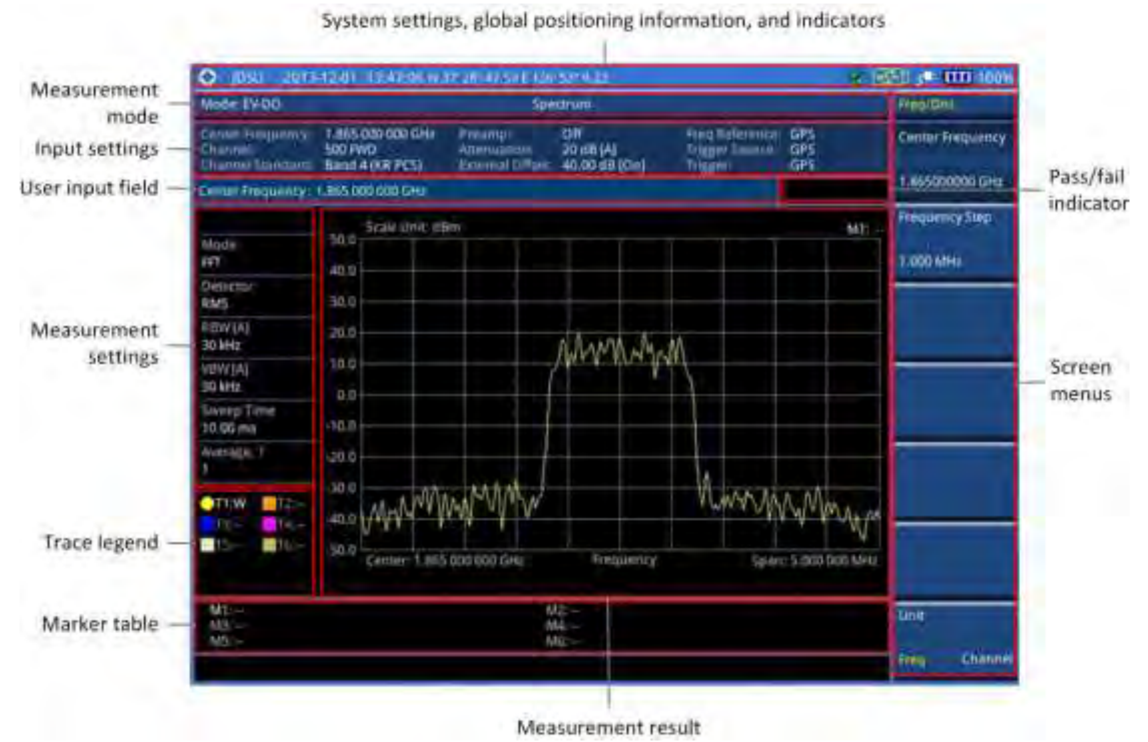
This instrument provides the following measurement tools for EV-DO system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask (SEM)
  - Adjacent Channel Power Ratio (ACLR)
  - Multi-ACPR
  - Spurious Emissions
- Power vs. Time: Idle Slot and Active Slot
- Modulation Analysis
  - Constellation
  - Code Domain Power
  - MAC Codogram
  - Received Code Strength Indicator (RCSI)
  - MAC CDP Table
- Auto Measure
- Power Statistics CCDF
- Over The Air (OTA)
  - Channel Scanner
  - PN Scanner
  - Multipath Profile
  - Code Domain Power
  - Route Map

Display overview

Figure 165 provides descriptions for each segment of the measurement screen.

Figure 165 EV-DO signal analyzer measurement screen



Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 166 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 167 Indirect connection

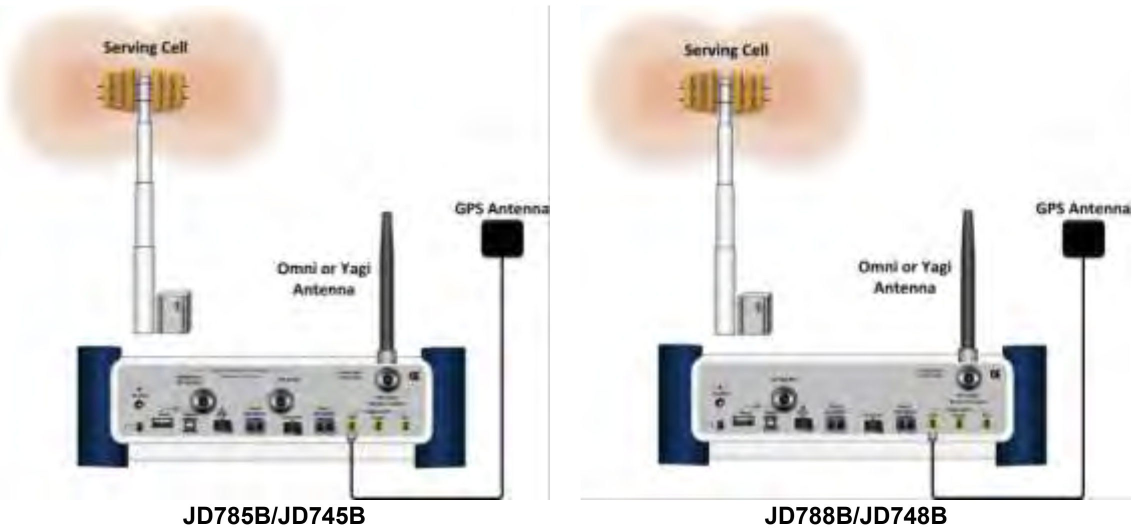
CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 168 OTA connection



CAUTION
If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **EV-DO** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   – **Spectrum**
   – **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACPR**, **Multi-ACPR**, or **Spurious Emissions**
   – **Power vs Time > Power vs Time (Idle Slot)** or **Power vs Time (Active Slot)**
   – **Modulation Analysis > Constellation > Composite 64**, **Composite 128**, **Pilot**, **MAC 64**, **MAC 128**, or **Data**
   – **Modulation Analysis > Code Domain Power > Pilot**, **MAC 64**, **MAC 128**, or **Data**
   – **Modulation Analysis > MAC Codogram**, **RCSI**, or **MAC CDP Table**
   – **Auto Measure**
   – **Power Statistics CCDF**
   – **OTA > Channel Scanner**, **PN Scanner**, **Multipath Profile**, **Code Domain Power**, or **Route Map**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.

- **b** Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
- **c** Press the **Select** soft key or the rotary knob to confirm the selection.

4. Press the **Channel Number** soft key.
5. Enter a value by using the numeric keys. You can also use the rotary knob.
6. Press the **Enter** soft key.
7. The instrument automatically displays the corresponding center frequency value for the selected channel number.
8. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   - **a** Press the **Channel Step** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Enter** soft key.

> **NOTE**
> This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.

> **NOTE**
> In the measurements such as **Code Domain Power** and **MAC Codogram**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator’s level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.

   b Press the **Attenuation Value** soft key to set the level.
   c Enter a value in fives by using the numeric keys.
   d Press the **dB** soft key or the **ENTER** hard key.
- To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
  As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

To set the scale per division:

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements. Connecting an external trigger is necessary for accurate modulation measurements on EV-DO systems.

Procedure

1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Table 17 Standards of external clock operation

Clock	Type	Reference	Port	Switching Standard
External Reference	Internal	Internal 10 MHz		Default
	External	External Ref Clock	Ext Ref (SMA)	Manual switching (Input signal level >-3 dBm)
	GPS	GPS Clock	GPS (SMA)	Automatic switching (GPS signal received)
Trigger	Internal	Internal Trigger		Default
	External	External Trigger	Trigger (SMA)	Manual switching
	GPS	GPS	GPS (SMA)	Manual switching

Figure 169 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, or **GPS**.

NOTE
When a GPS antenna is connected and locked, GPS coordinates (longitude and latitude) are displayed on the screen and frequency reference is automatically set to GPS in the **System > Freq Reference**.

Table 18 External reference indicators

Type	Indicator	Description
Internal	INT (green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.

External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

If you have configured test parameters as described in the “Configuring test parameters” on page 335, your measurement result is displayed on the screen as like the following example, Figure 170.

Figure 170 Spectrum measurement screen with EV-DO signal analyzer

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

6 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density (PSD) and peak to average ratio (PAR) of the signal in the EV-DO channel bandwidth (1.23 MHz).

After configuring test parameters as described in the "Configuring test parameters" on page 335, your measurement result is displayed on the screen as like the following example, Figure 171.

Figure 171 Channel power measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

After configuring test parameters as described in the “Configuring test parameters” on page 335, your measurement result is displayed on the screen as like the following example, Figure 172.

Figure 172 Occupied bandwidth measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP2 specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, your measurement result is displayed on the screen as like the following example, Figure 173.

Figure 173 SEM measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

ACPR

The Adjacent Channel Power Ratio (ACPR) is defined as the ratio of the average power in the adjacent frequency channel (or offset) to the average power in the transmitted frequency channel. It may be expressed as the ratio of the integrated signal power in the adjacent channel to the integrated signal power in the main channel.

After configuring test parameters as described in the “Configuring test parameters” on page 335, your measurement result is displayed on the screen as like the following example, Figure 174.

Figure 174 ACPR measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

Multi-ACPR

The Multi-ACPR measurement is used to perform multi-channel ACPR measurements with as many channels as possible. It helps you to measure ACPR in multi-channel transmitting Base Station environment.

Setting frequency for Multi-ACPR

You can set the frequency with either frequency or channel number.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the frequency, do one of the following:
   - To set the center frequency, complete the following steps:
     - **a** Toggle the **Unit** soft key and select **Freq**.
     - **b** Press the **Lowest Frequency** soft key to set the starting center frequency.
     - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **d** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
     - **e** Press the **Highest Frequency** soft key to set the stopping center frequency.
     - **f** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   - To set the channel number, complete the following steps:
     - **a** Toggle the **Unit** soft key and select **Channel**.
     - **b** To select the standard channel, press the **Channel Std** soft key and then select the

band to be measured.

c Press the **Lowest Channel** soft key to set the starting channel.

d Enter a value by using the numeric keys. You can also use the rotary knob.

e Press the **Enter** soft key.

f Press the **Highest Channel** soft key to set the stopping channel.

g Enter a value by using the numeric keys. You can also use the rotary knob.

h Press the **Enter** soft key.

After configuring the test parameters, your measurement result is displayed on the screen as like the following example, Figure 175.

Figure 175 Multi-ACPR measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:

a Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.

- **b** Press the **Enter** soft key.
- **c** Press the **Start Frequency** soft key to set up the frequency range.
- **d** Enter a value by using the numeric keys. You can also use the rotary knob.
- **e** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **f** Press the **Stop Frequency** soft key to set up the frequency range.
- **g** Enter a value by using the numeric keys. You can also use the rotary knob.
- **h** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

3 Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.

4 To set up the test limits for Pass/Fail indication, complete the following steps:
- **a** Press the **Start Limit** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:
- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Press the **PREV** hard key.

7 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:
- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

After configuring test parameters as described in the “Configuring test parameters” on page 335, your measurement result is displayed on the screen as like the following example, Figure 176.

Figure 176 Spurious emissions measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 347 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACPR	ACPR	(On/Off only)
Multi-ACPR	Multi-ACPR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting power vs. time measurements

The Power vs. Time (Idle Slot and Active Slot) in EV-DO Signal Analyzer verifies that the transmitter output power has correct amplitude, shape, and timing for the EV-DO format.

- Idle Slot: Slot with no data in traffic channel.
- Active Slot: Slot with the loaded data in traffic channel.

Forward link of 1xEV-DO is a frame structure and each frame consists of 16 slots. The frame period for 1xEV-DO is 26.667 ms, which is also the period of one pilot channel. Each frame is divided into 16 slots of 1.666 ms. 1xEV-DO uses CDMA modulation scheme, but unlike its previous systems the Pilot, MAC (Media Access Control), and Data (Traffic) Channel are not transmitted simultaneously; instead they are transmitted in TDM (Time Division Multiplex).

Power vs. time (idle slot)

The Power vs. Time (Idle Slot) measurement provides the idle slot that includes the Pilot and MAC channels with the masks in all regions.

After configuring test parameters as described in the "Configuring test parameters" on page 335, your measurement result is displayed on the screen as like the following example, Figure 177.

Figure 177 Power vs. time (idle slot) measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for power vs. time tests" on page 349 for more information.

Power vs. time (active slot)

The Power vs. Time (Active Slot) measurement includes the Pilot, MAC, and Data channels with the upper and lower masks.

After configuring test parameters as described in the "Configuring test parameters" on page 335, your measurement result is displayed on the screen as like the following example, Figure 178.

Figure 178 Power vs. time (active slot) measurement with EV-DO signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for power vs. time tests” on page 349 for more information.

Setting limit for power vs. time tests

Procedure

1 Press the ***LIMIT*** hot key.

2 Press the **PvsT Test Limits** soft key.

3 Select the test item(s) and set the limit(s):

To set the limit for	Select	Set
Pilot power	Pilot Power	High Limit Low Limit
Medium access control power	MAC Power	High Limit Low Limit
Data power during the data period	Data Power	High Limit Low Limit
On/off power ratio of the pilot and MAC powers to the data power	On/Off Ratio	Low Limit

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting modulation measurements

In order to make accurate measurements of time offset and PN, you must connect an external trigger before making a modulation measurement.

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. Press the **Detect Mode** soft key, and then select the detection mode option: **Auto**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 359 for more information. *The Max Inactive is not used in the Constellation mode.*

Measurement example

Figure 179 Constellation measurement with EV-DO signal analyzer

1) Composite 64

2) Composite 128

3) Pilot

4) MAC 64

5) MAC 128

6) Data

Code domain power

The Code Domain Power (CDP) measures the distribution of power across the set of code channels, normalized to the total EV-DO power. It helps to verify that each code channel is operating at its proper level and to identify problems throughout the transmitter design from coding to the RF section. System imperfections such as amplifier non-linearity will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.
   b. Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   c. Press the **Enter** soft key.
5. Press the **Detect Mode** soft key, and then select the detection mode option: **Auto**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available

for your measurement mode. See “Using save” on page 32 for more information.

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication for the Max Inactive. See “Setting limit for modulation tests” on page 359 for more information.

Measurement example

Figure 180 Code domain power measurement with EV-DO signal analyzer

1) Pilot

2) MAC 64

3) **MAC 128**

4) **Data**

MAC Codogram

The MAC Codogram displays the power variation for every code over time, presenting a clear view of the traffic load per channels at any given time. The MAC Codogram measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 To set the Pseudo-Noise (PN) offset, complete the following steps:

- **a** Toggle the **PN Offset** soft key between **Auto** and **Manual**.
- **b** Enter a value by using the numeric keys to set manually.
- **c** Press the **Enter** soft key.

3 To set the incremental step for the PN offset, complete the following steps:

- **a** Press the **PN Increment** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

4 To set the threshold between Auto and Manual, complete the following steps:

- **a** Press the **Threshold** soft key. Its default setting is -27 dB.
- **b** Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
- **c** Press the **Enter** soft key.

5 Toggle the **MAC** soft key and select the MAC Walsh code option: **64** or **128**.

6 To set the time interval, complete the following steps:

- **a** Press the **Time Interval** soft key.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

7 To place the time cursor to analyze your measurements, complete the following steps:

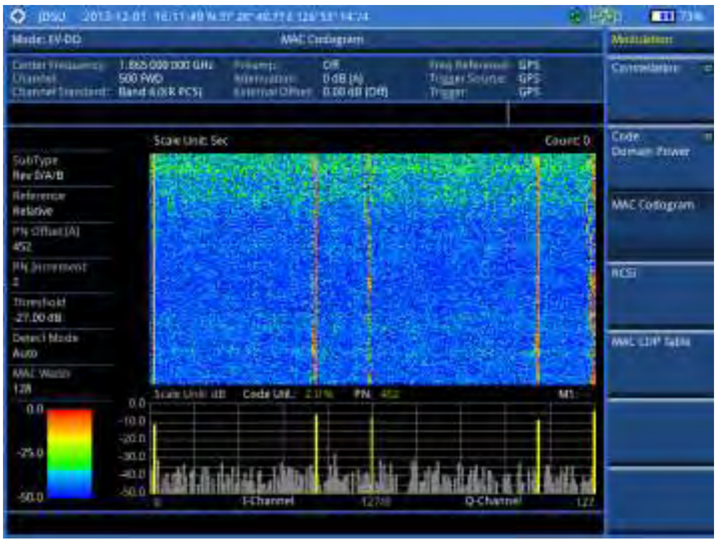
- **a** Toggle the **Time Cursor** soft key between **On** and **Off** to enable or disable the time cursor.
- **b** Enter a value by using the numeric keys.
- **c** Press the **Enter** soft key.

> **NOTE**
> When the time cursor is enabled, the measurement is put on hold and information about the time cursor is displayed.

8 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 181 MAC Codogram in full view with EV-DO signal analyzer



RCSI

The Received Code Strength Indicator (RCSI) is used to track the power variation over time of EV-DO channels: Pilot, MAC, Data, and Slot. The RCSI measurements can be saved into an external USB memory so that a post-analysis can be done with the application software JDViewer.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.
   b. Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   c. Press the **Enter** soft key.
5. Toggle the **MAC** soft key and select the MAC Walsh code option: **64** or **128**.
6. Press the **Alarm Code** soft key, and then select the alarm code option: **None**, **Pilot**, **MAC**, **Data**, or **Slot**.
7. To set the alarm mask, complete the following steps:
   a. Press the **Set Mask** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **[dB|dBm]** soft key.
8. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 182 RCSI measurement with EV-DO signal analyzer

MAC CDP Table

The MAC CDP Table is used for the user to look at a numeric and textual description of all the active control channels in the signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.
   b. Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   c. Press the **Enter** soft key.
5. Toggle the **MAC** soft key and select the MAC Walsh code option: **64** or **128**.

Measurement example

Figure 183 MAC CDP Table measurement with EV-DO signal analyzer

Setting display

If the MAC CDP table spans over to the next page(s), you can change pages up and down to view your measurement results.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Select **Page Up** or **Page Down** as needed to scroll the screen up and down.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the Modulation Test Limits soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
Time offset	Time Offset	High Limit Low Limit
Carrier feed through	Carrier Feed Through	High Limit
Highest level among inactive channels	Max Inactive	High Limit
Waveform quality (Rho) for pilot	Pilot Rho	Low Limit
Waveform quality (Rho) for MAC	MAC Rho	Low Limit
Waveform quality (Rho) for data	Data Rho	Low Limit

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

NOTE
The Time Offset compares the PN offset timing with the overall system time and the instrument checks the start of PN offset in comparison to either the GPS signal or the even second clock signal.

NOTE
The Carrier Feed Through is a result of the RF carrier signal feeding through the I/Q modulator and riding on the output circuitry without being modulated.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit for auto measure

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **PvsT Test Limits** soft key, and then enable test limits as desired.
4. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or

fail based on the instrument's limit settings in Auto Measure.

– **Scenario:** Runs a test with a programmed scenario in JDViewer.
The Scenario menu becomes activated.

3 To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.

4 Toggle the **Test Time** soft key and select the test time option:

– **Now:** Lets the instrument run a test only once.

– **Schedule:** Lets the instrument repeat tests as defined in the Set Timing.
The Set Timing menu becomes activated.

5 To define a schedule for an auto measurement, complete the following steps:

a Press the **Set Timing** soft key.
b Press the **Start Time (HH:MM)** soft key.
c Enter the time in the HH:MM format, and then press the **Enter** soft key.
d Press the **Stop Time (HH:MM)** soft key.
e Enter the time in the HH:MM format, and then press the **Enter** soft key.
f Press the **Time Interval** soft key.
g Enter the amount of time in minutes, and then press the **Enter** soft key.

6 Press the **Settings** soft key, and then set the following:

a Toggle the **MAC** soft key and select the MAC Walsh code option: **64** or **128**.
b Toggle the **PvsT** soft key and select the slot option: **Idle** or **Active**.
c Toggle the **External Offset** soft key and select **On**.
d Enter a value by using the numeric keys, and then press the **dB** soft key.

7 To save your settings and results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See "Using save" on page 32 for more information.

8 Press the **Run Test** soft key to start to run a test.
The Auto Measure Results window appears at the end of the test.

9 To stop running the test, press the **Abort** soft key.

10 To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:

– **Screen:** You can view each measurement screen as the test progresses.

– **Results:** You can view a measurement result table as the test progresses.

– **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1 Toggle the **Display** soft key and select the display option:

– **Result:** You can view the result table.
The Display Result menu becomes activated.

– **Settings:** You can view the measurement settings for the auto measurement.

2 Toggle the **Display Result** soft key and select the display result option:

– **Full:** You can view detailed measurement readings with the pass/fail indication.

– **Quick:** You can view only the Pass/Fail results.

3 To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Performing power statistics CCDF measurements

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CCDF Length** soft key to set the length of the CCDF.
3. Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Measurement example

Figure 184 CCDF measurement with EV-DO signal analyzer

Conducting EV-DO OTA measurements

This Over The Air (OTA) measurement has channel scanner, PN scanner, multipath profile, and Code Domain power screens. It is used to verify EV-DO transmitter performance at any location providing reflective measurements and identifying signals providing from different sites. The Code Domain power shows not only modulation performance metric but also amplifier capacity and code utilization metric. The Amplifier capacity (code utilization) measurement is an estimate of the amount of power amplifier capacity (code utilization) that is being used expressed in percent of maximum.

Channel scanner

Setting channel/frequency

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears. See "Appendix C – Band, frequency & channel standard" on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
5. To set the channel number for the selected index, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
6. The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
8. To add more channels to be scanned, repeat steps **3-6**.
9. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Index** soft key, and then enter an index number between one and six by turning the rotary knob or using the numeric keys.
4. To set the center frequency for the selected index, complete the following steps:
   a. Press the **Center Frequency** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. To set the integration bandwidth for the selected index, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. To add more channels to be scanned, repeat steps **3-5**.
7. Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Setting measure setup

After configuring other test parameters as described in the "Configuring test parameters" on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the incremental step for the PN offset, complete the following steps:
   - **a** Press the **PN Increment** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **Enter** soft key.
3. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Setting limit for OTA channel scanner

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Limit Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Limit Line** soft key between **On** and **Off** to display or dismiss the limit line.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 185 Channel scanner measurement with EV-DO OTA signal analyzer

PN scanner

Each access network sector has a unique PN offset. The PN Scanner is used to identify all the active PNs in an area.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
3. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 186 PN scanner measurement with EV-DO OTA signal analyzer

Multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 335, you

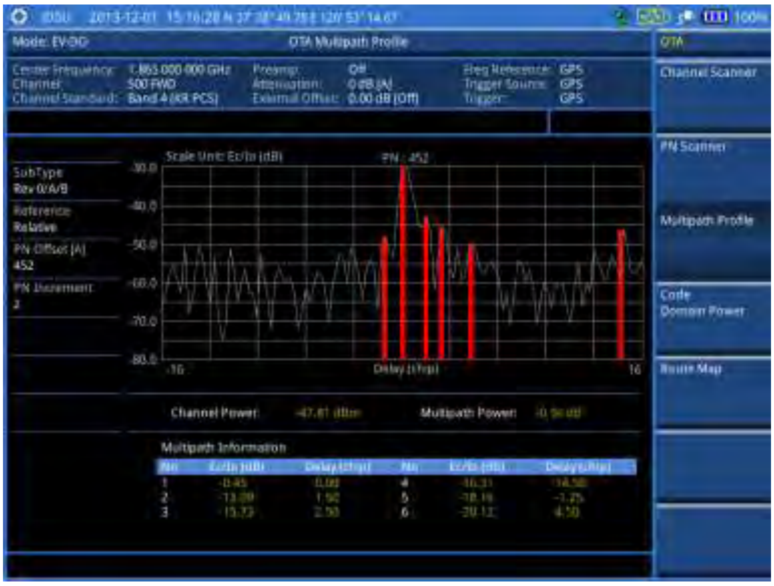
can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
3. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 187 Multipath profile measurement with EV-DO OTA signal analyzer



Code domain power

Channels with high correlation factors are determined to be active channels and are indicated as such on the display. Once the channels are decoded, the analyzer determines the power of each channel relative to the total signal power.

This measurement helps to verify that each code channel is operating at its proper level and helps to identify problems throughout the transmitter design from the coding to the RF section. System imperfections, such as the non-linearity of amplifiers, will present themselves as an undesired distribution of power in the code domain.

Setting measure setup

After configuring test parameters as described in “Configuring test parameters” on page 335, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the Pseudo-Noise (PN) offset, complete the following steps:
   a. Toggle the **PN Offset** soft key between **Auto** and **Manual**.
   b. Enter a value by using the numeric keys to set manually.
   c. Press the **Enter** soft key.
3. To set the incremental step for the PN offset, complete the following steps:
   a. Press the **PN Increment** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the threshold between Auto and Manual, complete the following steps:
   a. Press the **Threshold** soft key. Its default setting is -27 dB.
   b. Enter a value between -50 and zero by using the numeric keys to change the value in the Manual mode.
   c. Press the **Enter** soft key.
5. Toggle the **MAC** soft key and select the MAC Walsh code option: **64** or **128**.
6. Press the **Detect Mode** soft key, and then select the detection mode option: **Auto**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.
7. To set the threshold for pilot dominance, complete the following steps:
   a. Press the **Pilot Dominance >** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.

> **NOTE**
> Recommended value is 10. Color of the Pilot Dominance indicator on the screen bases on this setting.

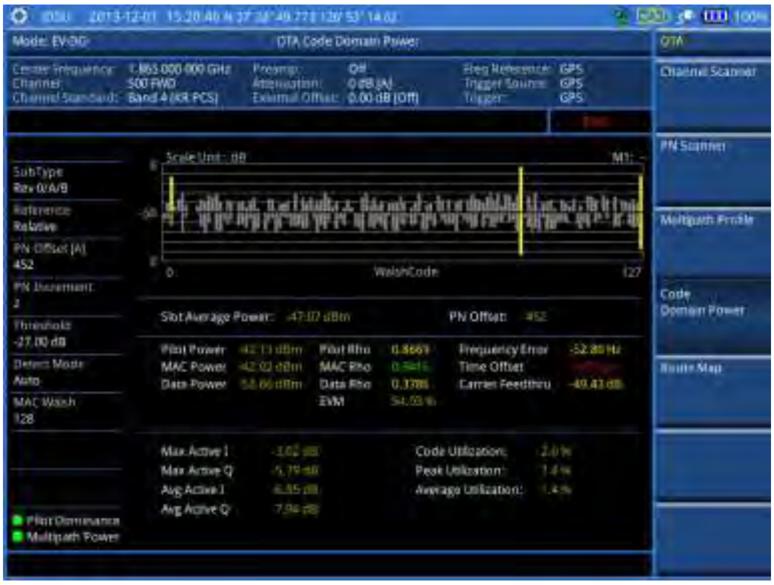
8. To set the threshold for multipath power, complete the following steps:
   a. Press the **Multipath Power <** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.

> **NOTE**
> Recommended value is one. Color of the multipath power indicator on the screen bases on this setting.

9. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 188 Code domain power measurement with EV-DO OTA signal analyzer



> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication.

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1. If required, connect a GPS receiver to your JD700B series for outdoor mapping.
   Indoor mapping does not necessarily need a GPS antenna.
2. Configure test parameters as described in the “Configuring test parameters” on page 335.
3. To load your map file, complete the following steps:
   a. Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

   > **NOTE**
   > The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument’s display. You must save your map file (`.mcf`) into the “**SavedMap**” folder of your USB drive so that you can load them onto your instrument.

   b. Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
   See “Using load” on page 34 for more information.
4. Press the ***MEASURE SETUP*** hot key.
5. Press the **Plot Point** soft key, and then select the plot point option from the following choices:
   – To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**

> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.
>
> With the **Full** setting, you can view all the collected points of the route without the loaded map.

– To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.

6 Press the **Plot Item** soft key, and then select the measurement option: **Pilot Power** or **Ec/Io**.

7 To set the incremental step for the PN offset, complete the following steps:

   a Press the **PN Increment** soft key.

   b Enter a value by using the numeric keys.

   c Press the **Enter** soft key.

8 Toggle the **Plot** soft key and select **Start**.

9 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

10 Toggle the **Plot** soft key and select **Stop** to stop plotting.

11 Press the ***SAVE/LOAD*** hot key to save the result.
See “Using save” on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the four different color indicators for Pilot power or Ec/Io.

Procedure

1 Press the ***LIMIT*** hot key.

2 Select the plot items and set the limits as needed:

To set the limit for	Select	Set
Pilot Power	Pilot Power	Excellent, Very Good, Good, Fair, Poor (dBm)
Ec/Io	Ec/Io	Good, Fair, Poor (dB)

3 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.
See “Using save” on page 32 for more information.

Measurement example

Figure 189 Route map measurement with EV-DO OTA signal analyzer

1) Pilot Power

2) Pilot Ec/Io

Chapter 12 Using TD-SCDMA Signal Analyzer

This chapter provides instructions for using the TD-SCDMA Signal Analyzer function (option 025) with the TD-SCDMA OTA Analyzer function (option 045). Topics discussed in this chapter are as follows:

Introduction

The Time Division-Synchronous Code Division Multiple Access, also known as TD-SCDMA, is a 3G mobile telecommunications standard that is pursued by the Chinese Academy of Telecommunications Technology (CATT) in the People's Republic of China. The TD-SCDMA uses the TDD scheme while the WCDMA uses the FDD.

This TD-SCDMA Signal Analyzer can be used for testing of TD-SCDMA systems, made according to the following standard documentation.

- 3GPP TS 25.105 Base Station radio transmission and reception (TDD)
- 3GPP TS 25.142 Base Station conformance testing (TDD)
- 3GPP TS 25.222 Multiplexing and channel coding (TDD)
- 3GPP TS 25.223 Spreading and modulation (TDD)

The instrument automatically makes standard defined measurements using the measurement methods and limits as defined in the standard. The detailed results allow you to analyze TD-SCDMA/HSDPA system performance. You may alter the measurement parameters for specialized analysis. Pass/Fail testing with standard defined or user defined upper and lower limits and the Pass/Fail indictor help you to determine base station performance easily.

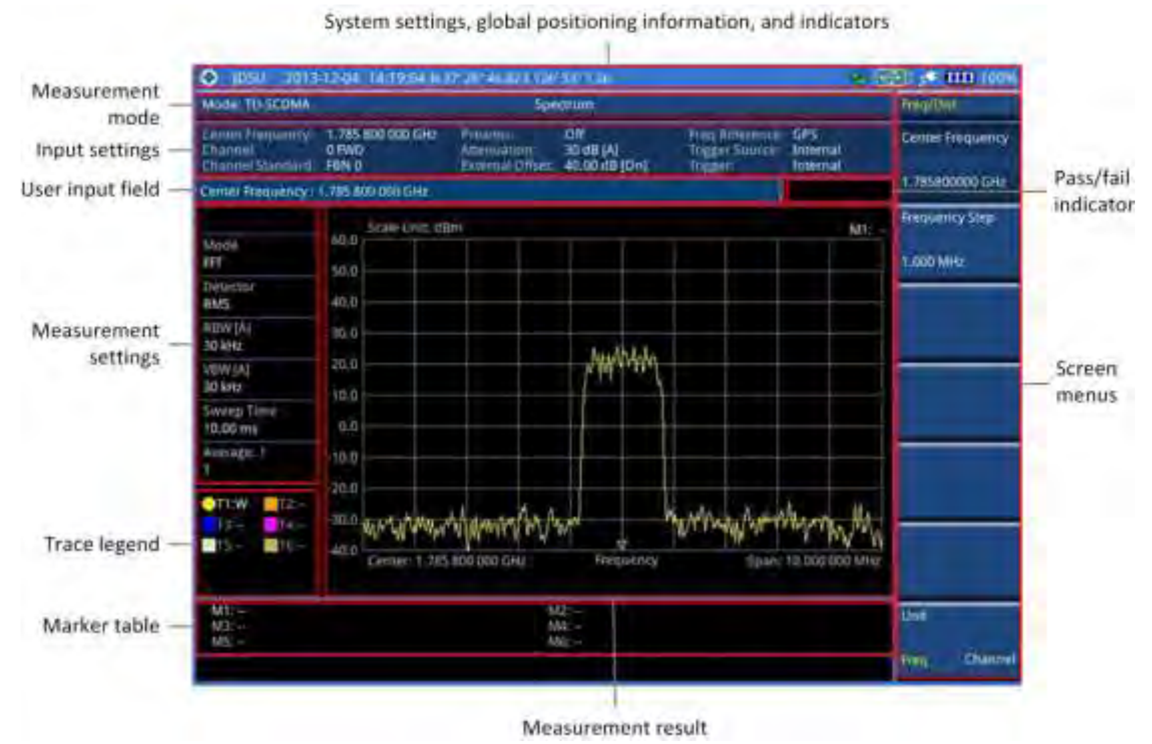
This instrument provides the following measurement tools for TD-SCDMA system:

- Spectrum Analysis
- RF Analysis
    - Channel Power
    - Occupied Bandwidth
    - Spectrum Emission Mask
    - Adjacent Channel Leakage power Ratio (ACLR)
    - Multi-ACLR
    - Spurious Emissions
- Power vs. Time:
    - Power vs. Time (Slot)
    - Power vs. Time (Frame)
    - Power vs. Time (Mask)
    - Timogram
- Modulation Analysis
    - Constellation
    - Midamble Power
    - Code Power
    - Code Error
- Auto Measure
- Over The Air (OTA)
    - Sync-DL ID Scanner
    - Sync-DL ID vs. Tau
    - Sync-DL ID Multipath
    - Sync-DL ID Analyzer
    - Route Map

Display overview

Figure 190 provides descriptions for each segment of the measurement screen.

Figure 190 TD-SCDMA signal analyzer measurement screen



Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 191 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 192 Indirect connection

JD785B/JD745B **JD788B/JD748B**

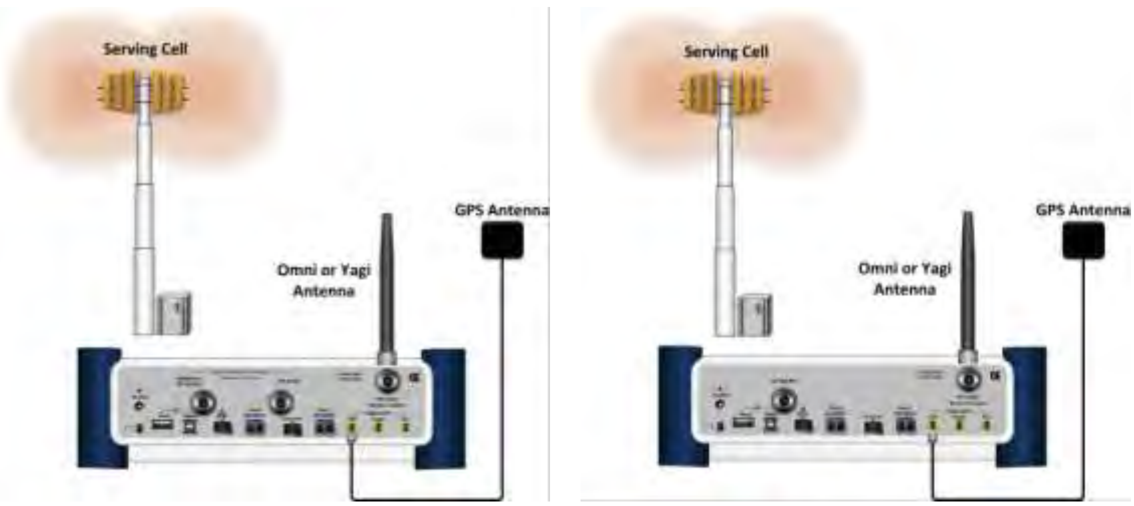
CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1 Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2 Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 193 OTA connection



JD785B/JD745B **JD788B/JD748B**

CAUTION
If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **More (1/2) > TD-SCDMA** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   - **Spectrum**
   - **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, **ACLR**, **Multi-ACLR**, or **Spurious Emissions**
   - **Power vs Time > Power vs Time (Slot)**, **Power vs Time (Frame)**, **Power vs Time (Frame)**, or **Timogram**
   - **Modulation Analysis > Constellation**, **Midamble Power**, **Code Power**, or **Code Error**
   - **Auto Measure**
   - **OTA > Sync-DL ID Scanner**, **Sync-DL ID vs Tau**, **Sync-DL ID Multipath**, **Sync-DL ID Analyzer**, or **Route Map**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.

See “Appendix C – Band, frequency & channel standard” on page 530 for more information.

b Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.

c Press the **Select** soft key or the rotary knob to confirm the selection.

4 Press the **Channel Number** soft key.

5 Enter a value by using the numeric keys. You can also use the rotary knob.

6 Press the **Enter** soft key.

7 The instrument automatically displays the corresponding center frequency value for the selected channel number.

8 *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:

a Press the **Channel Step** soft key.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **Enter** soft key.

NOTE
This frequency setting is not used in the Multi-ACLR and Spurious Emissions modes.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1 Press the **AMP/SCALE** hard key.

2 Press the **Auto Scale** soft key.
Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1 Press the **AMP/SCALE** hard key.

2 To set the maximum reference value on the Y-axis manually, complete the following steps:

a Press the **Reference Level** soft key.

b Enter a value by using the numeric keys or the rotary knob with 10 dB increments.

c Press the **dBm** soft key or the **ENTER** hard key.
This unit key name changes according to the setting in the **Units** menu.

NOTE
In the measurements such as **Midamble Power**, **Code Power**, and **Code Error**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3 To set the attenuation option, select one from the following choices:

– To set the input attenuator’s level automatically, select **Attenuation > Auto**.

NOTE
It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

– To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:

- **a** Select **Attenuation > Manual**.
- **b** Press the **Attenuation Value** soft key to set the level.
- **c** Enter a value in fives by using the numeric keys.
- **d** Press the **dB** soft key or the **ENTER** hard key.

– To couple the input attenuator’s level with your reference level setting, select **Attenuation > Couple**.
As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation in the spectrum and RF analysis. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values. Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Figure 194 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, or **GPS**.

Table 19 External reference indicators

Type	Indicator	Description
Internal	INT (green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.
External	EXT (green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	EXT (red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in µs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Your measurement result is displayed on the screen as like the following example, Figure 195.

Figure 195 Spectrum measurement screen with TD-SCDMA signal analyzer

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**.
   The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M

Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

> **NOTE**
> For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5. *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.
6. *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
   The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement determines the average power of an RF signal burst at or above a specified threshold value.

The purpose of the Channel Power measurement is to determine the power delivered to the antenna system on the RF channel under test. The instrument acquires a TD-SCDMA signal in the time domain. The average power level above the threshold is then computed and displayed.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. *Optional*. To set the delay, complete the following steps:
   a. Press the **Delay** soft key to set the amount of delay in μs.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

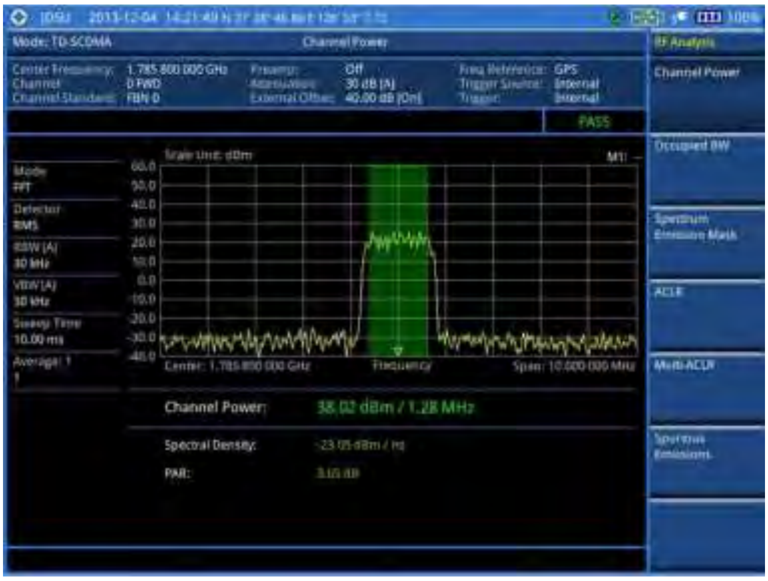


Figure 196 Channel power measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 388 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.

3 *Optional*. To set the delay, complete the following steps:

   a Press the **Delay** soft key to set the amount of delay in μs.

   b Enter a value by using the numeric keys. You can also use the rotary knob.

   c Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 197 Occupied bandwidth measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 388 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement required by 3GPP specifications encompasses different power limits and different measurement bandwidths (resolution bandwidths) at various frequency offsets. It may be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band. It provides useful figures-of-merit for the spectral re-growth and emissions produced by components and circuit blocks, without the rigor of performing a full SEM measurement.

The SEM measures spurious signal levels in up to five pairs of offset or region frequencies and relates them to the carrier power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. To select the mask type according to the output power of the base station, complete the following steps:
   a. Press the **Mask Type** soft key.
   b. Select the mask type option: **- 26 dBm**, **26 – 34 dBm**, or **34 dBm –**.
4. *Optional*. To set the delay, complete the following steps:

- **a** Press the **Delay** soft key to set the amount of delay in μs.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 198 SEM measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 388 for more information.

ACLR

The Adjacent Channel Leakage power Ratio (ACLR) measures the amount of interference or power in an adjacent frequency channel according to the standards.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in μs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 199 ACLR measurement with TD-SCDMA signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 388 for more information.

Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 To set the frequency, do one of the following:
   – To set the center frequency, complete the following steps:
      a Toggle the **Unit** soft key and select **Freq**.
      b Press the **Lowest Frequency** soft key to set the starting center frequency.
      c Enter a value by using the numeric keys. You can also use the rotary knob.
      d Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
      e Press the **Highest Frequency** soft key to set the stopping center frequency.
      f Enter a value by using the numeric keys. You can also use the rotary knob.

- **g** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

– To set the channel number, complete the following steps:

- **a** Toggle the **Unit** soft key and select **Channel**.
- **b** To select the standard channel, press the **Channel Std** soft key and then select the band to be measured.
- **c** Press the **Lowest Channel** soft key to set the starting channel.
- **d** Enter a value by using the numeric keys. You can also use the rotary knob.
- **e** Press the **Enter** soft key.
- **f** Press the **Highest Channel** soft key to set the stopping channel.
- **g** Enter a value by using the numeric keys. You can also use the rotary knob.
- **h** Press the **Enter** soft key.

Measurement example

Figure 200 Multi-ACLR measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 388 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.
4. To set up the test limits for Pass/Fail indication, complete the following steps:
   a. Press the **Start Limit** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the **dBm** soft key.
   d. Press the **Stop Limit** soft key.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Select the **dBm** soft key.
5. To set up the other parameters, complete the following steps:
   a. Select **More (1/2) > Attenuation** to set up the attenuation value.
   b. Enter a value in the multiple of five.
   c. Press the **dB** soft key or the **ENTER** hard key.
   d. Press the **RBW** soft key.
   e. Enter a value by using the numeric keys.
   f. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   g. Press the **VBW** soft key.
   h. Enter a value by using the numeric keys.
   i. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **PREV** hard key.
7. Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8. Set the number of measurements to be averaged:
   a. Press the **Average** soft key.
   b. Enter a value between 1 and 100.
   c. Press the **Enter** soft key.

Measurement example

Figure 201 Spurious emissions measurement with TD-SCDMA signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 388 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
ACLR	ACLR	(On/Off only)
Multi-ACLR	Multi-ACLR	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Conducting power vs. time measurements

The Power vs. Time (P vs T) measurement analyzes the amplitude profile and timing of the burst signal and provides a time mask for the signal. It measures the mean transmit power during the "useful part" of TD-SCDMA bursts and verifies that the power ramp fits within the defined mask. TD-SCDMA is a Time Division Multiple Access (TDMA) scheme with seven time slots, or bursts, per RF channel and by using the "Multi-Slot" function, up to seven slots in a frame can be viewed at one time.

Power vs. time (slot)

The Power vs. Time (Slot) in TD-SCDMA Signal Analyzer measures the modulation envelope in the time domain, showing the signal rise and fall shape of TD-SCDMA signal.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
4. To set the number of maximum users, complete the following steps:
   a. Press the **Max Users** soft key.
   b. Enter a value up to 16 by using the numeric keys.
   c. Press the **Enter** soft key.
5. *Optional*. To set the delay, complete the following steps:
   a. Press the **Delay** soft key to set the amount of delay in μs.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

> **NOTE**
> The Spec searches "Sync Sequence Number" from 0 to 31 based on the TD-SCDMA specification and determines "Scrambling Code Number" by using the sync sequence number, while the Full does from 0 to 127 fully.

   – To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

> **NOTE**
> The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches "Default Midamble Allocation" based on the TD-SCDMA specification.

   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

Measurement example

Figure 202 Power vs. time (slot) measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for power vs. time tests” on page 394 for more information.

Power vs. time (frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot of the TD-SCDMA signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
4. To set the number of maximum users, complete the following steps:
   - **a** Press the **Max Users** soft key.
   - **b** Enter a value up to 16 by using the numeric keys.
   - **c** Press the **Enter** soft key.
5. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in µs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

NOTE
The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

– To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

NOTE
The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

– To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

Measurement example

Figure 203 Power vs. time (frame) measurement with TD-SCDMA signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for power vs. time tests” on page 394 for more information. The On/Off Ratio is not used in the power vs. time (frame) tests.

Power vs. time (mask)

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
3. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
4. To set the number of maximum users, complete the following steps:
   - **a** Press the **Max Users** soft key.
   - **b** Enter a value up to 16 by using the numeric keys.
   - **c** Press the **Enter** soft key.
5. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in μs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

NOTE
The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

   – To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

NOTE
The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

Measurement example

Figure 204 Power vs. time (mask) measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for power vs. time tests” on page 394 for more information. The DwPTS Power and UpPTS Power are not used in the power vs. time (mask) tests.

Timogram

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
3. To set the number of maximum users, complete the following steps:
   a. Press the **Max Users** soft key.
   b. Enter a value up to 16 by using the numeric keys.
   c. Press the **Enter** soft key.
4. To set the time interval, complete the following steps:
   a. Press the **Time Interval** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.
5. To place the time cursor to analyze your measurements, complete the following steps:
   a. Toggle the **Time Cursor** soft key between **On** and **Off** to enable or disable the time cursor.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key.

> **NOTE**
> When the time cursor is enabled, the measurement is put on hold and information about

the time cursor is displayed.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To set the delay, complete the following steps:

  a Press the **Delay** soft key to set the amount of delay in μs.

  b Enter a value by using the numeric keys. You can also use the rotary knob.

  c Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

– To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

NOTE
The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

– To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

NOTE
The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

– To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

Measurement example

Figure 205 Timogram with TD-SCDMA signal analyzer

Setting limit for power vs. time tests

Procedure

1 Press the ***LIMIT*** hot key.
2 Press the **PvsT Test Limits** soft key.
3 Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Slot power	Slot Power	High Limit, Low Limit
Downlink pilot signal power	DwPTS Power	High Limit, Low Limit
Uplink pilot signal power	UpPTS Power	High Limit, Low Limit
Power between on and off portions of the downlink slots	On/Off Ratio	High Limit, Low Limit

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Conducting modulation measurements

TD-SCDMA receivers rely on the frequency or phase quality of the QPSK or 8PSK signal in order to achieve the expected carrier to noise performance. A transmitter with high frequency or phase error is often still able to support phone calls during a functional test. It displays the frequency errors numerically and graphically, showing the binary representation of the demodulated data bits of the received signal using Constellation, Midamble Power, Code Power, and Code Error screens.

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Toggle the **Scramble** soft key and select **Auto** or **Manual** to set the scramble code automatically or manually.
3 Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
4 Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
5 To set the number of maximum users, complete the following steps:
   a Press the **Max Users** soft key.
   b Enter a value up to 16 by using the numeric keys, and then press the **Enter** soft key.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

– To set the delay, complete the following steps:

a Press the **Delay** soft key to set the amount of delay in µs.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **µs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

– To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

> **NOTE**
> The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

– To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

> **NOTE**
> The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

– To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

– To set the relative threshold, complete the following steps:

a Press the **Threshold** soft key. Its default setting is -27 dB.

b Enter a value between -50 and zero by using the numeric keys.

c Press the **Enter** soft key.

Measurement example

Figure 206 Constellation measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 401 for more information. The Max Inactive is not used in the Constellation mode.

Midamble power

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Scramble** soft key and select **Auto** or **Manual** to set the scramble code automatically or manually.
3. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
4. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
5. To set the number of maximum users, complete the following steps:
   - **a** Press the **Max Users** soft key.
   - **b** Enter a value up to 16 by using the numeric keys.
   - **c** Press the **Enter** soft key.
6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To set the delay, complete the following steps:
     - **a** Press the **Delay** soft key to set the amount of delay in μs.
     - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

   – To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

> **NOTE**
> The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

   – To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

> **NOTE**
> The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.
   – To set the relative threshold, complete the following steps:
     - **a** Press the **Threshold** soft key. Its default setting is -27 dB.
     - **b** Enter a value between -50 and zero by using the numeric keys.
     - **c** Press the **Enter** soft key.

Measurement example

Figure 207 Midamble measurement with TD-SCDMA signal analyzer

Code power

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Toggle the **Scramble** soft key and select **Auto** or **Manual** to set the scramble code automatically or manually.
3 Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
4 Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
5 To set the number of maximum users, complete the following steps:
   a Press the **Max Users** soft key.
   b Enter a value up to 16 by using the numeric keys.
   c Press the **Enter** soft key.
6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To set the delay, complete the following steps:
      a Press the **Delay** soft key to set the amount of delay in μs.
      b Enter a value by using the numeric keys. You can also use the rotary knob.
      c Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

   – To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

NOTE
The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

– To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

NOTE
The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

– To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.

– To set the relative threshold, complete the following steps:

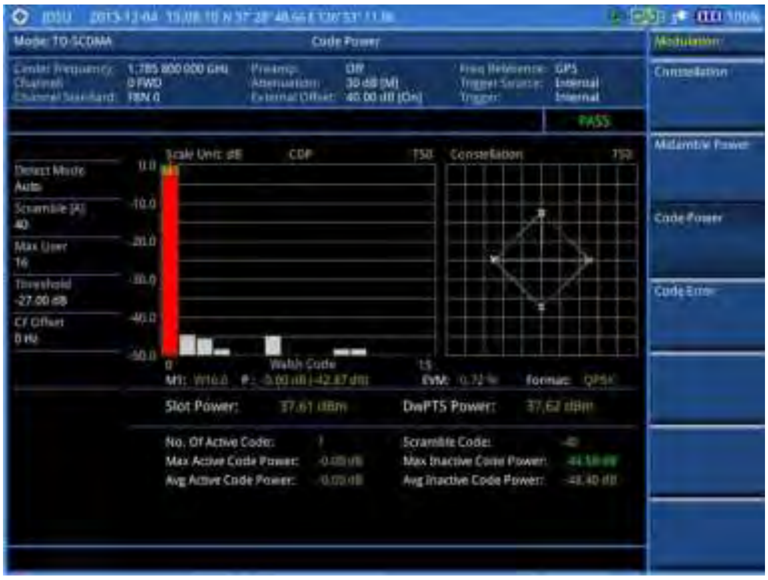
a Press the **Threshold** soft key. Its default setting is -27 dB.

b Enter a value between -50 and zero by using the numeric keys.

c Press the **Enter** soft key.

Measurement example

Figure 208 Code power measurement with TD-SCDMA signal analyzer



NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication for the Max Inactive. See “Setting limit for modulation tests” on page 401 for more information.

Code error

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Scramble** soft key and select **Auto** or **Manual** to set the scramble code automatically or manually.
3. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.
4. Press the **Spread Factor** soft key, and then select the spread factor option: **DL Auto** for auto detection of downlink, **UL Auto** for auto detection of uplink, **SF1**, **SF2**, **SF4**, **SF8**, or **SF16**
5. To set the number of maximum users, complete the following steps:
   a. Press the **Max Users** soft key.
   b. Enter a value up to 16 by using the numeric keys.
   c. Press the **Enter** soft key.
6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To set the delay, complete the following steps:
     a. Press the **Delay** soft key to set the amount of delay in µs.
     b. Enter a value by using the numeric keys. You can also use the rotary knob.
     c. Press the **µs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

   – To select how to determine scrambling estimation, toggle the **Scramble** soft key and select **Spec** or **Full**.

NOTE
The Spec searches “Sync Sequence Number” from 0 to 31 based on the TD-SCDMA specification and determines “Scrambling Code Number” by using the sync sequence number, while the Full does from 0 to 127 fully.

   – To select how to determine the Midamble spread factor estimation either in full or maximum power search, toggle the **Mid SF Map** soft key and select **Max** or **Spec**.

NOTE
The Max determines the spread factor of the Midamble by using the maximum power of the received Midamble, while the Spec searches “Default Midamble Allocation” based on the TD-SCDMA specification.

   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK/8PSK**, **QPSK**, **8PSK**, **16 QAM**, or **64 QAM**.
   – To set the relative threshold, complete the following steps:
     a. Press the **Threshold** soft key. Its default setting is -27 dB.
     b. Enter a value between -50 and zero by using the numeric keys.
     c. Press the **Enter** soft key.

Measurement example

Figure 209 Code error measurement with TD-SCDMA signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication for the Max Inactive. See “Setting limit for modulation tests” on page 401 for more information.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the Modulation Test Limits soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency Error	High Limit Low Limit
Error vector magnitude rms	EVM RMS	High Limit
Peak code domain error	PCDE	High Limit
Highest level among inactive channels	Max Inactive	High Limit

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **PvsT Test Limits** soft key, and then enable test limits as desired.
4. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 375, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument's limit settings in Auto Measure.
   – **Scenario:** Runs a test with a programmed scenario in JDViewer. The Scenario menu becomes activated.
3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   – **Now:** Lets the instrument run a test only once.
   – **Schedule:** Lets the instrument repeat tests as defined in the Set Timing. The Set Timing menu becomes activated.
5. To define a schedule for an auto measurement, complete the following steps:
   a. Press the **Set Timing** soft key.
   b. Press the **Start Time (HH:MM)** soft key.
   c. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d. Press the **Stop Time (HH:MM)** soft key.
   e. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   f. Press the **Time Interval** soft key.
   g. Enter the amount of time in minutes, and then press the **Enter** soft key.
6. Press the **Settings** soft key, and then set the following:
   a. Press the **Slot Number** soft key, and then select the time slot number to be displayed: **TS0**, **TS1**, **TS2**, **TS3**, **TS4**, **TS5**, or **TS6**.

b Toggle the **External Offset** soft key and select **On**.

c Enter a value by using the numeric keys, and then press the **dB** soft key.

7 To save your settings and results, go to ***SAVE/LOAD* > Save** and then perform functions as you desire. See “Using save” on page 32 for more information.

8 Press the **Run Test** soft key to start to run a test.
The Auto Measure Results window appears at the end of the test.

9 To stop running the test, press the **Abort** soft key.

10 To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:

– **Screen:** You can view each measurement screen as the test progresses.

– **Results:** You can view a measurement result table as the test progresses.

– **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1 Toggle the **Display** soft key and select the display option:

– **Result:** You can view the result table.
The Display Result menu becomes activated.

– **Settings:** You can view the measurement settings for the auto measurement.

2 Toggle the **Display Result** soft key and select the display result option:

– **Full:** You can view detailed measurement readings with the pass/fail indication.

– **Quick:** You can view only the Pass/Fail results.

3 To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Conducting TD-SCDMA OTA measurements

Sync-DL ID scanner

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Toggle the **Sync-DL ID** soft key and select **Auto** or **Manual** to set the Sync Downlink ID automatically or manually.

3 *Optional*. To select the delay, complete the following steps:

a Press the **Miscellaneous** soft key.

b Press the **Delay** soft key to set the amount of delay in μs.

c Enter a value by using the numeric keys. You can also use the rotary knob.

d Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 210 Sync-DL ID scanner measurement with TD-SCDMA OTA signal analyzer

Sync-DL ID vs. Tau

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Toggle the **Sync-DL ID** soft key and select **Auto** or **Manual** to set the Sync Downlink ID automatically or manually.

3 *Optional*. To select the delay, complete the following steps:

  a Press the **Miscellaneous** soft key.

  b Press the **Delay** soft key to set the amount of delay in μs.

  c Enter a value by using the numeric keys. You can also use the rotary knob.

  d Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 211 Sync-DL ID vs. Tau measurement with TD-SCDMA OTA signal analyzer

Sync-DL ID multipath

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Sync-DL ID** soft key and select **Auto** or **Manual** to set the Sync Downlink ID automatically or manually.
3. *Optional*. To select the delay, complete the following steps:
   - **a** Press the **Miscellaneous** soft key.
   - **b** Press the **Delay** soft key to set the amount of delay in μs.
   - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **d** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 212 Sync-DL ID multipath measurement with TD-SCDMA OTA signal analyzer

Sync-DL ID analyzer

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 375, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Sync-DL ID** soft key and select **Auto** or **Manual** to set the Sync Downlink ID automatically or manually.
3. *Optional*. To select the delay, complete the following steps:
   - **a** Press the **Miscellaneous** soft key.
   - **b** Press the **Delay** soft key to set the amount of delay in μs.
   - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **d** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Setting limit for Sync-DL ID analyzer

Procedure

1. Press the ***LIMIT*** hot key.
2. To set the limit for rms of the error vector magnitude, complete the following steps:
   - **a** Press the **EVM RMS** soft key.
   - **b** Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.

  - **c** Press the **High Limit** soft key, and then enter a value for the upper threshold.
  - **d** Press the **Enter** soft key.

3 To set the limit for frequency error, complete the following steps:

  - **a** Press the **Frequency Error** soft key.
  - **b** Toggle the **Test Limits** soft key between **On** and **Off** to enable or disable the limit.
  - **c** Press the **High Limit** soft key, and then enter a value for the upper threshold.
  - **d** Press the **ppm** soft key.
  - **e** Press the **Low Limit** soft key, and then enter a value for the lower threshold.
  - **f** Press the **ppm** soft key.

4 *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Measurement example

Figure 213 Sync-DL ID analyzer measurement with TD-SCDMA OTA signal analyzer

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1 If required, connect a GPS receiver to your JD700B series for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Configure test parameters as described in the "Configuring test parameters" on page 375.

3 To load your map file, complete the following steps:

  - **a** Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**
> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument's display. You must save your map file (`.mcf`) into the "**SavedMap**" folder of your USB drive so that you can load them onto your instrument.

b Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
See "Using load" on page 34 for more information.

4 Press the ***MEASURE SETUP*** hot key.

5 Press the **Plot Point** soft key, and then select the plot point option from the following choices:

– To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.
>
> With the **Full** setting, you can view all the collected points of the route without the loaded map.

– To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.

6 Toggle the **Plot** soft key and select **Start** to start plotting.

7 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

8 Toggle the **Plot** soft key and select **Stop** to stop plotting.

9 Press the ***SAVE/LOAD*** hot key to save the result.
See "Using save" on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit for route map

You can set the thresholds for each test item.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Excellent** soft key to set its threshold.
3. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
4. Press the **Very Good** soft key to set its threshold.
5. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
6. Press the **Good** soft key to set its threshold.
7. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
8. Press the **Fair** soft key to set its threshold.
9. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
10. Press the **Poor** soft key to set its threshold.
11. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.

12 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 214 Route map measurement with TD-SCDMA OTA signal analyzer

1) Map view

2) Full view

13

Chapter 13 Using Mobile WiMAX Signal Analyzer

This chapter provides instructions for using the Mobile WiMAX Signal Analyzer function (option 026) with the Mobile WiMAX OTA Analyzer function (option 046). Topics discussed in this chapter are as follows:

Introduction

The Mobile WiMAX Signal Analyzer performs power and spectrum measurements as well as modulation analysis to test the proper transmitter performance of Mobile WiMAX systems. It performs conformance testing according to the following standards providing a simple Pass/Fail indication on each test.

- IEEE 802.16e-2005
- WiBro (Korean Mobile WiMAX OFDMA Service)

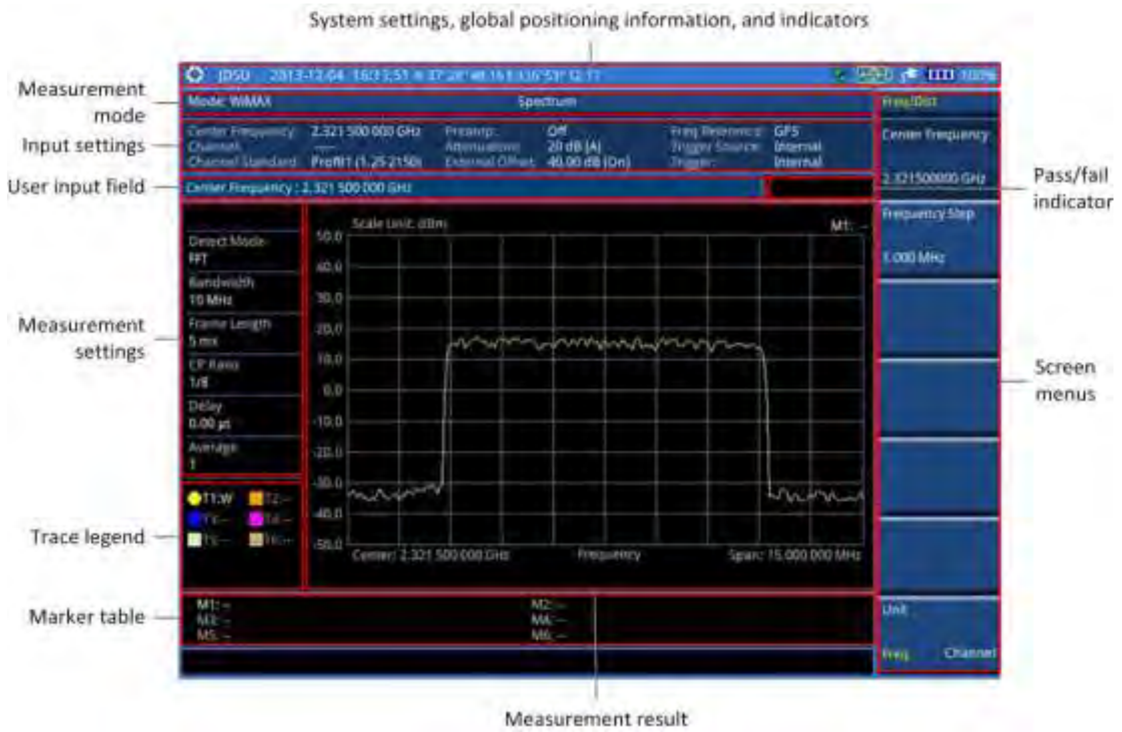
This instrument provides the following measurement tools for Mobile WiMAX system:

- Spectrum Analysis
- RF Analysis
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - Spurious Emissions
- Power vs. Time (Frame)
- Modulation Analysis
  - Constellation
  - Spectral Flatness
  - EVM vs. Subcarrier
  - EVM vs. Symbol
- Auto Measure
- Power Statistics CCDF
- Over The Air (OTA)
  - Preamble Scanner
  - Multipath Profile
  - Preamble Power Trend
  - Route Map

Display overview

Figure 215 provides descriptions for each segment of the measurement screen.

Figure 215 Mobile WiMAX signal analyzer measurement screen



Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 216 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 217 Indirect connection

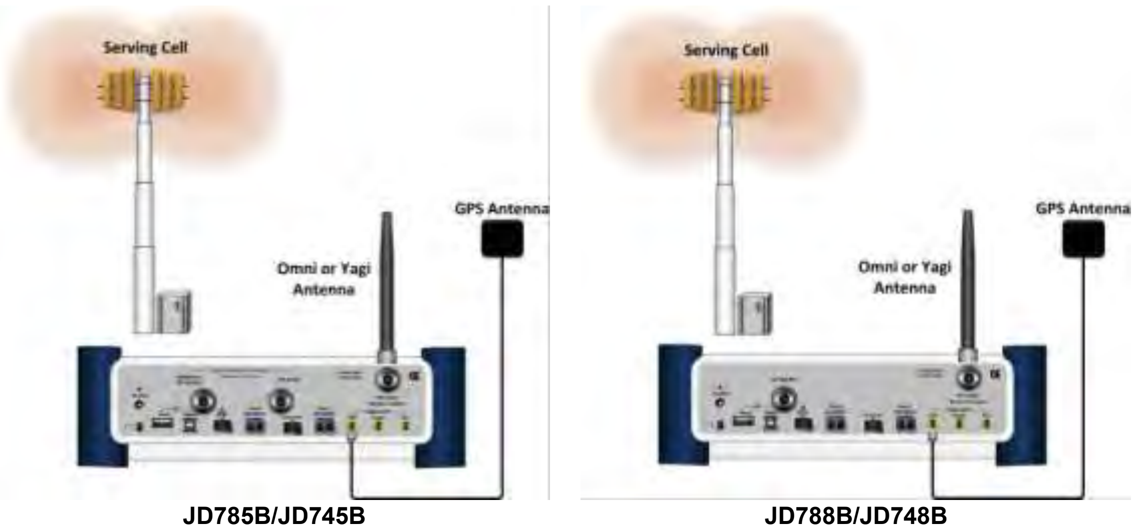
> **CAUTION**
> The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 218 OTA connection



> **CAUTION**
> If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Signal Analyzer** soft key.
3. Press the **More (1/2) > Mobile WiMAX** soft key. The **Spectrum** mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:
   - **Spectrum**
   - **RF Analysis > Channel Power**, **Occupied BW**, **Spectrum Emission Mask**, or **Spurious Emissions**
   - **Power vs Time (Frame)**
   - **Modulation Analysis > Constellation**, **Spectral Flatness**, **EVM vs Subcarrier**, or **EVM vs. Symbol**
   - **Auto Measure**
   - **Power Statistics CCDF**
   - **OTA > Preamble Scanner**, **Multipath Profile**, **Preamble Power Trend**, or **Route Map**

Configuring test parameters

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.

4. Press the **Channel Number** soft key.
5. Enter a value by using the numeric keys. You can also use the rotary knob.
6. Press the **Enter** soft key.
7. The instrument automatically displays the corresponding center frequency value for the selected channel number.
8. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   - **a** Press the **Channel Step** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **Enter** soft key.

> **NOTE**
> This frequency setting is not used in the Spurious Emissions mode.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.

> **NOTE**
> In the measurements such as **Midamble Power**, **Code Power**, and **Code Error**, you may need to select the reference option between **Relative** and **Absolute** before setting the reference level.

3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.
   - **b** Press the **Attenuation Value** soft key to set the level.
   - **c** Enter a value in fives by using the numeric keys.
   - **d** Press the **dB** soft key or the **ENTER** hard key.

– To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
  As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBμV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

> **NOTE**
> This Units menu is available in the Spectrum and RF Analysis modes.

Scale per division

You can use the **Scale/Div** feature available for the spectrum and RF analysis. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.

3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red disappears and the sweeping resumes.

Setting trigger source

You can set the trigger source option for your measurements.

Procedure

1. Press the ***TRIGGER*** hot key.
2. Select the trigger source option from the choices: **Internal**, **External**, and **GPS**.

Setting external clock

To enhance the reliability of modulation analysis measurements the JD700B series must be synchronized with a base station. When an external clock is not supplied, the instrument works with its built-in internal high-accuracy time base and some measurement results may exhibit inaccurate values.

Therefore, it is highly recommended that you use the same reference clock as the signal source. You can use the ***TRIGGER*** hot key to set the external clock.

Figure 219 Connection ports for external reference clock

Procedure

1. Connect an external reference or a GPS antenna to the JD700B series.
2. Press the ***SYSTEM*** hot key.
3. Press the **Freq Reference** soft key, and then select the reference option: **Internal**, **External 10 MHz**, **External 13 MHz**, **External 15 MHz**, or **GPS**.

Table 20 External reference indicators

Type	Indicator	Description
Internal	(green)	The green **INT** icon indicates that the instrument uses the built-in internal time base.
External	(green)	The green **EXT** icon indicates that an external reference is connected and locked and that the instrument uses the same reference clock as the signal source.
External	(red)	The red **EXT** icon indicates that an external reference is connect but not locked.
GPS	(green)	The green GPS antenna icon indicates that a GPS antenna is connected and locked.
GPS	(yellow)	The yellow GPS antenna icon indicates that a GPS antenna is connected and locking is in progress.
GPS	(grey)	The grey GPS antenna icon indicates that a GPS antenna is not connected, failed, or unable to be locked.

Conducting spectrum measurements

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be

measured from the following choices:

– **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth

– **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7

– **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25

b Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.

c Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.

d Enter a value by using the numeric keys, and then press the **Enter** soft key.

e Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.

f Press the **DL Symbols** soft key to set the number of downlink symbols.

g Enter a value by using the numeric keys, and then press the **Enter** soft key.

h Press the **UL Symbols** soft key to set the number of uplink symbols.

i Enter a value by using the numeric keys, and then press the **Enter** soft key.

3 *Optional*. To set the delay, complete the following steps:

a Press the **Delay** soft key to set the amount of delay in μs.

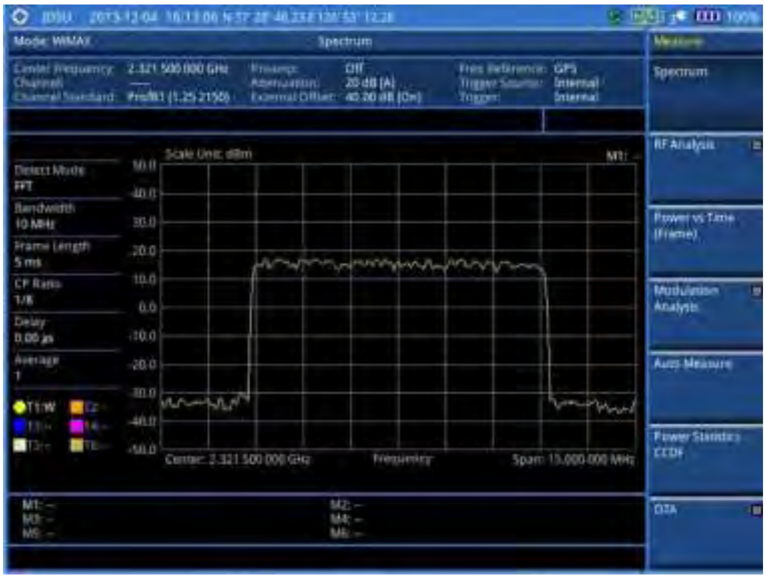
b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Your measurement result is displayed on the screen as like the following example, Figure 220.

Figure 220 Spectrum measurement screen with Mobile WiMAX signal analyzer



Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1 Press the **TRACE/DISPLAY** hard key.

2 Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.

3 Toggle the **Trace View** soft key and select **On**.

4 Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal's maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal's minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

6 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

Conducting RF measurements

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density (PSD) and peak to average ratio (PAR) of the signal in the Mobile WiMAX channel bandwidth.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   - **a** Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
     - **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
     - **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
     - **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   - **b** Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   - **c** Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **e** Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   - **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
   - **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
   - **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.
3. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in µs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **µs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4. To set the start/stop symbols, complete the following steps:
   - **a** Press the **Start Symbol** soft key.
   - **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **c** Press the **Stop Symbol** soft key.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.

Measurement example

Figure 221 Channel power measurement with Mobile WiMAX signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 427 for more information.

Occupied bandwidth

The Occupied Bandwidth measures the spectrum shape of the carrier. It is defined as the bandwidth, which includes 99% of the transmitted power among total transmitted power.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b. Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c. Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   d. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e. Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   f. Press the **DL Symbols** soft key to set the number of downlink symbols.

   - **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
   - **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.

3 *Optional*. To set the delay, complete the following steps:

   - **a** Press the **Delay** soft key to set the amount of delay in μs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4 To set the start/stop symbols, complete the following steps:

   - **a** Press the **Start Symbol** soft key.
   - **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **c** Press the **Stop Symbol** soft key.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.

Measurement example

Figure 222 Occupied bandwidth measurement with Mobile WiMAX signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 427 for more information.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement compares the total power level within the defined carrier bandwidth and the given offset channels according to the standards.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   - **a** Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
     - **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
     - **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
     - **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   - **b** Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   - **c** Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **e** Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   - **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
   - **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
   - **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.
3. *Optional*. To set the delay, complete the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in μs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4. To set the start/stop symbols, complete the following steps:
   - **a** Press the **Start Symbol** soft key.
   - **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **c** Press the **Stop Symbol** soft key.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.

Measurement example

Figure 223 SEM measurement with Mobile WiMAX signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for RF tests” on page 427 for more information.

Spurious emissions

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The Spurious Emissions measurement is to identify and determine the power level of out-of-band spurious emission within the necessary channel bandwidth and modulated signal measured at the RF port of the Base Station.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the range table and frequency range, press the **Range Table** soft key and then complete the following steps:
   a. Press the **Range** soft key, and then enter the range number to add a new range or change an existing one.
   b. Press the **Enter** soft key.
   c. Press the **Start Frequency** soft key to set up the frequency range.
   d. Enter a value by using the numeric keys. You can also use the rotary knob.
   e. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f. Press the **Stop Frequency** soft key to set up the frequency range.
   g. Enter a value by using the numeric keys. You can also use the rotary knob.
   h. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

3 Toggle the **Range** soft key between **On** and **Off** to display or hide the selected range.

4 To set up the test limits for Pass/Fail indication, complete the following steps:

- **a** Press the **Start Limit** soft key.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Select the **dBm** soft key.
- **d** Press the **Stop Limit** soft key.
- **e** Enter a value by using the numeric keys. You can also use the rotary knob.
- **f** Select the **dBm** soft key.

5 To set up the other parameters, complete the following steps:

- **a** Select **More (1/2) > Attenuation** to set up the attenuation value.
- **b** Enter a value in the multiple of five.
- **c** Press the **dB** soft key or the **ENTER** hard key.
- **d** Press the **RBW** soft key.
- **e** Enter a value by using the numeric keys.
- **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
- **g** Press the **VBW** soft key.
- **h** Enter a value by using the numeric keys.
- **i** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 Press the **PREV** hard key.

7 Toggle the **Measure Type** soft key between **Examine** and **Full** to select the measurement type.

> **NOTE**
> The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically changes the selected range from one another.

8 Set the number of measurements to be averaged:

- **a** Press the **Average** soft key.
- **b** Enter a value between 1 and 100.
- **c** Press the **Enter** soft key.

Measurement example

Figure 224 Spurious emissions measurement with Mobile WiMAX signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for RF tests" on page 427 for more information.

Setting limit for RF tests

By default, test limits specified in the standard are set for you. You can change thresholds if you desire.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Channel power	Channel Power	High Limit Low Limit
Occupied bandwidth	Occupied BW	High Limit
Spectrum emission mask	Spectrum Emission Mask	(On/Off only)
Spurious emissions	Spurious Emissions	(On/Off only)

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See "Using save" on page 32 for more information.

Conducting power vs. time (frame) measurements

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in a Mobile WiMAX signal.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b. Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c. Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.

- **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
- **e** Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
- **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
- **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
- **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
- **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.

3. To set the start/stop symbols, complete the following steps:
   - **a** Press the **Start Symbol** soft key.
   - **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **c** Press the **Stop Symbol** soft key.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
4. Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.
5. Toggle the **Search Type** soft key and select **Full** or **Window**.
6. Toggle the **Video Filter** soft key and select **On** or **Off** to enable or disable the video filter.
7. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To set the delay, complete the following steps:
     - **a** Press the **Delay** soft key to set the amount of delay in μs.
     - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK**, **16 QAM**, or **64 QAM**.

Setting limit for power vs. time tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **PvsT Test Limits** soft key.
3. Select the test item(s) and set the limit(s):

To set the limit for	Select	Set
Preamble power	Preamble Power	High Limit, Low Limit
Downlink burst power	DL Burst Power	High Limit, Low Limit
Uplink burst power	UL Burst Power	High Limit, Low Limit
Frame average power	Frame Average Power	High Limit, Low Limit
Time offset	Time Offset	High Limit, Low Limit
I/Q origin offset	IQ Origin Offset	High Limit

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Measurement example

Figure 225 Power vs. time (frame) measurement with Mobile WiMAX signal analyzer

Conducting modulation measurements

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   - **a** Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
     - **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
     - **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
     - **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   - **b** Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   - **c** Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **e** Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   - **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
   - **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
   - **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.
3. To set the start/stop symbols, complete the following steps:
   - **a** Press the **Start/Stop Symbol** soft key.
   - **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
4. Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.
5. Toggle the **Search Type** soft key and select **Full** or **Window**.
6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   - To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK**, **16 QAM**, or **64 QAM**.
   - To select the downlink zone, press the **DL Zone** soft key and then select the permutation zone option: **Auto**, **PUSC** for partial usage of subcarrier channels, **FUSC** for full usage of subcarrier channels, or **AMC2X3** for adaptive modulation and coding.

NOTE
The permutation zone that is a number of contiguous OFDMA symbols in downlink that use the same permutation. The DL subframe may contain more than one permutation zone. The maximum number of DL zone is 8 in one DL subframe.

   - To set the delay, complete the following steps:
     - **a** Press the **Delay** soft key to set the amount of delay in μs.
     - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
     - **c** Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 226 Constellation measurement with Mobile WiMAX signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 436 for more information. The Spectral Flatness is not used in the Constellation mode.

Spectral flatness

The Spectral Flatness is used to measure the flatness energy of the constellation according to the WiMAX specification IEEE 802.16e.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b. Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c. Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   d. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e. Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or

1/32.

- **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
- **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
- **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
- **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.

3 To set the start/stop symbols, complete the following steps:

- **a** Press the **Start Symbol** soft key.
- **b** Enter a value by using the numeric keys, and then press the **Enter** soft key.
- **c** Press the **Stop Symbol** soft key.
- **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.

4 Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.

5 Toggle the **Search Type** soft key and select **Full** or **Window**.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

- To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK**, **16 QAM**, or **64 QAM**.
- To select the downlink zone, press the **DL Zone** soft key and then select the permutation zone option: **Auto**, **PUSC** for partial usage of subcarrier channels, **FUSC** for full usage of subcarrier channels, or **AMC2X3** for adaptive modulation and coding.

> **NOTE**
> The permutation zone, which is a number of contiguous OFDMA, symbols in downlink that use the same permutation. The DL subframe may contain more than one permutation zone. The maximum number of DL zone is 8 in one DL subframe.

- To set the delay, complete the following steps:
  - **a** Press the **Delay** soft key to set the amount of delay in µs.
  - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **c** Press the **µs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 227 Spectral flatness measurement with Mobile WiMAX signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication for the Spectral Flatness. See “Setting limit for modulation tests” on page 436 for more information.

EVM vs. subcarrier

The EVM vs Subcarrier shows the error vector magnitude representing the average constellation error of WIMAX OFDMA subcarriers.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b. Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c. Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   d. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e. Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   f. Press the **DL Symbols** soft key to set the number of downlink symbols.
   g. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   h. Press the **UL Symbols** soft key to set the number of uplink symbols.
   i. Enter a value by using the numeric keys, and then press the **Enter** soft key.
3. To set the start/stop symbols, complete the following steps:
   a. Press the **Start/Stop Symbol** soft key.
   b. Enter a value by using the numeric keys, and then press the **Enter** soft key.
4. Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.
5. Toggle the **Search Type** soft key and select **Full** or **Window**.
6. *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:
   – To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK**, **16 QAM**, or **64 QAM**.
   – To select the downlink zone, press the **DL Zone** soft key and then select the permutation zone option: **Auto**, **PUSC** for partial usage of subcarrier channels, **FUSC** for full usage of subcarrier channels, or **AMC2X3** for adaptive modulation and coding.

NOTE
The permutation zone, which is a number of contiguous OFDMA, symbols in downlink that use the same permutation. The DL subframe may contain more than one permutation zone. The maximum number of DL zone is 8 in one DL subframe.

– To set the delay, complete the following steps:

a Press the **Delay** soft key to set the amount of delay in μs.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 228 EVM vs. subcarrier measurement with Mobile WiMAX signal analyzer

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 436 for more information. The Spectral Flatness and Frequency Error are not used in the EVM vs. Subcarrier mode.

EVM vs. symbol

The EVM vs Symbol is used to show the error vector magnitude representing the average constellation error of WiMAX OFDMA symbols.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:

   a Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:

- **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
- **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
- **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25

b Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.

c Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.

d Enter a value by using the numeric keys, and then press the **Enter** soft key.

e Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.

f Press the **DL Symbols** soft key to set the number of downlink symbols.

g Enter a value by using the numeric keys, and then press the **Enter** soft key.

h Press the **UL Symbols** soft key to set the number of uplink symbols.

i Enter a value by using the numeric keys, and then press the **Enter** soft key.

3 To set the start/stop symbols, complete the following steps:

a Press the **Start/Stop Symbol** soft key.

b Enter a value by using the numeric keys, and then press the **Enter** soft key.

4 Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.

5 Toggle the **Search Type** soft key and select **Full** or **Window**.

6 *Optional*. Press the **Miscellaneous** soft key, and then do the following as needed:

- To select the detect mode, press the **Detect Mode** soft key and then select the option: **Auto**, **QPSK**, **16 QAM**, or **64 QAM**.
- To select the downlink zone, press the **DL Zone** soft key and then select the permutation zone option: **Auto**, **PUSC** for partial usage of subcarrier channels, **FUSC** for full usage of subcarrier channels, or **AMC2X3** for adaptive modulation and coding.

> **NOTE**
> The permutation zone, which is a number of contiguous OFDMA, symbols in downlink that use the same permutation. The DL subframe may contain more than one permutation zone. The maximum number of DL zone is 8 in one DL subframe.

- To set the delay, complete the following steps:

a Press the **Delay** soft key to set the amount of delay in μs.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

Measurement example

Figure 229 EVM vs. symbol measurement with Mobile WiMAX signal analyzer

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for modulation tests” on page 436 for more information. The Spectral Flatness and Frequency Error are not used in the EVM vs. Subcarrier mode.

Setting limit for modulation tests

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Modulation Test Limits** soft key to set the limits.
3. Select the test item(s) and set the limit(s) depending on your selected measurement mode:

To set the limit for	Select	Set
Spectral flatness	Spectral Flatness	On/Off
Frequency error	Frequency Error	High Limit Low Limit
RMS for RCE	RCE RMS	High Limit
Peak for RCE	RCE Peak	High Limit
RMS for error vector magnitude	EVM RMS	High Limit
Peak for error vector magnitude	EVM Peak	High Limit

4. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Performing auto measurements

The Auto Measure function of the JD700B series allows a complete signal profiling covering RF characterization and modulation quality parameters of up to 10 different carriers, particularly useful on an overlay architecture where base stations are transmitting in different frequencies.

The Auto Measure can be easily executed either by selecting a menu in the instrument or by running a programmed scenario in the PC-based application so that the instrument automatically configure and perform tests on every aspect of all the carriers.

Setting limit

You can set test limits for test item(s) in the auto measurement.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **RF Test Limits** soft key, and then enable test limits as desired.
3. Press the **PvsT Test Limits** soft key, and then enable test limits as desired.
4. Press the **Modulation Test Limits** soft key, and then enable test limits as desired.
5. *Optional*. You can enable alarm sound that goes off if the measurement falls outside of the limit. Toggle the **Beep** soft key between **On** and **Off** to enable or disable the beep sound.
6. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings. See “Using save” on page 32 for more information.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Configuration** soft key and select the configuration option:
   – **Current:** Lets the instrumnet use current frequency (single carrier) and determine pass or fail based on the instrument’s limit settings in Auto Measure.
   – **Scenario:** Runs a test with a programmed scenario in JDViewer. The Scenario menu becomes activated.
3. To load a scenario, press the **Scenario** soft key, and then select a scenario file to load.
4. Toggle the **Test Time** soft key and select the test time option:
   – **Now:** Lets the instrument run a test only once.
   – **Schedule:** Lets the instrument repeat tests as defined in the Set Timing. The Set Timing menu becomes activated.
5. To define a schedule for an auto measurement, complete the following steps:
   a. Press the **Set Timing** soft key.
   b. Press the **Start Time (HH:MM)** soft key.
   c. Enter the time in the HH:MM format, and then press the **Enter** soft key.
   d. Press the **Stop Time (HH:MM)** soft key.
   e. Enter the time in the HH:MM format, and then press the **Enter** soft key.

   f. Press the **Time Interval** soft key.
   g. Enter the amount of time in minutes, and then press the **Enter** soft key.

6. Press the **Settings** soft key, and then set the following:
   a. Press the **Start Symbol** soft key.
   b. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   c. Press the **Stop Symbol** soft key.
   d. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e. Toggle the **External Offset** soft key and select **On** or **Off**.
   f. Enter a value by using the numeric keys, and then press the **dB** soft key.
7. To save your settings and results, go to ***SAVE/LOAD*** **> Save** and then perform functions as you desire. See "Using save" on page 32 for more information.
8. Press the **Run Test** soft key to start to run a test.
   The Auto Measure Results window appears at the end of the test.
9. To stop running the test, press the **Abort** soft key.
10. To change the view on the screen during the test, press the **Display** and then select the view option from the following choices:
    – **Screen:** You can view each measurement screen as the test progresses.
    – **Results:** You can view a measurement result table as the test progresses.
    – **Settings:** You can view a measurement setting table as the test progresses.

Setting display

After completion of the auto measurement, the screen menu changes to Trace/Display so that you can view the results in different forms.

Procedure

1. Toggle the **Display** soft key and select the display option:
   – **Result:** You can view the result table.
   The Display Result menu becomes activated.
   – **Settings:** You can view the measurement settings for the auto measurement.
2. Toggle the **Display Result** soft key and select the display result option:
   – **Full:** You can view detailed measurement readings with the pass/fail indication.
   – **Quick:** You can view only the Pass/Fail results.
3. To view the measurement results for a different carrier, press the **View Carrier** soft key and then select the carrier number to view.

Performing power statistics CCDF measurements

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 414, you can continue your measurement. The measurement settings can be saved and recalled as a file. You can also use JDViewer, PC application software to configure a measure setup, save as a file, and load the file on to the instrument.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CCDF Length** soft key to set the length of the CCDF.
3. Enter a value between 1 and 100 by using the numeric keys. You can also use the rotary knob.
4. Press the **Enter** soft key.

Measurement example

Figure 230 CCDF measurement with Mobile WiMAX signal analyzer

Conducting Mobile WiMAX OTA measurements

This Over The Air (OTA) measurement has preamble scanner, multipath profile, and preamble power trend screens. Preamble scanner displays six preambles and relative powers to inform neighbor cells existence. The multipath profile graph helps the user to determine testing area's RF environmental condition. The preamble power trend shows power variations of selected preamble over time along with relative power trend for strongest preamble.

Preamble scanner

The OTA Preamble Scanner displays the six strongest preambles to inform neighbor cells existence of testing area. Preamble Index, Relative Power, Cell ID, and Sector ID are listed in for each preamble signal with Time Offset in us. Positioning information, latitude, and longitude will be displayed if a GPS antenna is supplied and locked to the GPS satellites on the bottom of the screen.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   - **a** Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
     – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
     – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
     – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   - **b** Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   - **c** Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   - **d** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **e** Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   - **f** Press the **DL Symbols** soft key to set the number of downlink symbols.
   - **g** Enter a value by using the numeric keys, and then press the **Enter** soft key.
   - **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
   - **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.
3. *Optional*. Press the **Miscellaneous** soft key, and then do the following steps:
   - **a** Press the **Delay** soft key to set the amount of delay in μs.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 231 Preamble scanner measurement with Mobile WiMAX OTA signal analyzer

Multipath profile

The Multipath Profile enables the user to determine RF environmental conditions of testing area. It indicates the multipath power with time delay in us up to six.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **System Config** soft key, and then do the following:
   a Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   d Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   f Press the **DL Symbols** soft key to set the number of downlink symbols.
   g Enter a value by using the numeric keys, and then press the **Enter** soft key.
   h Press the **UL Symbols** soft key to set the number of uplink symbols.
   i Enter a value by using the numeric keys, and then press the **Enter** soft key.
3 *Optional*. Press the **Miscellaneous** soft key, and then do the following steps:
   a Press the **Delay** soft key to set the amount of delay in μs.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Press the **μs** soft key.

NOTE
The Delay setting is used only when there is a time offset in the signals to be measured.

4 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 232 Multipath profile measurement with Mobile WiMAX OTA signal analyzer

Preamble power trend

The Preamble Power Trend shows power variations of a strongest preamble signal over time along with the relative power trend compare to total preamble power. Searching preamble index can be set auto to detect strongest or manual to search specific preamble. Positioning information, latitude, and longitude will be displayed if a GPS antenna is supplied and locked to the GPS satellites on the bottom of the screen.

Setting measure setup

After configuring test parameters as described in the “Configuring test parameters” on page 414, you can continue your measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **System Config** soft key, and then do the following:
   a. Press the **Bandwidth** soft key, and then select the nominal channel bandwidth to be measured from the following choices:
      – **7 MHz (8/7):** Sets the channel bandwidth to 7 MHz with sampling factor 8/7. In conjunction with nominal channel bandwidth
      – **8.75 MHz (8/7):** Sets the channel bandwidth to 8.75 MHz with sampling factor 8/7
      – **10 MHz (28/25):** Sets the channel bandwidth to 10 MHz with sampling factor 28/25
   b. Toggle the **Frame Length** soft key and select **5 ms** or **10 ms**.
   c. Press the **TTG (RTG)** soft key to set the transmit/receive transition gap between the last sample of the downlink burst and the first sample of the subsequent uplink burst.
   d. Enter a value by using the numeric keys, and then press the **Enter** soft key.
   e. Press the **CP Ratio** soft key, and then select the cyclic prefix ratio option: **1/4**, **1/8**, **1/16**, or **1/32**.
   f. Press the **DL Symbols** soft key to set the number of downlink symbols.
   g. Enter a value by using the numeric keys, and then press the **Enter** soft key.

- **h** Press the **UL Symbols** soft key to set the number of uplink symbols.
- **i** Enter a value by using the numeric keys, and then press the **Enter** soft key.

3 Toggle the **Preamble Index** soft key and select the preamble search method: **Auto** or **Manual**.

4 *Optional*. Press the **Miscellaneous** soft key, and then do the following steps:

- **a** Press the **Delay** soft key to set the amount of delay in μs.
- **b** Enter a value by using the numeric keys. You can also use the rotary knob.
- **c** Press the **μs** soft key.

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

Figure 233 Preamble power trend with Mobile WiMAX OTA signal analyzer

Route map

The JD700B Series provides indoor and outdoor mapping function that allows a user to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters plotting real time directly on top of a loaded floor plan or a map.

Setting measure setup

Procedure

1 If required, connect a GPS receiver to your JD700B series for outdoor mapping.
Indoor mapping does not necessarily need a GPS antenna.

2 Configure test parameters as described in the “Configuring test parameters” on page 414.

3 To load your map file, complete the following steps:

- **a** Plug in your USB drive that has a floor map or `.mcf` file type created in JDMapCreator.

> **NOTE**

> The JDMapCreator converts and resizes any scanned floor plan or layout to fit onto your instrument's display. You must save your map file (`.mcf`) into the "**SavedMap**" folder of your USB drive so that you can load them onto your instrument.

b Press ***SAVE/LOAD*** hot key, and then select **Load > Load Map**.
See "Using load" on page 34 for more information.

4 Press the ***MEASURE SETUP*** hot key.

5 Press the **Plot Point** soft key, and then select the plot point option from the following choices:

– To collect data/plot points automatically as you move around in a vehicle or outside, press the **GPS** soft key and then toggle the **Screen Mode** soft key between **Map** and **Full**.

> **NOTE**
> With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. If a point is off the map, the instrument displays an arrow to indicate the direction of the current location on the map and the distance from the center to the location at the top of the screen.
>
> With the **Full** setting, you can view all the collected points of the route without the loaded map.

– To collect data/plot points manually without a GPS antenna in an indoor environment, press the **Position** soft key.

6 Toggle the **Plot** soft key and select **Start** to start plotting.

7 Touch directly on the screen or press the **ENTER** hard key to collect data and plot points on the loaded map for the **Position** setting.

> **NOTE**
> For the **Position** setting, you can change the direction of the route with the arrow keys and the distance with the rotary knob.

8 Toggle the **Plot** soft key and select **Stop** to stop plotting.

9 Press the ***SAVE/LOAD*** hot key to save the result.
See "Using save" on page 32 for more information.

> **NOTE**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit for route map

You can set the thresholds for each test item.

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Excellent** soft key to set its threshold.
3. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
4. Press the **Very Good** soft key to set its threshold.
5. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
6. Press the **Good** soft key to set its threshold.
7. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
8. Press the **Fair** soft key to set its threshold.
9. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
10. Press the **Poor** soft key to set its threshold.
11. Enter a value, and then press the **Enter** soft key. You can also use the rotary knob.
12. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select **Limit** to save the limit settings.

See “Using save” on page 32 for more information.

Measurement example

Figure 234 Route map measurement with Mobile WiMAX OTA signal analyzer

Chapter 14 Using Cable and Antenna Analyzer

This chapter provides instructions for using the Cable and Antenna Analyzer function, which is available for the JD785B/JD745B Base Station Analyzer and the JD786B/JD746B RF Analyzer. Topics discussed in this chapter are as follows:

Introduction

The Cable and Antenna Analyzer is a diagnostic tool needed to accurately detect operational problems by performing cable and antenna measurements to verify the base station's infrastructure, including feed lines, connectors, antennas, cables, jumpers, amplifiers, and filters. The JD785B/JD745B Base Station Analyzer and the JD786B/JD746B RF Analyzer have all of the measurement functions necessary to verify cable and antenna systems from Voltage Standing Wave Ratio (VSWR) to power measurements. In addition, the JD785B/JD745B and the JD786B/JD746B make distance-to-fault measurements to pinpoint a faulty location accurately.

To get maximum power into a load it is required that the load impedance match the generator impedance. Any difference in impedance or mismatching would not produce maximum power transfer. An impedance mismatch at the antenna system produces a reflective 'traveling wave', which goes in the opposite direction from the incident wave. As the two traveling waves cross each other in opposite direction, it is produce an interference pattern called a "standing wave". VSWR is the ratio between the power sent forward to the cable and/or antenna and the amount of power that is reflected back to the transmitter.

Some of the consequences of having a high VSWR condition in cellular services include dropped calls, poor reception, and an overall unacceptable performance in the cell (or section of cell) covered by the base station antenna. Therefore, the VSWR of the antenna system including the feed line is one of the most critical factors in the service and maintenance of the RF transmitter systems.

This Cable and Antenna Analyzer function performs following measurements:

- Reflection: VSWR and Return Loss
- Distance to Fault (DTF): VSWR and Return Loss
- Reflection-DTF (dual measurement)
- 2 Port Measurements: Vector and Scalar (Optional)
- Cable Loss (1 Port)
- 1 Port Phase
- Smith Chart

Display overview

Figure 235 provides descriptions for each segment of the measurement screen.

Figure 235 Reflection measurement screen

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Cable & Antenna Analyzer** soft key. The **Reflection (VSWR)** mode is selected by default.
3. To change the mode, press the ***MEASURE*** hot key and then select the measurement mode:
   – **Reflection (Return Loss)**
   – **DTF (VSWR)**
   – **DTF (Return Loss)**
   – **Reflection-DTF**
   – **Cable Loss (1 Port)**
   – **1 Port Phase, Smith Chart**
   – **2 Port Measurement (Vector/Scalar)**

Configuring test parameters

Setting frequency

You can set frequencies manually using the Start Frequency/Stop Frequency or Center Frequency/Span. You can also select from the band list stored in the instrument. It is recommended to set the frequency to a value that covers the normal range of the measurement with enough margins.

Procedure

To set the start and stop frequencies:

1. Press the **FREQ/DIST** hard key.
2. Press the **Start Frequency** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
4. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Press the **Stop Frequency** soft key.
6. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
7. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the center frequency and span:

1. Press the **FREQ/DIST** hard key.
2. Press the **Center Frequency** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
4. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. Press the **Span** soft key.
6. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
7. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To select the band from the band list:

1. Press the **FREQ/DIST** hard key.
2. Press the **Band List** soft key, and then select **Standard Band** or **Custom Band**.
   The band list window appears.
3. Select a frequency band from the list, and then press the **Select** soft key.
   The start and stop frequency information on the screen changes according to your choice.

Setting distance

In the DTF measurement mode, you need to set the start and stop distances. The maximum measurable distance is displayed on the left side of the screen depending on the frequency setting. You can set any distance within the maximum measurable distance. Optimum resolution is achieved when the user setting distance is the same as the maximum measurable distance

Procedure

1. Press the **FREQ/DIST** hard key.
2. Press the **Start Distance** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
4. Select the **Enter** soft key.
5. Press the **Stop Frequency** soft key.
6. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
7. Select the **Enter** soft key.

Adjusting scale

You can adjust the Y-axis scale to optimize the display of measurement trace(s). Adjusting scale does not affect the calibration state.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Do one of the following choices:
   – Press the **Auto Scale** to optimize the display of the measured trace by letting the instrument set the minimum and maximum values for the Y-axis automatically.
     Each time this key is pressed, the top and bottom scales are set to the minimum and maximum values with margin on the Y-axis of the chart.
   – Press the **Full Scale** to restore the insturment's default amplitude range for the Y-scale automatically.
   – To set the minimum and maximum values for the Y-axis manually, complete the following steps:
     a Press the **Maximum (Top)** soft key.
     b Enter a value by using the numeric keys.
     c Press the **Enter** soft key.
     d Press the **Minimum (Top)** soft key.
     e Enter a value by using the numeric keys.
     f Press the **Enter** soft key.

NOTE
This setting is not used in the Smith Chart measurement mode.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

Performing calibration

To get reliable and accurate measurement results, you must perform a calibration on your instrument after setting frequencies and prior to making a measurement. You need to have the following ready:

- Calibration accessories (optional).
- Calibration Kit: Includes one 50-ohm load, one open standard, and one short standard.
- Test Cable: Use a phase stable cable for reliable and consistent measurement results.

1-port calibration

Measurements that need the 1-port calibration are in the Reflection, DTF, Cable Loss, 1 Port Phase, or Smith Chart mode.

Figure 236 illustrates the connection method when a port extension cable is used for calibration. To compensate errors caused by a port extension cable or adapters, perform an Open-Short-Load calibration including the port extension cable.

Figure 236 Connection for 1-port calibration

> **NOTE**
> Do not use an unnecessary extension cable or adapter in order to prevent a measurement error.
>
> Bending or moving the extension cable while making a measurement may cause errors in the measurement.

> **NOTE**
> If O-S-L calibration is done at the end of the port extension cable for DTF measurement, the length of the port extension cable is compensated automatically and is not included in the distance to the point of discontinuity.

O-S-L calibration

The Open-Short-Load calibration must be performed after setting frequency and connecting a test cable. When using an extension cable connected to the Cable and Antenna Analyzer Reflection/RF Out port, the calibration kit must be connected to the other end of the extension cable.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Calibrate** soft key.
   The on-screen instruction for the calibration appears.
3. Connect the **OPEN** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected extension cable.
4. Press the **Continue** soft key to start calibration.
   The calibration progress bar appears.
5. Connect the **SHORT** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected extension cable.
6. Press the **Continue** soft key to continue calibration.
   The calibration progress bar appears.
7. Connect the **LOAD** connector of the CAL Kit directly to the **Cable and Antenna Analyzer**

Reflection/RF Out port or at the end of the connected extension cable.

8 Press the **Continue** soft key to continue calibration.
The calibration progress bar appears.
After completion, the calibration status on the screen changes to **CAL ON**.

Quick calibration

The Quick Calibration is useful when you want to measure only cable length in DTF measurements.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Calibrate** soft key.

3 Connect the **OPEN** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected extension cable.

4 Press the **Quick Cal.** soft key to turn the quick calibration off.
The calibration status on the screen changes back to the previous state.

2-port calibration

You must perform 2-port calibration for 2-port measurements before making a measurement.

Vector measurement

Figure 237 illustrates the connection diagram for calibration in Vector measurements.

Figure 237 Connection for 2-port calibration in vector measurement

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Calibrate** soft key.
The on-screen instruction for the calibration appears.

3 Connect the **OPEN** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected test cable as illustrated in Figure 237-1).

4 Press the **Continue** soft key to start calibration.
The calibration progress bar appears.

5 Connect the **SHORT** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected test cable.

6 Press the **Continue** soft key to continue calibration.

The calibration progress bar appears.

7 Connect the **LOAD** connector of the CAL Kit directly to the **Cable and Antenna Analyzer Reflection/RF Out** port or at the end of the connected test cable.

8 Press the **Continue** soft key to continue calibration.
The calibration progress bar appears.

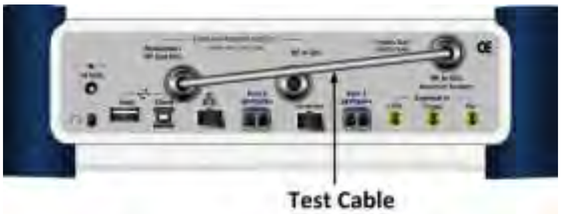
9 Connect the **Reflection/RF Out** port and the **RF In** port for the Cable and Antenna Analyzer with the test cable (THRU cable) and the proper adapter as illustrated in Figure 237-2).

10 Press the **Continue** soft key to continue calibration.
The calibration progress bar appears.
After completion, the calibration status on the screen changes to **CAL ON**.

Scalar measurement

Figure 238 illustrates the connection diagram for calibration in Scalar measurements.

Figure 238 Connection for 2-port calibration in scalar measurement



Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Calibrate** soft key.
The on-screen instruction for the calibration appears.

3 Connect the **Reflection/RF Out** port for the Cable and Antenna Analyzer and the **RF In** port for the Spectrum Analyzer with a test cable as illustrated in Figure 238.

4 Press the **Continue** soft key to continue calibration.
The calibration progress bar appears.
After completion, the calibration status on the screen changes to **CAL ON**.

Calibration status indicators

The instrument displays calibration status that is an important indicator to get reliable and accurate measurement results from CAA testing. The calibration status includes **CAL ON**, **CAL ON (I)**, **CAL ON (Q)**, **CAL OFF (T)**, and **CAL OFF**.

Table 21 Calibration status indicators

Indicator(s)	Description
CAL ON	Indicates that the O-S-L calibration is performed and the instrument is ready to make a measurement.
CAL ON (I)	Indicates that the frequency setting is changed within the frequency range registered for the O-S-L calibration and so the calibration is still valid. When the calibration status changes from CAL ON to CAL ON (I), re-calibration is not necessarily required.
CAL ON (Q)	Indicates that quick calibration (Quick Cal) is performed. It is useful only if cable length measurement is needed.
CAL OFF (T)	Indicates that the temperature registered during the calibration is changed by ±10°C or

	greater. It is recommended that you perform a new O-S-L calibration to obtain accurate measurement results. When the temperature comes back within the registered range, the status may be changed to CAL ON.
CAL OFF	Indicates that the frequency setting is changed off the frequency range registered for the calibration. The calibration is no longer valid.

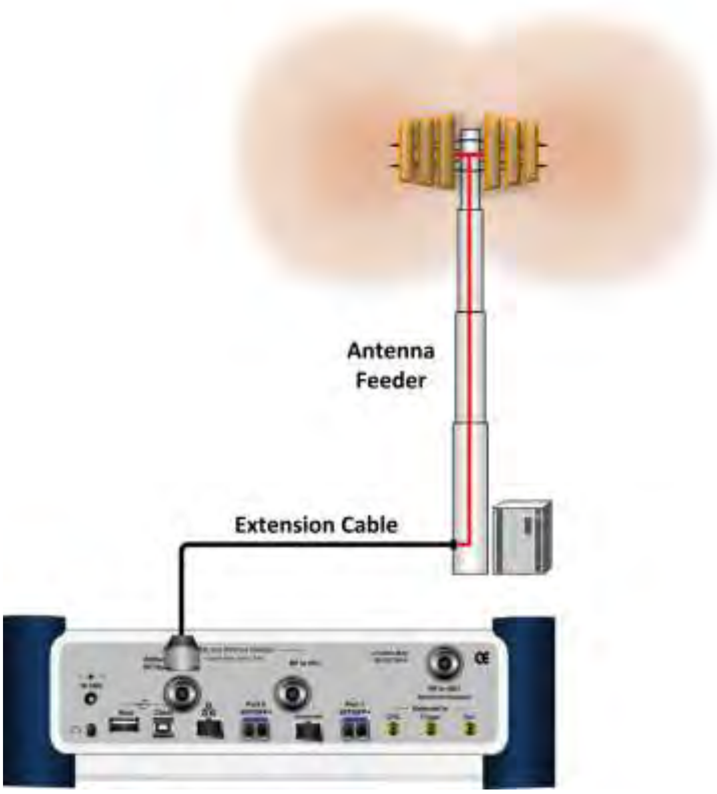
Connecting a cable

Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements

Procedure

1. Connect the one end of the port extension cable to the **Cable and Antenna Analyzer Reflection/RF Out** port of the instrument.
2. Connect the other end of the port extension cable to an antenna or feed line as illustrated in Figure 239. Measurement result is displayed on the screen.

Figure 239 Connection for reflection measurement



NOTE
After calibration, do not change the connection of the port extension cable or the frequency setting. It may cause a measurement error.

Changing any frequency settings will automatically turn the calibration status to OFF on the display screen, which requires re-calibration to proceed next measurement.

CAUTION
The maximum input power for the **Cable and Antenna Analyzer Reflection/RF Out** port is +25 dBm. Do not connect this port directly to the output port of the system to prevent degraded performance or malfunctioning.

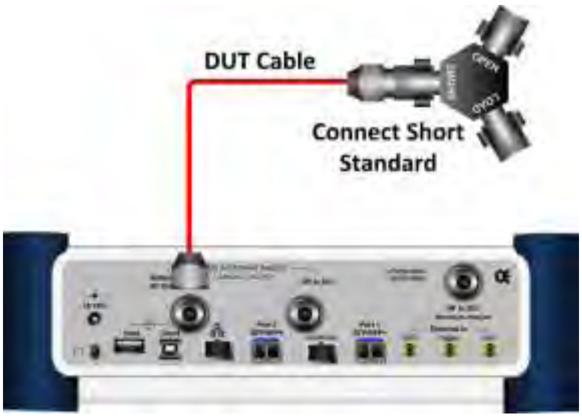
WARNING
Do not attempt to connect the instrument to the antenna when there is a risk of lightning. Electric shock may cause malfunction of or damage to the instrument.

Connecting a cable for cable loss (1 port) measurements

Procedure

1. Connect the one end of the cable under test to the **Cable and Antenna Analyzer Reflection/RF Out** port of the instrument.
2. Connect the **SHORT** standard of the Cal Kit to the other end of the cable under test as illustrated in Figure 240. Measurement result is displayed on the screen.

Figure 240 Connection for cable loss (1 port) measurement



Connecting a cable for 2-port vector measurements

Procedure

1. Connect the one end of the Thru test cable to the Cable and Antenna Analyzer Reflection/RF Out port of the instrument and the other end of the cable to DUT.
2. Connect the DUT to the **Cable and Antenna Analyzer RF In** port of the instrument as illustrated in Figure 241. Measurement result is displayed on the screen.

Figure 241 Connection for 2-port vector measurement

> **CAUTION**
> The maximum input power for the **Cable and Antenna Analyzer RF In** port is +25 dBm. However, a proper level of input to the **Cable and Antenna Analyzer RF In** port is 0 dBm. When the input power is expected to be greater than 0 dBm, you must adjust the output power for the RF Out.

Connecting a cable for 2-port scalar measurements

Procedure

1. Connect the one end of the Thru test cable to the Cable and Antenna Analyzer Reflection/RF Out port of the instrument and the other end of the cable to DUT.
2. Connect the DUT to the **Spectrum Analyzer RF In** port of the instrument as illustrated in Figure 242. Measurement result is displayed on the screen.

Figure 242 Connection for 2-port scalar measurement

> **CAUTION**
> The maximum input power for the **Spectrum Analyzer RF In** port is +25 dBm for JD780B series and +20 dBm for JD740B series.

Performing reflection measurements

The Reflection measurement can be used to characterize cable and antenna system to ensure transmission line impedance performance and signal reflection characteristics of cell-site across a specific frequency range in voltage standing-wave ration (VSWR) or return loss.

Making a measurement

Procedure

1. Make a proper cable connection as described in "Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements" on page 454.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4. *Optional*. To turn the bias tee on, complete the following steps:
   - **a** Toggle the **Bias Tee** soft key and select **On**.
   - **b** Enter a value between 12 and 32 with 0.1 V step.
   - **c** Enter the **V** soft key.

> **NOTE**
> The instrument's built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

5. *Optional*. To select the output power, toggle the **Output Power** soft key between **0 dBm** and **-30 dBm**.

> **NOTE**
> When an amplifier's reflection is measured, it is recommended that you change this output power level to -30 dBm and then re-calibrate. Changing to -30 dBm may result in reduced measurement dynamic range.

6. *Optional*. To turn the interference rejection on, toggle the **Interference Rej** soft key between **On** and **Off** to enable or disable the feature.

> **NOTE**
> It is recommended that you use this feature only when you suspect interfering signals in the area as turning this on slows down the measurement.

Measurement example

Figure 243 Reflection measurement in return loss scale

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for cable and antenna analyzer” on page 470 for more information.

> **NOTE**
> You can go to ***MEASURE SETUP*** **> Zone** to view your measurements in detail with the user-definable zoom zones. See “Setting zoom zones” on page 469 for more information.

Performing DTF measurements

The Distance-To-Fault (DTF) measurement can be used to accurately identify fault locations in the cell-site transmission (cable and feed line) system, indicating signal discontinuities in VSWR or return loss over distance in meter or foot. This measurement precisely pinpoints the location of such things as damaged or degraded antennas, connectors, amplifiers, filters, and duplexers.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements” on page 454.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4 Press the **DTF Settings** soft key, and then do the following:

- To select a cable from the list, complete the following steps:
  - **a** Press the **Cable List** soft key, and then select **Standard Cable** or **Custom Cable**. The cable list window appears.
  - **b** Select a cable by using the rotary knob or the **Page Up**/**Page Down** soft keys.
  - **c** Press the **Select** soft key.
  - **d** *Optional*. In the standard cable list window, press the **Add to Custom** soft key to add the selected cable to the custom list.
- To define a new cable, complete the following steps:
  - **a** Press the **Prop Velocity** soft key to define the cable's relative propagation delay.
  - **b** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **c** Press the **Enter** soft key.
  - **d** Press the **Cable Loss** soft key to define the cable's cable loss.
  - **e** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **f** Press the **Enter** soft key.

> **NOTE**
> The propagatin velocity affects the calucation of the distance and the cable loss does the peak level of the discontinuity in a DTF measurement.

- Toggle the **Metrics** soft key and select the unit option for the X-axis: **Meter** or **Foot**.
- Press the Windowing soft key, and then select the video filtering option: **Rectangular**, **Blackman**, **Nominal Side Lobe**, **Low Side Lobe**, or **Minimum Side Lobe**.

5 *Optional*. To turn the bias tee on, complete the following steps:

- **a** Toggle the **Bias Tee** soft key and select **On**.
- **b** Enter a value between 12 and 32 with 0.1 V step.
- **c** Enter the **V** soft key.

> **NOTE**
> The instrument's built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

6 *Optional*. To select the output power, toggle the **Output Power** soft key between **0 dBm** and **-30 dBm**.

> **NOTE**
> When an amplifier's reflection is measured, it is recommended that you change this output power level to -30 dBm and then re-calibrate. Changing to -30 dBm may result in reduced measurement dynamic range.

7 *Optional*. To turn the interference rejection on, toggle the **Interference Rej** soft key between **On** and **Off** to enable or disable the feature.

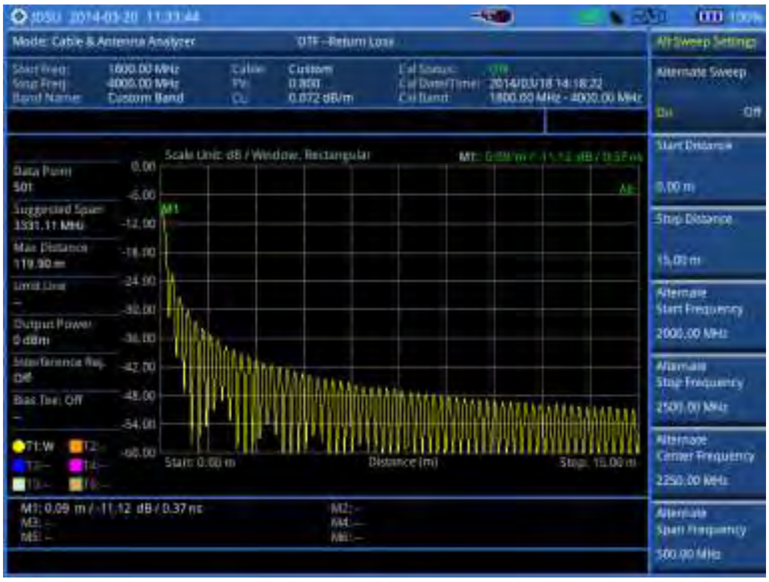
> **NOTE**
> It is recommended that you use this feature only when you suspect interfering signals in the area as turning this on slows down the measurement.

Measurement example

Figure 244 DTF measurement

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for cable and antenna analyzer” on page 470 for more information.

Figure 245 DTF measurement with the alternate sweep on



> **NOTE**
> You can go to ***MEASURE SETUP*** **> Alternate Sweep Settings** to scale down a specific sub-band. See “Setting alternate sweep” on page 470 for more information.

Performing reflection-DTF measurements

You can view two measurement results simultaneously on the screen as you configure each measurement setting.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements” on page 454.
2. Press the ***MEASURE SETUP*** hot key.
3. Toggle the **Active Window** soft key between **Top** and **Bottom** and select the window to be active for setting.
4. Press the **Dual Config** soft key, and then select the dual configuration option:
   – To select the measurement mode for the top window, press the **Top** soft key, and then select **Reflection (VSWR)** or **Reflection (Return Loss)**.
   – To select the measurement mode for the bottom window, press the **Bottom** soft key, and then select **DTF (VSWR)** or **DTF (Return Loss)**.
   – To configure DTF settings for the bottom window, select **Bottom > DTF Settings**. See “Performing DTF measurements” on page 458 for more information.
   – To set the alternate sweep settings for the bottom window, select **Bottom > Alternate Sweep Settings**. See “Setting alternate sweep” on page 470 for more information.

NOTE
See “Performing reflection measurements” and “Performing DTF measurements” for more information on how to set other measurement setup parameters for the Reflection-DTF measurement.

Measurement example

Figure 246 Reflection-DTF dual measurement

1) Alternate sweep off:

2) Alternate sweep on:

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for cable and antenna analyzer” on page 470 for more information.

Performing cable loss (1 port) measurements

The Cable Loss (1 Port) measurement quantifies signal loss through a cable or other device over a defined frequency range by range by connecting one end of the cable to the instrument measurement port and terminating the other end of the cable with a short, or leaving it open altogether. This measurement can be particularly useful in measuring the loss of feed line connected to the antenna.

Making a measurement

Procedure

1 Make a proper cable connection as described in “Connecting a cable for cable loss (1 port) measurements” on page 455.

2 Press the ***MEASURE SETUP*** hot key.

3 Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

NOTE
The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4 *Optional*. To turn the bias tee on, complete the following steps:

   a Toggle the **Bias Tee** soft key and select **On**.

   b Enter a value between 12 and 32 with 0.1 V step.

   c Enter the **V** soft key.

> **NOTE**
> The instrument's built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

> **NOTE**
> See "Performing reflection measurements" for more information on how to set other measurement setup parameters for the Cable Loss (1 Port) measurement.

Measurement example

Figure 247 Cable loss (1 port) measurement

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for cable and antenna analyzer" on page 470 for more information.

Figure 248 Cable loss (1 port) measurement with the zone enabled

> **NOTE**
> You can go to ***MEASURE SETUP* > Zone** to view your measurements in detail with the user-definable zoom zones. See “Setting zoom zones” on page 469 for more information.

Performing 1-port phase measurements

The 1-port Phase measurement is used to measure S_{11} phase to tune antennas and to phase-match cables.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements” on page 454.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4. *Optional*. To turn the bias tee on, complete the following steps:
   a. Toggle the **Bias Tee** soft key and select **On**.
   b. Enter a value between 12 and 32 with 0.1 V step.
   c. Enter the **V** soft key.

> **NOTE**
> The instrument’s built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

> **NOTE**
> See “Performing reflection measurements” on page 457 for more information on how to set other measurement setup parameters for the Cable Loss (1 Port) measurement.

Measurement example

Figure 249 Cable loss (1 port) measurement

Figure 250 Cable loss (1 port) measurement with zoom

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for cable and antenna analyzer” on page 470 for more information.

NOTE
You can go to ***MEASURE SETUP*** **> Zone** to view your measurements in detail with the user-definable zoom zones. See “Setting zoom zones” on page 469 for more information.

Performing Smith chart measurements

The Smith Chart measurement is used to measure DUTs’ impedance and phase to properly tune RF devices. Smith chart also displays impedance-matching characteristics in cable and antenna systems or filter and duplexer devices.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for reflection, DTF, 1-port phase, and Smith Chart measurements” on page 454.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4. *Optional*. To turn the bias tee on, complete the following steps:
   a. Toggle the **Bias Tee** soft key and select **On**.
   b. Enter a value between 12 and 32 with 0.1 V step.
   c. Enter the **V** soft key.

> **NOTE**
> The instrument’s built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

> **NOTE**
> See “Performing reflection measurements” on page 457 for more information on how to set other measurement setup parameters for the Smith Chart measurement.

Performing 2-port vector measurements

The Vector measurement is used to perform faster and more accurate measurement with around 80 dB dynamic range. It also provides antenna isolation measurement. You can determine DUT’s S_{21} phase characteristic by selecting the measurement display type as Phase.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for 2-port vector measurements” on page 455.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of

> measuring wide frequency bands or requiring precise measurement data.

4 Toggle the **Display** soft key and select **Magnitude** to view measurements in dB or **Phase** in degree.

5 *Optional*. To turn the bias tee on, complete the following steps:

   a Toggle the **Bias Tee** soft key and select **On**.

   b Enter a value between 12 and 32 with 0.1 V step.

   c Enter the **V** soft key.

> **NOTE**
> The instrument's built-in bias tee function (option 002) supplies 12-32 VDC bias to active devices through the **RF In** port, eliminating the need of an external power supply.

6 *Optional*. To select the output power, toggle the **Output Power** soft key between **0 dBm** and **-30 dBm**.

> **NOTE**
> When an amplifier's reflection is measured, it is recommended that you change this output power level to -30 dBm and then re-calibrate. Changing to -30 dBm may result in reduced measurement dynamic range.

7 *Optional*. To set the number of measurements to be averaged, press the **Average** soft key and then adjust the number between one and five by using the rotary knob.

8 *Optional*. To turn the interference rejection on, toggle the **Interference Rej** soft key between **On** and **Off** to enable or disable the feature.

> **NOTE**
> It is recommended that you use this feature only when you suspect interfering signals in the area as turning this on slows down the measurement.

Measurement example

Figure 251 2-port vector measurement

Performing 2-port scalar measurements

The Scalar measurement enables full characterization of DUT with dynamics over 100 dB.

Making a measurement

Procedure

1. Make a proper cable connection as described in “Connecting a cable for 2-port scalar measurements” on page 456.
2. Press the ***MEASURE SETUP*** hot key.
3. Press the **Data Points** soft key to change the resolution of your measurement, and then select the data point option: **126**, **251**, **501**, **1001**, and **2001**. Changing the data point does not affect current calibration.

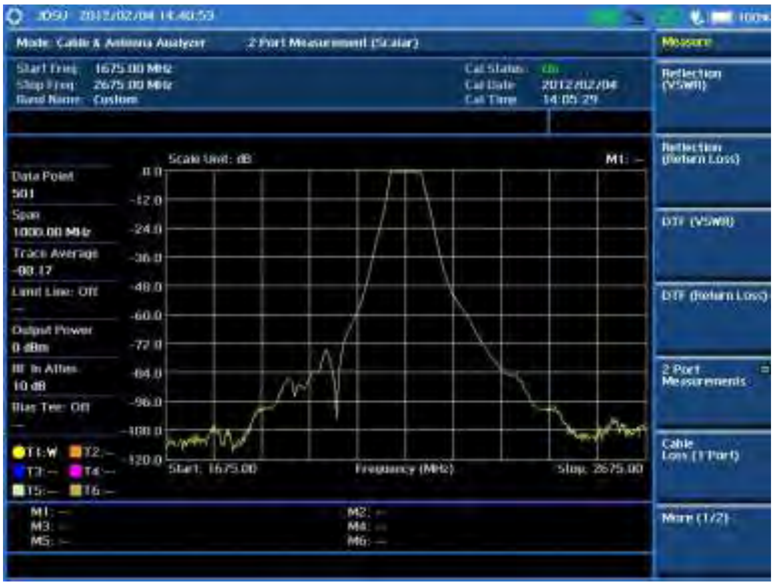
> **NOTE**
> The larger number you choose, the higher resolution you get and the longer the instrument takes to sweep and display results. Selecting the data point larger than what you need for a measurement will result in unnecessarily long sweep time. It is recommended that you select high resolution data points only for an instance of measuring wide frequency bands or requiring precise measurement data.

4. *Optional*. To select the output power, toggle the **Output Power** soft key between **0 dBm** and **-30 dBm**.

> **NOTE**
> When an amplifier’s reflection is measured, it is recommended that you change this output power level to -30 dBm and then re-calibrate. Changing to -30 dBm may result in reduced measurement dynamic range.

Measurement example

Figure 252 2-port scalar measurement



Analyzing measurements

Setting trace and display

You can display up to six traces on the measurement chart simultaneously.

Procedure

1 Press the **TRACE/DISPLAY** hard key.
2 Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**. The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3 Toggle the **Trace View** soft key and select **On** to display the selected trace.
4 Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Capture the selected trace and compare traces	Capture	C
Load a saved trace	Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	Trace Clear All	

5 *Optional.* If you have at least two traces (T1 and T2), you can perform trace math:
   a Press the **Trace Math** soft key.
   b Press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.

NOTE
The trace to be loaded must be in the same measurement mode and has the same frequency setting as the current measurement.

Setting zoom zones

You can define up to three zoom-in zones so that you can view uplink and downlink frequencies in detail on a single measurement window for compliance verification.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **Zone** soft key.
3 To zoom in a zone, complete the following steps:
   a Press the **Zoom** soft key, and then select the zone number to zoom in: **Zone 1**, **Zone 2**, or **Zone 3**.
   b Toggle the **Zoom** soft key and select **On**.
   The zoom-in chart for the selected zone appears under the measurement result.
4 To define a zone range, complete the following steps:
   a Press the **Zone [1|2|3]** soft key to select an active zone.
   b Toggle the **Zone [1|2|3]** soft key between **On** and **Off** to view or dismiss the active zone.
   c Press the **Start Frequency** soft key.
   d Enter a value by using the numeric keys. You can also use the rotary knob.
   e Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   f Press the **Stop Frequency** soft key.
   g Enter a value by using the numeric keys. You can also use the rotary knob.
   h Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5 To clear all the zone settings, press the **Clear All** soft key.

Setting alternate sweep

You can use the Alternate Sweep in DTF measurements to scale down a specific sub-band without a need of an additional calibration.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the Alternate Sweep Settings soft key.
3. Toggle the **Alternate Sweep** soft key and select **On** or **Off** to enable or disable the alternate sweep feature.
4. To set the start and stop distances for the alternate sweep, complete the following steps:
   - **a** Press the **Start Distance** soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **c** Select the **Enter** soft key.
   - **d** Press the **Stop Frequency** soft key.
   - **e** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **f** Select the **Enter** soft key.
5. To set the start and stop frequencies for the alternate sweep, complete the following steps:
   - **a** Press the Alternate Start Frequency soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **c** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   - **d** Press the Alternate Stop Frequency soft key.
   - **e** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. To set the center and span frequencies for the alternate sweep, complete the following steps:
   - **a** Press the Alternate Center Frequency soft key.
   - **b** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **c** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
   - **d** Press the Alternate Span Frequency soft key.
   - **e** Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
   - **f** Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

Setting limit for cable and antenna analyzer

Procedure

1. Press the ***LIMIT*** hot key.
2. Press the **Multi Segment Line** soft key for Pass/Fail indication.
3. Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.
4. Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.
   - **a** Press the **# of Line** soft key.
   - **b** Enter a value between 1 and 50 by using the numeric keys.
   - **c** Press the **Enter** soft key.
5. Press the **Autoset** soft key to let the instrument set the limit for each segment and display the line.

6 *Optional*. To move the limit line, complete the following steps:

  a Select **Limit Up/Down** or **Limit Left/Right**.

  b Turn the rotary knob to move the line as desired. You can also manually enter a value.

7 *Optional*. To edit the segment properties, complete the following steps:

  a Press the **Edit Limit** soft key.

  b Press the **Move** soft key and then turn the rotary knob to select the segment to edit.

  c Select the menu option, from the following choices:

  – To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.

  – To add a new point, press the **Add Point** soft key.

  – To delete the selected point, press the **Delete Point** soft key.

  – To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.

8 *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings.
See “Using save” on page 32 for more information.

Chapter 15 Using RFoCPRI Interference Analyzer

This chapter provides instructions for using the RFoCPRI function that requires Optical Hardware (option 008) and RFoCPRI Interference Analyzer (options 060 – 065). Topics discussed in this chapter are as follows:

Introduction

Cell sites today have a distributed architecture of the radio that consists of the radio equipment control (REC) or base band unit (BBU) installed at the bottom of the tower and the radio equipment (RE) or remote radio head (RRH) installed at the top of the tower. These two elements communicates with each other via the Common Public Radio Interference (CPRI) protocol over fiber links.

This distributed architecture provides the benefit of replacing coax-based feeders with fiber- based feeders, significantly reducing the problems of signal loss and reflections. However, since all the RF interfaces reside on the RRH, any RF maintenance or troubleshooting requires climbing to the top of the tower to access the RRH, increasing operational cost and unnecessary safety issues.

JD700B series analyzers provide the option of RFoCPRI that allows you to perform RF maintenance and troubleshooting activities on the ground via the fiber interfaces at the BBU, significantly reducing maintenance time and operational expenses. Thanks to the RFoCPRI technology, you can verify the CPRI control signals and extracts the IQ data transmitted between the BBU and RRU to monitor and analyze the uplink interferences and the downlink signals.

The RFoCPRI option provides following measurements and analysis:

- Layer 2 monitoring
- Layer 2 terminate testing
- Interference analysis including spectrum, spectrogram, RSSI, and spectrum replay
- PIM detection of single or multiple carrier(s)

Display overview

Figure 253 provides descriptions for each segment of the measurement screen.

Figure 253 RFoCPRI analysis screen

Connecting a cable

There are two ways of connecting a cable: monitoring mode and terminate mode. The monitoring mode lets you perform in-service testing by using coupler(s) while the terminate mode allows you to do out-of-service testing.

When selecting a SFP/SFP+ to connect, you need to make sure that your SFP/SFP+ is compatible with your DUT and that you have the information such as line rate, wavelength, and mode (MM or SM) handy.

In-service testing (monitoring mode)

Figure 254 Coupled mode

JD785B/JD786B/JD745B/JD746B **JD788B/JD748B**

Out-of-service testing (terminate mode)

Figure 255 Terminate mode

JD785B/JD786B/JD745B/JD746B **JD788B/JD748B**

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **RFoFiber** soft key.
3. Press the **RFoCPRI** soft key. The Layer 2 Monitoring mode is set by default.
4. Press the ***MEASURE*** hot key, and then select the measurement mode option from the following choices:

- **Layer 2 Monitoring**
- **Layer 2 Term**
- **Interference Analyzer > Spectrum**, **Spectrogram**, **RSSI**, or **Spectrum Replay**
- **PIM Detection > PIM Detection Single Carrier**, **PIM Detection Multiple Carriers**, or **Calculated PIM**

Monitoring layer 2

The Layer 2 Monitoring is used to monitor the L1 inband protocol, for the link maintenance of the physical layer (layer 1), that resides on the layer 2 of CPRI.

Selecting measurement mode

Procedure

1. Connect cables as illustrated in **Figure 254** Coupled mode.
2. Press the ***MEASURE*** hot key.
3. Select **Layer 2 Monitoring**.

Starting layer 2 monitoring

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CPRI Parameters** soft key.
3. To set the CPRI line bit rate of the front haul under testing, complete the following steps:
   a. Press the **Link Rate** soft key.
   b. Select the CPRI line bit rate option from the choices: **614.4 Mbps**, **1228.8 Mbps**, **2457.6 Mbps**, **3072.0 Mbps**, **4915.2 Mbps**, **6144.0 Mbps**, and **9830.4 Mbps**.

> **NOTE**
> It is important to set the link rate correctly. If not, you will have LOS and LOF alarms on the screen.

4. Check the results if any of the following layer 1 alarms were detected and if the optical signal level is good. Red indicates the occurrence of the alarm.
   - **LOS:** Loss of Signal
   - **LOF:** Loss of Frame
   - **RAI:** Remote Alarm Indication
   - **SDI:** SAP Defect Indication
   - **Optic Rx Level:** If the optical signal level is lower than the threshold, RRH may not be in service mode.
5. *Optional*. You can use the **Save Logging Data** soft key to record the event logging in `.csv` file format. See “Using save” on page 32 for more information.
6. To clear the previous event history and restart a new monitoring, press the **Clear History** soft key.

Measurement example

Figure 256 CPRI layer 2 monitoring

Performing layer 2 term testing

The Layer 2 Term is used to test the CPRI front haul in the terminated status. CellAdvisor JD700B series can act as a BBU (Baseband Unit) to enable the RRH (Remote Radio Head) to be in the operation state. Once the RRH enters the operation status, JD700B series can generate an alarm or error and send it to the RRH to verify the optical cable installation from the test point to the RRH.

Selecting measurement mode

Procedure

1 Connect cables as illustrated in **Figure 255** Terminate mode.
2 Press the ***MEASURE*** hot key.
3 Select **Layer 2 Term**.

Starting layer 2 term test as master

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **CPRI Parameters** soft key.
3 To set the CPRI line bit rate of the front haul under test, complete the following steps:
   a Press the **Link Rate** soft key.
   b Select the CPRI link rate option from the choices: **614.4 Mbps**, **1228.8 Mbps**, **2457.6 Mbps**, **3072.0 Mbps**, **4915.2 Mbps**, **6144.0 Mbps**, and **9830.4 Mbps**.

NOTE
It is important to set the link rate correctly. If not, you will have LOS and LOF alarms on the screen.

4 To set the clock reference, complete the following steps:

  a Press the **Tx Clock** soft key.

  b Select the transmission clock reference option **Internal** from the choices: **Internal**, **Recovered**, and **External**.

5 Toggle the **Port Type** soft key between **Master** and **Slave** and select **Master**.

6 Press the **BBU Emulation** soft key.

7 Toggle the **Start-up Sequence** soft key between **Normal** and **Bypass** and select the start-up sequence you want.

  – **Normal:** Negotiates with the RRH to support the start-up procedure.

  – **Bypass:** Forces to configure the predefined parameters. Selecting Bypass activates additional soft keys.

8 If you have set the start-up sequence to **Bypass**, complete the following steps:

  a Press the **Protocol Version** soft key, and then enter a value between one and 10 by using the numeric keys and press the **Enter** soft key. You can also use the rotary knob.

  b Press the **HDLC Rate** soft key, and then select the HDLC (High level Data Link Control) rate option from the choices: **No HDLC**, **240**, **480**, **960**, **1920**, and **2400**.

  c Toggle the **Eth Channel** soft key between **Enable** and **Disable**. Setting this to Enable activates the Eth Subchannel Number menu.

  d Press the **Eth Subchannel Number** soft key, and then enter a value between 20 and 63 by using the numeric keys and press the **Enter** soft key. You can also use the rotary knob.

9 Press the **PREV** hard key twice to return the Measure Setup screen bar.

10 Toggle the **Laser** soft key and select **On** to activate the transmission.

11 Press the **Alarm/Error** soft key and then do the following:

  – To insert an alarm, complete the following steps:

    a Press the **Alarm Type** soft key.

    b Select the alarm type option from the choices: **R-LOS**, **R-LOF**, **RAI**, and **SDI**.

    c Toggle the **Alarm Insertion** soft key and select **On** to start to insert the selected alarm.

    d To stop inserting the alarm, toggle the **Alarm Insertion** soft key and select **Off**.

  – To insert a code error, complete the following steps:

    a Toggle the **Error Type** soft key between **Code** and **K30.7** and select **Code**.

    b Toggle the **Insert Type** soft key between **Single** and **Rate**, and then select the insert type option you want.

      – **Single:** Inserts an error once and then turns the error insertion off.

      – **Rate:** Inserts an error at the error rate set in the Error Rate menu. Setting this to Rate activates the Error Rate soft key.

    c Press the **Error Rate**, and then select the error rate option from the choices: **1E-3**, **1E-4**, **1E-5**, **1E-6**, **1E-7**, **1E-8**, and **1E-9**.

    d Toggle the **Error Insertion** soft key and select **On** to start to insert the error.

    e To stop inserting the error, toggle the **Error Insertion** soft key and select **Off**.

  – To insert a K30.7 error, complete the following steps:

    a Toggle the **Error Type** soft key between **Code** and **K30.7** and select **K30.7**.

    b Toggle the **Error Insertion** soft key and select **On** to insert the error.
    This setting returns to Off after one insertion as it is a single insertion of K30.7 error.

12 Check the real time results on the screen.

13 *Optional*. You can use the **Save Logging Data** soft key to record the event logging in `.csv` file format. See “Using save” on page 32 for more information.

14 To clear the previous event history and restart a new monitoring, press the **PREV** hard key and then press the **Clear History** soft key.

Starting layer 2 term test as slave

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **CPRI Parameters** soft key.
3. To set the CPRI line bit rate of the front haul under test, complete the following steps:
   - **a** Press the **Link Rate** soft key.
   - **b** Select the CPRI link rate option from the choices: **614.4 Mbps**, **1228.8 Mbps**, **2457.6 Mbps**, **3072.0 Mbps**, **4915.2 Mbps**, **6144.0 Mbps**, and **9830.4 Mbps**.

> **NOTE**
> It is important to set the link rate correctly. If not, you will have LOS and LOF alarms on the screen.

4. To set the clock reference with the received clock signal, complete the following steps:
   - **a** Press the **Tx Clock** soft key.
   - **b** Select the clock reference option **Recovered** from the choices: **Internal**, **Recovered**, and **External**.
5. Toggle the **Port Type** soft key between **Master** and **Slave** and select **Slave**.
6. Press the **PREV** hard key to return the Measure Setup screen bar.
7. Toggle the **Laser** soft key and select **On** to activate the transmission.
8. Check the real time results on the screen.
9. *Optional*. You can use the **Save Logging Data** soft key to record the event logging in `.csv` file format. See “Using save” on page 32 for more information.
10. To clear the previous event history and restart a new monitoring, press the **PREV** hard key and then press the **Clear History** soft key.

Measurement example

Figure 257 CPRI layer 2 term test as master

Figure 258 CPRI layer 2 term test as slave

Performing interference analysis

After checking that the link connection is good with no errors and alarms, you can proceed to the interference analysis activities including spectrum measurements, spectrogram, RSSI, and spectrum replayer.

Selecting measurement mode

Procedure

1. Connect cables as illustrated in **Figure 254** Coupled mode.
2. Press the ***MEASURE*** hot key.
3. Press the **Interference Analyzer** soft key.
4. Select the interference measurement mode from the following choices:
   – **Spectrum**
   – **Spectrogram**
   – **RSSI**
   – **Spectrum Replay**

Setting CPRI measure setup

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the bandwidth of the downlink signal, complete the following steps:
   a. Press the **Bandwidth** soft key.
   b. Select the bandwidth option from the choices: **1.4 MHz**, **3 MHz**, **5 MHz**, **10 MHz**, **15 MHz**, and **20 MHz**. The RBW range changes based on this bandwidth setting.
3. To use the pre-configured settings for a NEM, press the **NEM** soft key and then select the NEM option from the following choices:

- **None** (no pre-configuration)
- **Ericsson (UL)**
- **Ericsson (DL)**
- **Alcatel-Lucent (UL/DL)**
- **Samsung (UL/DL)**
- **Huawei (UL)**
- **Huawei (DL)**

> **NOTE**
> The pre-configured information may be subject to changes at any times by NEMs.

4 Press the **CPRI Parameters** soft key to set the CPRI parameters.

5 To set the CPRI line bit rate of the front haul under test, complete the following steps:

a Press the **Link Rate** soft key.

b Select the CPRI link rate option from the choices: **614.4 Mbps**, **1228.8 Mbps**, **2457.6 Mbps**, **3072.0 Mbps**, **4915.2 Mbps**, **6144.0 Mbps**, and **9830.4 Mbps**.

> **NOTE**
> It is important to set the link rate correctly. If not, you will have LOS and LOF alarms on the screen.

6 To set the antenna per carrier group, complete the following steps:

a Press the **AxC Group** soft key.

b Enter a value between one and 24 by using the rotary knob.

c Press the **Enter** soft key.

> **NOTE**
> The maximum number of the AxC Group is determined by the combination of factors such as link rate, sample width, oversampling, and signal bandwidth.

7 To set the clock reference, press the **Tx Clock** soft key, and then select **Recovered** from the choices: **Internal**, **Recovered**, and **External**.

8 Toggle the **Port Type** soft key between **Master** and **Slave** and select **Slave**.

9 To set the I and Q sample widths, complete the following steps:

a Press the **IQ Sample Width** soft key

b Enter a value between four and 20 by using the rotary knob.

c Press the **Enter** soft key.

10 To set the mapping method, complete the following steps:

a Press the **Mapping Method** soft key.

b Select the mapping method option from the choices: **1**and **3**.

- **Mapping Method 1:** IQ sample based for packed position. An RRH of GSM, UMTS, and LTE supports this mapping method.
- **Mapping Method 3:** Backward compatible with the mapping method 1 for flexible position. An RRH of GSM, UMS, and LTE supports this mapping method.

11 To set the first bit position of each AxC Container in the IQ data block of a basic frame, complete the following steps:

a Press the **Map Position** soft key.

b Select the AxC Container number you want to set from the choices: **AxC 0**, **AxC 1**, **AxC 2**, **AxC 3**, **AxC 4**, **AxC 5**, **AxC 6**, and **AxC 7**.

c Enter a value using the numeric keys. You can also use the rotary knob.

d Press the **Enter** soft key.

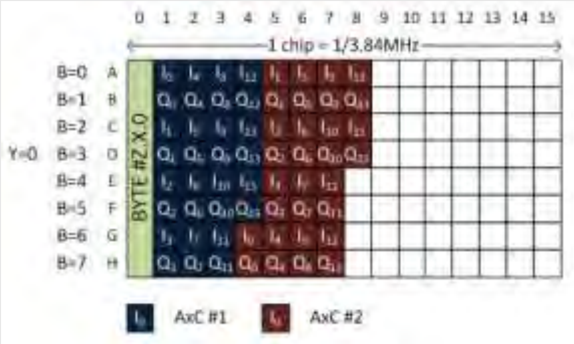
> **NOTE**
> The number of required AxC Container for a basic frame are two AxCs for 5 MHz, four AxCs for 10 MHz, and eight AxCs for 20 MHz.

Following is an example of test configuration for a DUT.

DUT	
CPRI Line Rate (Mbps)	614.4
UMTS Channel (MHz)	3.84
Carriers	2
AxC Positioning	Packed
IQ Sampling	15
Over Sampling	1

Test Configuration		
Link Rate (Mbps)		614.4
Bandwidth (MHz)		3
NEM		None
AxC Group		1 – 2
IQ Sample Width		15
Map Position	AxC 0	0
	AxC 1	15

For this test configuration, IQ allocation will be like this in the CPRI basic frame.



12 Press the **PREV** hard key twice to return the Measure Setup screen bar.

Configuring test parameters

Configuration of test parameters described in this section is used in the Interference Analyzer mode including spectrum measurements, spectrogram, and RSSI.

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

Procedure

To set the frequency with center frequency:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. *Optional*. To define the amount of frequency increment for the rotary knob, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the frequency with channel number:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
      See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Press the **Channel Number** soft key.
5. Enter a value by using the numeric keys. You can also use the rotary knob.
6. Press the **Enter** soft key.
7. The instrument automatically displays the corresponding center frequency value for the selected channel number.
8. *Optional*. To define the amount of channel increment for the rotary knob, complete the following steps:
   a. Press the **Channel Step** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.

Setting reference level

You can set the reference level automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, the Y-axis scale changes to be optimized with some margin.

To set the reference level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   a. Press the **Reference Level** soft key.
   b. Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   c. Press the **dBm** soft key or the **ENTER** hard key.
      This unit key name changes according to the setting in the **Units** menu.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

Setting scale per division

You can use the **Scale/Div** feature to change the scale per division, representing the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Select **More (1/2) > Scale/Div**.
3. Enter a value between 1 and 20 by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

Setting external offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset, and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB, the measurement result compensates 40 dB.

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting RBW

You can set the RBW and VBW in the Spectrum, Spectrogram, and RSSI modes. The RBW range is limited as per the bandwidth of the signal under test.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **RBW** soft key to set the resolution bandwidth.
3. Enter a value in 1-3 sequence by using the numeric keys, and then select **kHz** soft key.
   You can also use the rotary knob.
   – For signal bandwidths 1.4 MHz and 3 MHz: RBW from 1 kHz to 30 kHz
   – For signal bandwidths 5 MHz, 10 MHz, 15 MHz, and 20 MHz: RBW from 1 kHz to 100 kHz
4. Press the **VBW** soft key to set the video bandwidth.
5. Enter a value by using the numeric keys, and then select the unit option from the choices:
   MHz, **kHz**, and **Hz**. You can also use the rotary knob.

Setting average

You can set the number of measurements to be averaged for the trace presentation in the Spectrum, Spectrogram, and RSSI modes. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between one and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode. This setting is used in the Spectrum, Spectrogram, and RSSI modes.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red disappears and the sweeping resumes.

Setting trace

You can display up to six traces on the measurement chart simultaneously.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Press the **Select Trace** soft key, and then select the trace number: **T1**, **T2**, **T3**, **T4**, **T5**, or **T6**.
   The legend shape of the selected trace changes from square to round to indicate that the trace is the active one now.
3. Toggle the **Trace View** soft key and select **On**.
4. Do one of the following:

To	Select	Trace Legend
Clear current data and display with new measurements	Clear Write	W
Display the input signal’s maximum response only (unlimited or for a certain amount of time)	Max Hold	M
Display the input signal’s minimum response only (unlimited or for a certain amount of time)	Min Hold	m
Capture the selected trace and compare traces	Capture	C
Load a saved trace	More (1/2) > Load	L
Hide the selected trace	Trace View > Off	F
Remove all the traces and initialize the trace settings	More (1/2) > Trace Clear All	

NOTE
For the **Max Hold** and **Min Hold**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen. You can set it to **Unlimited** to hold and view maximum or minimum data or specify a certain amount of time up to 60 seconds by using numeric keys or the rotary knob.

5 To select the detection option, press the **More (1/2) > Detectors**, and then do one of the following:

To display	Select
Random noise better than the peak without missing signals	Normal
The highest value in each data point	Peak
The root mean squared average power across the spectrum	RMS
The lowest value in each data point	Negative Peak
The center value in each data point	Sample

6 *Optional*. Press the **More (1/2) > Trace Info** soft key, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

7 *Optional.* If you have the two traces T1 and T2, you can perform trace math. To view the power difference between the traces, press the **T1 – T2 -> T5** or **T2 – T1 -> T6** soft key.
The result is overlaid on the screen along with the second Y-axis.

NOTE
To be able to load a trace, the trace to be overlaid must be saved in the same measurement mode and frequency setting as the current measurement.

Conducting spectrum measurements

After configuring test parameters as described in the "Configuring test parameters" on page 481, you can continue to proceed to the spectrum measurement with an audible indicator. You can also turn the interference ID on.

Sound indicator

The Sound Indicator is used to identify interfering signals with alarm sound. It is especially useful for locating interferer sources with a directional antenna.

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Press the **Sound Indicator** soft key.

3 Select the alarm reference option from the choices: **Marker** and **Line**.

– **Marker:** Sets the active marker position as the alarm reference.

– **Line:** Lets the limit line as the alarm reference. Selecting this option activates the Limit Line soft key.

4 To define a threshold for the limit line, complete the following steps:

a Press the **Limit Line** soft key.

b Enter a value by using the numeric keys. You can also use the rotary knob.

c Press the **dBm** soft key.

5 Toggle the **Sound** soft key between **On** and **Off** and select **On** to enable to sound. To turn it off, select **Off**.
6 *Optional*. To adjust the volume for alarm sound, press the **Volume** soft key, and then turn the rotary knob clockwise or counter clockwise.
7 *Optional*. You can save logging data automatically so that you can load the measurement data and replay in the Spectrum Replayer mode. See “Using save” on page 32 for more information.

Interference ID

The Interference ID automatically classifies interfering signals over a designated spectrum and displays a list of possible signal types corresponding to the selected signal.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **Interference ID** soft key.
3 To set the threshold, complete the following steps:
   a Press the **Threshold** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Press the **dBm** soft key.
4 Toggle the Interference ID soft key between **On** and **Off** and select **On** to enable the Interference ID. To turn it off, select **Off**.
5 *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 491 for more information.

Measurement example

Figure 259 RFoCPRI spectrum measurement

Figure 260 RFoCPRI spectrum analysis on LTE Uplink 10 MHz, antenna 1

Figure 261 RFoCPRI spectrum analysis on LTE Uplink 10 MHz, antenna 2

Conducting spectrogram

The Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 481, you can continue to proceed to the spectrogram measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set the amount of time between each trace measurement:
   a. Press the **Time Interval** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Sec** soft key.
3. To set the time cursor on a specific trace position, complete the following steps:
   a. Toggle the **Time Cursor** soft key and select **On**.
   b. Turn the rotary knob to move the time cursor. You can also enter a value and then press the **Enter** soft key.
   c. To turn the time cursor off, select **Off**.

> **NOTE**
> Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

4. To start a new measurement, press the **Reset/Restart** soft key.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Measurement example

The spectrogram shows a vertical line on the chart when the marker is enabled on the screen.

Figure 262 RFoCPRI interference measurement in spectrogram

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See “Setting limit for interference analyzer” on page 491 for more information.

Conducting RSSI

The Received Signal Strength Indicator (RSSI) is a multi-signal tracking metric that is particularly useful for measuring power-level variations over time. The RSSI measurement lets you assign power limit line for audible alarms and increase alarm counters every time a signal exceeds a defined limit line. For long-term analysis, the spectrogram and RSSI measurements can be automatically saved into an external USB memory. Post-analysis can be performed with JDViewer application software.

Setting measure setup

After configuring test parameters as described in the "Configuring test parameters" on page 481, you can continue to proceed to the spectrogram measurement.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. To set up the alarm parameters, complete the following steps:
   - **a** Press the **Alarm** soft key.
   - **b** Press the **Alarm at** soft key, and then select the marker number you want to set.
   - **c** Press the **Limit Line** soft key to set a threshold for the alarm.
   - **d** Enter a value by using the numeric keys. You can also use the rotary knob.
   - **e** Press the **dBm** soft key.
   - **f** Toggle the **Alarm** soft key between **On** and **Off** to turn the alarm feature on or off.

> **NOTE**
> You must set the marker(s) first by using the **MARKER** hard key as these features use the marker position to sound an alarm. See "Using marker" on page 49 for more information.

   - **g** *Optional*. Press the **Volume** soft key and adjust the volume.
3. Press the **PREV** hard key to return to the Measure Setup screen bar.
4. To start a new measurement, press the **Reset/Restart** soft key.
5. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See "Using save" on page 32 for more information.

Measurement example

Figure 263 RFoCPRI interference measurement in RSSI

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-

> segment line, and channel limit. See “Setting limit for interference analyzer” on page 491 for more information.

Performing spectrum replayer

The Spectrum Replayer lets you retrieve and replay recorded spectrum analyzer traces in interference analysis mode. These traces can be played back in the spectrogram or RSSI. You can configure the limit line to create failure points when signals exceed it. The failure points are clearly displayed on the trace timeline for quick access during playback.

Setting measure setup

Procedure

1. Press the ***MEASURE*** hot key.
2. Press the **Spectrum Replayer** soft key.
   The file manager window appears.
3. Select a file to be loaded, and then press the **Load** soft key.
   The Measure Setup screen menus appear.
4. Toggle the **Replay Direction** soft key between **FWD** and **REV** to change play direction to forward or reverse.
5. Press the **Replay Speed** soft key, and then select the speed option: **X1**, **X2**, **X3**, and **X4**.
6. Press the **Play** soft key to start playing.
7. Press the **Pause** soft key to pause or stop playing data.
8. To move to a particular failure position directly and play from there, complete the following steps:
   - **a** Press the **Jump to Fail Index** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the **Enter** soft key.
9. *Optional*. Toggle the **Time Cursor** soft key between **On** and **Off** to display or dismiss the time cursor on the screen. This key becomes activated when you play logged data in the Spectrogram mode.

> **NOTE**
> If you connected a USB drive, do not remove it while playing. Doing so may freeze the USB port, which will require you to restart the instrument to get a USB drive recognized again.

Measurement example

Figure 264 RFoCPRI spectrum replay

Setting display

You can select the display option to view data in a different mode.

Procedure

1. Press the **TRACE/DISPLAY** hard key.
2. Select the display option from the choices: **Spectrum**, **Spectrogram**, and **RSSI**.

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line, multi-segment line, and channel limit. See "Setting limit for interference analyzer" on page 491 for more information.

Setting limit for interference analyzer

Procedure

To use the display line:

1. Press the ***LIMIT*** hot key.
2. Press the **Display Line** soft key for a reference line.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Display Line** soft key between **On** and **Off** to display and dismiss the reference line. The straight line appears across the screen to be used as a visual reference only.

To display the multiple segment line:

1. Press the ***LIMIT*** hot key.
2. Press the **Multi Segment Line** soft key for Pass/Fail indication.
3. Toggle the **Limit** soft key between **Upper** and **Lower** to select the one to be displayed.
4. Set the number of segments for the selected upper or lower limit line. You can set up to 50 segments.

a. Press the **# of Line** soft key.
b. Enter a value between 1 and 50 by using the numeric keys.
c. Press the **Enter** soft key.

5. Press the **Autoset** soft key to let the instrument set the limit for each segment and display the line.
6. *Optional*. To move the limit line, complete the following steps:
   a. Select **Limit Up/Down** or **Limit Left/Right**.
   b. Turn the rotary knob to move the line as desired. You can also manually enter a value.
7. *Optional*. To edit the segment properties, complete the following steps:
   a. Press the **Edit Limit** soft key.
   b. Press the **Move** soft key and then turn the rotary knob to select the segment to edit.
   c. Select the menu option, from the following choices:
      – To hide the line for the selected segment, toggle the **Line** soft key and select **Off**.
      – To add a new point, press the **Add Point** soft key.
      – To delete the selected point, press the **Delete Point** soft key.
      – To change the position, press the **Frequency** or **Amplitude** soft key, and then turn the rotary knob to change the value as desired.
8. *Optional*. Go to ***SAVE/LOAD* > Save**, and then select **Limit** to save the limit settings.
   See “Using save” on page 32 for more information.

Performing PIM detection (single and multiple carriers)

The Passive Intermodulation (PIM) Detection allows you to detect Uplink PIM across the full spectrum for any technology. When PIM is detected, the normal repair mode is to replace the offending cable and what you need to do is replacing the whole cable irrespective of the location of the fault.

Selecting measurement mode

Procedure

1. Connect cables as illustrated in **Figure 254** Coupled mode.
2. Press the ***MEASURE*** hot key.
3. Press the **PIM Detection** soft key.
4. Select the PIM detection mode from the following choices:
   – **PIM Detection Single Carrier**
   – **PIM Detection Multiple Carriers**
   – **Calculated PIM**

Calculating possible PIM

The Calculated PIM is used when you want to check any possible existence of PIM before the actual measurement. The instrument displays possible PIM in red color.

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Calculated PIM** soft key.
3. Toggle the **Radio Config** soft key between **Single** and **Multi** and select the mode you want to

use.

- **Single:** Sets the frequency of Radio 1.
- **Multi:** Sets the frequency of Radio 1 and Radio 2.

4 Do one of the following:

- To set the frequency and span, complete the following steps:
  - **a** Toggle the **Mode** soft key between **Freq** and **Band** and select **Freq**.
  - **b** Press the **Radio [1]2] Frequency** soft key.
  - **c** Enter a value by using the numeric keys.
  - **d** Select the unit option from the choices: **GHz**, **MHz**, **kHz**, and **Hz**.
  - **e** Press the **Radio [1|2] Span** soft key.
  - **f** Enter a value by using the numeric keys.
  - **g** Select the unit option from the choices: **GHz**, **MHz**, **kHz**, and **Hz**.
- To set the radio band, complete the following steps:
  - **a** Toggle the **Mode** soft key between **Freq** and **Band** and select **Band**.
  - **b** Press the **Radio [1]2] Band** soft key.
  - **c** Highlight the radio band to select by using the rotary knob.
  - **d** Press the **Select** soft key.

Detecting PIM (single and multiple carriers)

Procedure

1 Press the ***MEASURE SETUP*** hot key.

2 Connect cables as instructed on the screen.

> **NOTE**
> Make sure that the Tx of RRH is connected to the Rx port of SFP/SFP+ installed in your CellAdvisor.

3 Configure CPRI measure setup as described in “Setting CPRI measure setup” on page 479.

4 Do one of the following:

- To set the uplink center frequency and span to be measured, complete the following steps:
  - **a** Toggle the **Unit** soft key between **Freq** and **Channel** and select **Freq**.
  - **b** Press the Uplink Center Frequency soft key.
  - **c** Enter a value by using the numeric keys. You can also use the rotary knob.
  - **d** Select the unit from the choices: **GHz**, **MHz**, **kHz**, and **Hz**.
- To set the channel number to be measured, complete the following steps:
  - **a** Toggle the **Unit** soft key between **Freq** and **Channel** and select **Channel**.
  - **b** Press the **Channel Std** soft key, and then highlight a desired band.
  - **c** Press the **Select** soft key.
  - **d** Press the **Channel Number** soft key.
  - **e** Enter a value by using the numeric keys, and then press the **Enter** soft key.
    The instrument automatically displays the corresponding center frequency value for the selected channel number.

5 Press the **Continue** soft key, and then follow the instructions on the screen.

Measurement example

Figure 265 PIM detection

16

Chapter 16 Using Channel Scanner

This chapter provides instructions for using the Channel Scanner function (option 012). Topics discussed in this chapter are as follows:

Introduction

A Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

You can measure up to 20 channels with this channel scanner. Using existing format-based or custom parameters, you will be able to easily verify improper multi-channel power levels.

- Channel Scanner
- Frequency Scanner
- Custom Scanner (Channel or Frequency)

Display overview

Figure 266 provides descriptions for each segment of the measurement screen.

Figure 266 Channel scanner screen

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS.

Figure 267 Direct connection

JD785B/JD786B/JD745B/JD746B

JD788B/JD748B

Indirect connection

Procedure

1. Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS.

Figure 268 Indirect connection

JD785B/JD786B/JD745B/JD746B

JD788B/JD748B

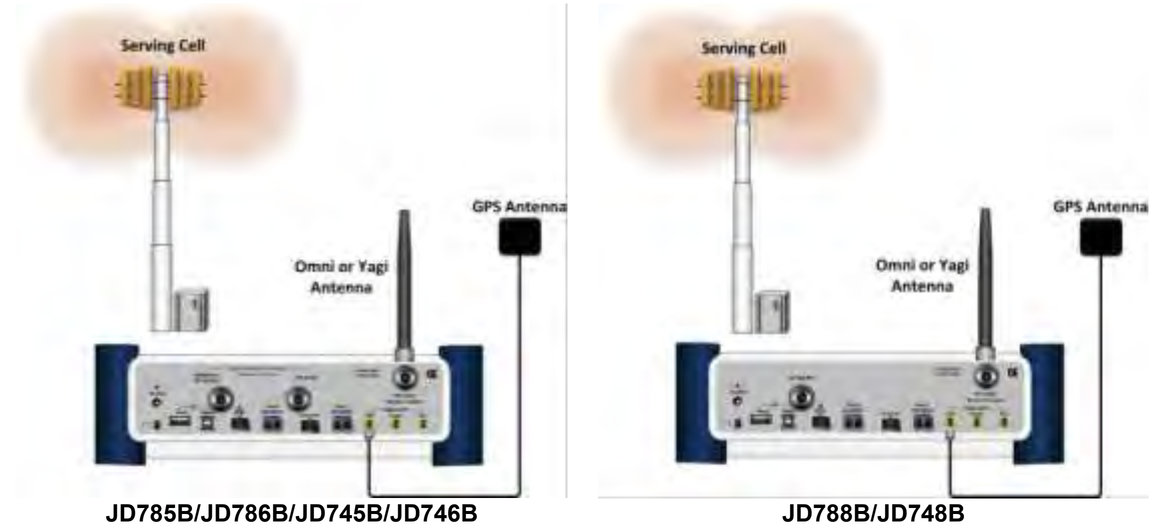
CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Over the air (OTA)

Procedure

1. Connect an Omni/directional RF antenna to the **Spectrum Analyzer RF In** port of the JD700B series.
2. Connect a GPS antenna to the **GPS** port of the JD700B series.

Figure 269 OTA connection



CAUTION
If the input signal level to be measured is less than 0 dBm, set 0 dB attenuation or turn on the preamp to have better dynamic range for the OTA testing.

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Press the **Channel Scanner** soft key. The Channel Scanner mode is selected by default.
3. To change the measurement mode, press the ***MEASURE*** hot key and then select the measurement mode:
   - **Channel Scanner**
   - **Frequency Scanner**
   - **Custom Scanner**

Configuring test parameters

Setting frequency

You need to set the channel or frequency to be scanned depending on the scanner mode: channel scanner, frequency scanner, and custom scanner. Refer to each scanner mode for how to set the channel or frequency.

Setting amplitude

Reference level and attenuation

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured, as you desire.

Procedure

To automatically set the reference and attenuation level:

1. Press the **AMP/SCALE** hard key.
2. Press the **Auto Scale** soft key.
   Each time you press this key, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

To set the reference or attenuation level manually:

1. Press the **AMP/SCALE** hard key.
2. To set the maximum reference value on the Y-axis manually, complete the following steps:
   - **a** Press the **Reference Level** soft key.
   - **b** Enter a value by using the numeric keys or the rotary knob with 10 dB increments.
   - **c** Press the **dBm** soft key or the **ENTER** hard key.
     This unit key name changes according to the setting in the **Units** menu.
3. To set the attenuation option, select one from the following choices:
   – To set the input attenuator's level automatically, select **Attenuation > Auto**.

> **NOTE**
> It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

   – To set the input attenuation manually up to 55 dB for JD780B series or 50 dB for JD740B series to optimize S/N, complete the following steps:
   - **a** Select **Attenuation > Manual**.
   - **b** Press the **Attenuation Value** soft key to set the level.
   - **c** Enter a value in fives by using the numeric keys.
   - **d** Press the **dB** soft key or the **ENTER** hard key.

   – To couple the input attenuator's level with your reference level setting, select **Attenuation > Couple**.
   As you increase the reference setting, the attenuation level also increases acoordingly.

Optional. **To change the scale unit:**

1. Select **More (1/2) > Units**.
2. Select the unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
   The scale unit on the screen changes accordingly.

Pre-amplifier

You can turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector.

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Preamp** soft key and select **On** or **Off** as needed.

> **NOTE**
> You can turn the Preamp on when the input attenuation range is from 0 dB to 10 dB. If the attenuation value is manually set to greater than 10 dB, the instrument will automatically turn off the pre-amplifier to display low-level signal properly on the chart.

External offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB in the Spectrum mode, the measurement result compensates 40 dB at both the Spectrum Analyzer and Signal Analyzer modes

Procedure

To set the external offset:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **On**.
3. Enter a value by using the numeric keys.
4. Press the **dB** soft key to complete the entry.

To turn the external offset off:

1. Press the **AMP/SCALE** hard key.
2. Toggle the **External Offset** soft key and select **Off**.

Setting average

You can set the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. When the averaging reaches to your setting, a new measurement value replaces the measurement value in sequence from the earliest.

Procedure

1. Press the **BW/AVG** hard key.
2. Press the **Average** soft key.
3. Enter a value between 1 and 100 as needed by using the numeric keys.
4. Press the **Enter** soft key.

Setting sweep mode

The default setting is **Continue** to sweep continuously for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Procedure

To select the single sweep mode:

1. Press the ***SWEEP*** hot key.
2. Toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key. The letter HOLD in red appears and the sweeping is paused.
3. *Optional*. Press the **Sweep Once** soft key to get a new measurement.

To return to the continuous sweep mode:

1. Toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key. The letter HOLD in red disappears and the sweeping resumes.

NOTE
Selecting **Sweep Mode > Fast** may reduce the measurement accuracy, but you can use this fast sweep mode to identify the existence of interfering signals.

Making channel scanner measurements

Setting channel

You need to set the channel to be scanned.

Procedure

1. Press the **FREQ/DIST** hard key.
2. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears. See "Appendix C – Band, frequency & channel standard" on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
3. Toggle the **Link** soft key to select the scanning direction and select **Fwd** for forward or **Rev** for reverse.
4. To set the starting channel, complete the following steps:
   a. Press the **Start Channel** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
5. To set the amount of channel increment in scanning channels, complete the following steps:
   a. Press the **Channel Step** soft key.
   b. Enter a value by suing the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
6. To set the integration bandwidth, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
7. To set the number of channels to be displayed in the measurement table, complete the following steps:
   a. Press the **# of Channels** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.

Measurement example

Test results can be saved as a `*.csv` file format so that you can work on it in any spreadsheet software.

Figure 270 Channel scanner measurement

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the display line and channel limit. See “Setting limit for channel scanner” on page 505 for more information.

Making frequency scanner measurements

Setting frequency

You need to set the frequency to be scanned.

Procedure

1. Press the **FREQ/DIST** hard key.
2. To set the starting center frequency, complete the following steps:
   a. Press the **Start Frequency** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
3. To set the amount of frequency increment in scanning channels, complete the following steps:
   a. Press the **Frequency Step** soft key.
   b. Enter a value by suing the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
4. To set the integration bandwidth, complete the following steps:
   a. Press the **Integration Bandwidth** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
5. To set the number of frequencies to be displayed in the measurement table, complete the following steps:
   a. Press the **# of Frequency** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.

Measurement example

Figure 271 Frequency scanner measurement

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line and channel limit. See “Setting limit for channel scanner” on page 505 for more information.

Making custom scanner measurements

Setting channel/frequency

You can customize channels or frequencies to be scanned as you desire.

Procedure

To set the channels to be scanned:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears. See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Toggle the **Link** soft key to select the scanning direction and select **Fwd** for forward or **Rev** for reverse.
5. Press the **Index** soft key, and then enter an index number by turning the rotary knob or using the numeric keys.
6. To set the channel number for the selected index, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **Enter** soft key.
      The instrument displays a corresponding center frequency for the channel number.
7. To set the integration bandwidth for the selected index, complete the following steps:

   a Press the **Integration Bandwidth** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

8 To add more channels to be scanned, repeat steps **5-7**.

9 Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned:

1 Press the **FREQ/DIST** hard key.

2 Toggle the **Unit** soft key and select **Freq**.

3 Press the **Index** soft key, and then enter an index number by turning the rotary knob or using the numeric keys.

4 To set the center frequency for the selected index, complete the following steps:
   a Press the **Center Frequency** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

5 To set the integration bandwidth for the selected index, complete the following steps:
   a Press the **Integration Bandwidth** soft key.
   b Enter a value by using the numeric keys. You can also use the rotary knob.
   c Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

6 To add more channels to be scanned, repeat steps **3-5**.

7 Press the **ESC** hard key to dismiss the channel list window and view the scanning result.

Measurement example

Figure 272 Custom scanner measurement

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the display line and channel limit. See “Setting limit for channel scanner” on page 505 for more information.

Analyzing measurements

Setting limit for channel scanner

Procedure

To use the display line:

1. Press the ***LIMIT*** hot key.
2. Press the **Display Line** soft key to set a threshold for the limit line and Pass/Fail indication.
3. Enter a value, and then press the **dBm** unit soft key.
4. Toggle the **Display Line** soft key between **On** and **Off** to display or dismiss the limit line.

To use the channel limit:

1. Press the ***LIMIT*** hot key.
2. Press the **Channel Limit** soft key to set the limits for each channel index.
3. Press the **Index** soft key, and then select the channel/frequency index number by turning the rotary knob or using the numeric keys.
4. Toggle the **Limit** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
5. Set the upper threshold:
   a. Press the **High Limit** soft key.
   b. Enter a value for the upper limit.
   c. Press the **dBm** unit soft key.
6. Set the lower threshold:
   a. Press the **Low Limit** soft key.
   b. Enter a value for the lower limit.
   c. Press the **dBm** unit soft key.
7. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

Chapter 17 Using Power Meter

This chapter provides instructions for using the RF Power Meter function and the Optical Power Meter function. Topics discussed in this chapter are as follows:

Introduction

The Power Meter of the JD700B series uses power measurement based on spectrum measurement results to provide an accurate power measurement result unlike a general spectrum analyzer, of which power accuracy may be degraded if the span is set too wide.

The power meter also provides Pass/Fail indication with user-defined lower and upper limits.

The Power Meter function provides following measurements:

- Internal RF Power Measurement
- External RF Power Measurement
- Optical Power Measurement

Display overview

Figure 273 provides descriptions for each segment of the measurement screen.

Figure 273 Power measurement screen

Performing internal RF power measurements

The internal power measurement of the JD700B series collects powers from the raw data of spectrum analyzer in the optimal span and integrates the powers up to the specified user span, which results in an accurate power measurement, independent of the span setting.

Connecting a cable

Direct connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the Power amplifier output port of BTS as shown in **Figure 274**.

Figure 274 Direct connection

Indirect connection

Procedure

1 Connect the **Spectrum Analyzer RF In** port of the JD700B series and the monitor (test) port of BTS as shown in **Figure 275**.

Figure 275 Indirect connection

CAUTION
The maximum power for the **Spectrum Analyzer RF In** port is +25 dBm (0.316 W) for JD780B series and +20 dBm (0.1 W) for JD740B series. If the level of the input signal to be measured is greater than this, use a ***High Power Attenuator*** to prevent damage when you directly connect the signal to the instrument or connect the signal from the coupling port of a directional coupler.

Selecting measurement mode

Procedure

1 Press the **MODE** hard key.

2 Select **More (1/2) > Power Meter > Internal RF Power Meter**.

Setting frequency

You need to set the frequency range to be measured with either the center frequency/span or the start/stop frequencies. You can also set the frequency with the channel number and span.

Procedure

To set the center frequency and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Center Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Span** soft key, and then do one of the following:
   – To set the span manually, select **Span**, enter a value, and then select the unit.
   – To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

NOTE
The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER* > Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

To set the start and stop frequencies:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Freq**.
3. Press the **Start Frequency** soft key.
4. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
5. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.
6. Press the **Stop Frequency** soft key.
7. Enter a value by using the numeric keys. You can also use the rotary knob or the arrow keys.
8. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

To set the channel number and span:

1. Press the **FREQ/DIST** hard key.
2. Toggle the **Unit** soft key and select **Channel**.
3. To select the standard channel, complete the following steps:
   a. Press the **Channel Std** soft key. The standard channel window appears.
   See “Appendix C – Band, frequency & channel standard” on page 530 for more information.
   b. Highlight the band to be measured by using the rotary knob, the arrow keys, or the **Page Up/Page Down** soft keys.
   c. Press the **Select** soft key or the rotary knob to confirm the selection.
4. Toggle the **Link** soft key to select the sweep direction and select **Fwd** for forward or **Rev** for reverse.
5. To set the channel number, complete the following steps:
   a. Press the **Channel Number** soft key.
   b. Enter a value by using the numeric keys.
   c. Press the **Enter** soft key or **ENTER** hard key to complete the entry.
   The instrument automatically displays the corresponding center frequency value for the selected channel number.
6. To set the span, complete the following steps:
   a. Press the **Span** soft key.

b Select the span option, from the following choices:
  - To set the span manually, select **Span**, enter a value, and then select the unit.
  - To set the span automatically, select **Full Span**, **Zero Span**, or **Last Span** as needed.

> **NOTE**
> The **Zero Span** option is available only in the Spectrum mode. If you have selected **Zero Span**, select ***TRIGGER*** **> Free Run**, **External**, **GPS**, **Video**, or **Display Position**.

Optional. **To define the amount of frequency increment for the rotary knob:**

1. Press the **Frequency Step** soft key, if the **Freq** is selected.
2. Enter a value by using the numeric keys.
3. Press the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

Optional. **To define the amount of channel increment for the rotary knob:**

1. Press the **Channel Step** soft key, if the **Channel** is selected.
2. Enter a value by using the numeric keys.
3. Press the **Enter** soft key.

Setting amplitude

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Display** soft key and select the display method: **Relative** or **Absolute**.
3. If the **Relative** is selected, press the **Set Reference** soft key to set the current value as the reference.
4. To specify the display range, complete the following steps:
   a. Press the **Display Maximum** soft key to set the maximum value for the power meter.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **dBm** soft key.
   d. Press the **Display Minimum** soft key to set the minimum value for the power meter.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Press the **dBm** soft key.
5. *Optional*. To enable the external offset, complete the following steps:
   a. Toggle the **External Offset** soft key and select **On**.
   b. Enter a value between 0 and 60 by using the numeric keys.
   c. Press the **dB** soft key.

Setting sweep mode

The default setting of the sweep mode is **Continue**. If you want to hold the measurement, you can change the sweep mode.

Procedure

1. Press the ***SWEEP*** hot key.
2. To select the single sweep mode, toggle the **Sweep Mode** soft key and select **Single**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red appears and the sweeping is paused.
3. To return to the continuous sweep mode, toggle the **Sweep Mode** soft key and select **Continue**. You can also use the ***HOLD*** hot key.
   The letter HOLD in red disappears and the sweeping resumes.

Making a measurement

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Press the **Resolution** soft key, and then select the resolution option from the following choices:
   - **0:** Displays the reading with no decimal place
   - **1:** Displays the reading with one decimal place
   - **2** : Displays the reading with two decimal places
3. To set the resolution bandwidth, complete the following steps:
   - **a** Press the **RBW** soft key.
   - **b** Enter a value by using the numeric keys.
   - **c** Press the unit: **MHz**, **kHz**, or **Hz**.
4. Press the **Accuracy Mode** soft key, and then select the accuracy mode option: **Low**, **Middle**, and **High**.
5. To specify the number of measurements to be averaged, complete the following steps:
   - **a** Press the **Average** soft key.
   - **b** Enter a value between 1 and 100 by using the numeric keys.
   - **c** Press the **Enter** soft key.

Measurement example

Figure 276 Internal power measurement

NOTE
You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for power meter" on page 517 for more information.

Performing external RF power measurements

This instrument performs radio output power measurement with the use of optional external power sensors including JD730 series power sensors. It serves as the highly accurate RF power meter and gives wider range of power measurement.

Connecting a cable

There are two types of power sensors. Directional power sensors are used in in-service power measurement. Terminating power sensors are used in out-of-service power measurement.

Table 22 External power sensor type

Part No.	Description	Frequency Range	Power Range
JD731B	Directional Power Sensor	300-3800 MHz	Average: +21.76 to +51.76 dBm (0.15 to 150 W) Peak: +36.02 to +56.02 dBm (4 to 400 W)
JD732B	Terminating Power Sensor	20-3800 MHz	Average: -30 to +20 dBm
JD733A	Directional Power Sensor	150-3500 MHz	Average/Peak: +20 to +47 dBm (0.1 to 50 W)
JD734B	Terminating Power Sensor	20-3800 MHz	Peak: -30 to +20 dBm
JD736B	Terminating Power Sensor	20-3800 MHz	Average/Peak: -30 to +20 dBm

Terminating power sensor connection

Procedure

1. Connect an external power sensor to the **USB Host** port of the JD700B series and to the RF output port of BTS.
   The JD700B series automatically detects and initializes the power sensor connected to the instrument. Connecting an external power sensor is mandatory.

Table 23 Terminating power sensor connection

JD785B/JD786B/JD745B/JD746B

JD788B/JD748B

Directional power sensor connection

Procedure

1. Connect an external power sensor to the **USB Host** port of the JD700B series and to the RF output port of BTS as shown in **Figure 277**.
   The JD700B series automatically detects and initializes the power sensor connected to the instrument. Connecting an external power sensor is mandatory.

Figure 277 Directional power sensor connection

JD785B/JD786B/JD745B/JD746B JD788B/JD748B

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Select **More (1/2) > Power Meter > External RF Power Meter**.

Setting frequency

You need to set the frequency to be measured depending on your connected external power sensor.

Procedure

1. Press the **FREQ/DIST** hard key.
2. Press the **Frequency** soft key.
3. Enter a value by using the numeric keys. You can also use the rotary knob.
4. Select the unit: **GHz**, **MHz**, **kHz**, or **Hz**.

Setting amplitude

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Display** soft key and select the display method: **Relative** or **Absolute**.
3. If the **Relative** is selected, press the Set Reference soft key to set the current value as the reference.
4. To specify the display range, complete the following steps:
   a. Press the **Display Maximum** soft key to set the maximum value for the power meter.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **dBm** soft key.
   d. Press the **Display Minimum** soft key to set the minimum value for the power meter.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Press the **dBm** soft key.
5. *Optional*. To enable the external offset, complete the following steps:
   a. Toggle the **External Offset** soft key and select **On**.

b Enter a value between 0 and 60 by using the numeric keys.

c Press the **dB** soft key.

Making a measurement

Procedure

1 Press the ***MEASURE*** hot key.

2 Depending your connected power sensor, do one of the following:

– For JD736B, select the power range option: **Average Power**, **Peak Power**, or **Pulse Power**.

– For JD734B, select **Peak Power**.

– For JD732B, select **Average Power**.

– For JD731B, select the power range option: **Forward Avg Power**, **Reverse Avg Power**, **Forward Peak Power**, **Pulse Power**, or **VSWR**.

– For JD733A, select the power range option: **Forward Avg Power**, **Reverse Avg Power**, **Forward Peak Power**, or **VSWR**.

3 Press the ***MEASURE SETUP*** hot key.

4 Press the **Resolution** soft key, and then select the resolution option from the following choices:

– **0:** Displays the reading with no zero decimal place

– **1:** Displays the reading with one decimal place

– **2:** Displays the reading with two decimal places

Measurement example

You can measure and understand a trend of a system output in operation where output power constantly varies depending on the amount of calls being processed by the BTS or Repeater. In addition, the Log graph benefits you to easily examine the discontinuance of output power caused by the transmission problems or defective connection.

Figure 278 External power measurement of pulse power

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See "Setting limit for power meter" on page 517 for more information.

Performing optical power measurements

The optical power measurement is available in conjunction with MP-series power sensor, which measures optical power via a USB connection.

Connecting a cable

There are two types of optical power sensors.

Table 24 Optical power sensors

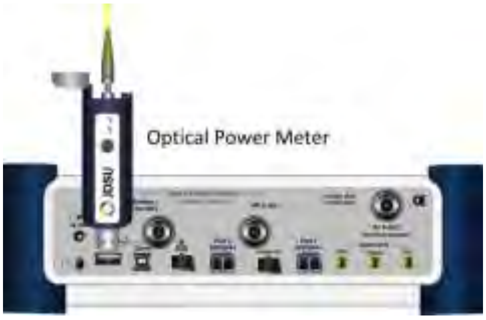
Part No.	Wavelength Range	Dynamic Range
MP-60A	780-1650 nm	1300, 1310, 1490, 1550 nm: -50 to +10 dBm 850 nm: -45 to +10 dBm
MP-80A	780-1650 nm	1300, 1550 nm: -35 to +23 dBm 980 nm: -30 to +23 dBm

Optical power sensor connection

Procedure

1. Connect a MP-series optical power sensor to the **USB Host** port of the JD700B series as shown in **Figure 279**.

Figure 279 Optical power sensor connection



JD785B/JD786B/JD745B/JD746B

JD788B/JD748B

Selecting measurement mode

Procedure

1. Press the **MODE** hard key.
2. Select **More (1/2) > Power Meter > Optical Power Meter**.

Setting amplitude

Procedure

1. Press the **AMP/SCALE** hard key.
2. Toggle the **Display** soft key and select the display method: **Relative** or **Absolute**.
3. If the **Relative** is selected, press the Set Reference soft key to set the current value as the reference.
4. To specify the display range, complete the following steps:
   a. Press the **Display Maximum** soft key to set the maximum value for the power meter.
   b. Enter a value by using the numeric keys. You can also use the rotary knob.
   c. Press the **dBm** soft key.
   d. Press the **Display Minimum** soft key to set the minimum value for the power meter.
   e. Enter a value by using the numeric keys. You can also use the rotary knob.
   f. Press the **dBm** soft key.
5. *Optional*. To enable the external offset, complete the following steps:
   a. Toggle the **External Offset** soft key and select **On**.
   b. Enter a value between 0 and 60 by using the numeric keys.
   c. Press the **dB** soft key.

Making a measurement

Procedure

1. Press the ***MEASURE SETUP*** hot key.
2. Toggle the **Wavelength** soft key and select the wavelength option:
   – To set the wave length automatically, select **Auto**.
   – To select the wave length from the standard wave list, select **StdWave**.
   The StdWave soft key becomes activated.
3. Press the **StdWave** soft key, and then select the standard wavelength option: **850 nm**, **980 nm**, **1300 nm**, **1310 nm**, **1480 nm**, **1490 nm**, or **1550 nm**.
4. Press the **Resolution** soft key, and then select the resolution option from the following choices:
   – **0:** Displays the reading with nodecimal place
   – **1:** Displays the reading with one decimal place
   – **2:** Displays the reading with two decimal places

Measurement example

Figure 280 optical power measurement

> **NOTE**
> You can use the ***LIMIT*** hot key to analyze your measurements with the user-definable limit and Pass/Fail indication. See “Setting limit for power meter” on page 517 for more information.

Setting limit for power meter

You can use the ***Limit*** hot key to set the threshold for the Pass/Fail indication.

Procedure

1. Press the ***LIMIT*** hot key.
2. Toggle the **Limit** soft key between **On** and **Off** to enable or disable the Pass/Fail indication.
3. To set the upper and lower limits, complete the following steps:
   - a Press the **High Limit** soft key.
   - b Enter a value for the upper threshold by using the numeric keys.
   - c Press the **dBm** unit soft key.
   - d Press the **Low Limit** soft key.
   - e Enter a value for the lower threshold by using the numeric keys.
   - f Press the **dBm** unit soft key.
4. *Optional*. Go to ***SAVE/LOAD*** **> Save**, and then select the save option from the choices available for your measurement mode. See “Using save” on page 32 for more information.

18

Chapter 18 Performing Fiber Inspection

This chapter provides instructions for using the fiber testing function with a P5000i fiberscope. Topics discussed in this chapter are as follows:

Introduction

Inspection of fiber optic connections is essential for the optimal performance and longevity of fiber optic connectivity. Throughout their lives, fiber connectors must be inspected, analyzed, and cleaned to maintain an acceptable level of functionality. The JD700B series makes it fast and easy to troubleshoot and certify that every connection at a cell site is optimized for a lifetime of performance.

The JD700B series supports the handheld fiber microscope P5000i that can capture video images from the sensor and analyzes the images for fiber end face defects and contamination with reliable PASS/FAIL results to guarantee the performance of your optical connections.

Display overview

Figure 281 provides descriptions for each segment of the measurement screen.

Figure 281 Fiber inspection screen

Connecting a fiber microscope

Connecting an optional fiber microscope P5000i is mandatory for fiber inspection and analysis. See “JD700B Series Common Options” on page 547 for available options.

Procedure

1 Connect your fiber microscope P5000i to the **USB Host** port of the JD700B series.
The instrument detects the connected microscope automatically and displays the icon.

Selecting measurement mode

Procedure

1 Press the **MODE** hard key.
2 Select **More (1/2) > Fiber Inspection**.

Configuring test parameters

Selecting profile and tip

You can select analysis profiles and inspection tips from the list.

Procedure

1 Press the ***MEASURE SETUP*** hot key.
2 Press the **Profile & Tip** soft key.
The profile and tip pane appears.
3 To select one of the pre-configured analysis profiles that match the PASS/FAIL criteria in the IEC visual inspection standard, complete the following steps:
   a Tap the drop-down list button for the **Profile**.
   b Select the profile that you want to use, from the following choices:
      – **MM (IEC-61300-3-35)**
      – **Ribbon, MM (IEC-61300-3-35)**
      – **Ribbon, SM APC (IEC-61300-3-35)**
      – **SM APC (IEC-61300-3-35)**
      – **SM PC (IEC-61300-3-35)**
      – **SM UPC (IEC-61300-3-35)**

> **NOTE**
> All of the profiles are factory set and cannot be edited or removed.

4 To select the inspection tip (optical settings) that you want to use, complete the following steps:
   a Tap the drop-down list button for the **Tip**.
   b Select one of the tips available to your selected profile, from the following choices:
      – **Standard Tips (with BAP1)** and **Simplex Long Reach (-L) Tips**
      – **Ribbon Tips** and **Ribbon Tips – Long Reach**

> **NOTE**
> This setting allows you to select the best optical settings for the type of inspection tip that is attached to your microscope probe.

5 Tap the **Apply** button or press the **Apply** soft key to save and return to the previous state.

Setting preferences

You can set your preferences of auto center and QuickCapture button function. The QuickCapture button is the small grey round button on the side of the microscope.

Procedure

1. To set the function of the QuickCapture button on the side of the P5000i, toggle the **Test Button** soft key and select the option from the following choices:
   - **Test:** Sets the capture button to function as Test. Pressing the Quickcapture button analyzes fiber image as like the **Test** soft key on your JD700B series.
   - **Freeze:** Sets the capture button to function as Freeze. Pressing the Quickcapture button captures fiber image as like the **Freeze** soft key on your JD700B series.
2. To turn the auto center feature on or off, toggle the **Auto Center** soft key between **On** and **Off** and select the option you want to set. Default setting is **On**. It automatically displays the center of the fiber when viewing at high magnification.

Performing fiber inspection

Capturing fiber image

Procedure

1. Connect the fiber to be inspected to the tip of your microscope P5000i.
   The live image of the fiber is displayed on the screen.
   See the user manual of your fiber microscope for details on using the P5000i.
2. Focus the image by rotating the **Focus Control** on the P5000i until the image is in focus.
3. Toggle the **Magnification** soft key between **Low** and **High** and select the option you want to use. You can also press the **Magnification Control** button on either side of the P5000i.
4. Press the **Freeze** soft key to capture the properly focused image.
   The text “Capturing…” appears.
5. *Optional*. To save the captured image as a file (`.png`), complete the following steps:
   a. Tap the **Save PNG** soft key.
      The Save window appears with the on-screen key.
   b. Type a file name in the **File Name** field.
   c. Select a folder where you want to save the file, if desired.
   d. Press the **Save** soft key.
6. Press the **Live** soft key to return to the live image screen or press the **Quit** soft key to exit.

Measurement example

Figure 282 Captured fiber image

Testing a fiber

Procedure

1 Connect the fiber to be inspected to the tip of your microscope P5000i.
The live image of the fiber is displayed on the screen.
See the user manual of your fiber microscope for details on using the P5000i.

2 Focus the image by rotating the **Focus Control** on the P5000i until the image is in focus.

3 Toggle the **Magnification** soft key between **Low** and **High** and select the option you want to use.
You can also press the **Magnification Control** button on either side of the P5000i.

4 Press the **Test** soft key to start fiber analysis.
The text “Analyzing…” appears.

5 Once the test is completed, check the result displayed on the screen with the following information:

– Image overlay of the zone locations, defects, and scratches

– PASS or FAIL result

– Specific test result for each zone

6 To show or hide image overlays, press the **Overlay** soft key.
Each time this key is pressed, the selection changes.

7 *Optional*. To save the fiber inspection result with specific details as a report (`.pdf`), complete the following steps:

a Tap the **Save PDF** soft key.
The Save window appears with the on-screen key.

b Type a file name in the **File Name** field.

c Select a folder where you want to save the file, if desired.

d Press the **Save** soft key.
The information input window appears.

e Type in information as required.

f Tap the **Apply** button or press the **Apply** soft key to save and return to the previous state.

8 Press the **Live** soft key to return to the live image screen or press the **Quit** soft key to exit the fiber inspection.

Measurement example

Figure 283 Analyzed fiber image and fiber inspection result

Figure 284 Fiber inspection report

Appendix

Topics discussed in this chapter are as follows:

Appendix A - Product general information

JD780B series

	JD785B/JD786B	JD788B	Supplemental Information
Inputs and Outputs			
RF In			Spectrum Analyzer
Connector	Type-N female	Type-N female	
Impedance	50 Ω	50 Ω	Nominal
Damage Level	>+33 dBm, ±50 V DC	>+33 dBm, ±50 V DC	Nominal
Reflection/RF Out			Cable and Antenna Analyzer
Connector	Type-N female	Type-N female	
Impedance	50 Ω	50 Ω	Nominal
Damage Level	>+40 dBm, ±50 V DC	>+40 dBm, ±50 V DC	Nominal
RF In			Cable and Antenna Analyzer
Connector	Type-N female	N/A	
Impedance	50 Ω	N/A	Nominal
Damage Level	>+25 dBm, ±50 V DC	N/A	Nominal
External Trigger, GPS			
Connector	SMA female	SMA female	
Impedance	50 Ω	50 Ω	Nominal
External Ref			
Connector	SMA female	SMA female	
Impedance	50 Ω	50 Ω	Nominal
Input Frequency	10, 13, 15 MHz	10, 13, 15 MHz	
Input Range	-5 to +5 dBm	-5 to +5 dBm	
USB			
USB Host	Type A, 1 port	Type A, 1 port	
USB Client	Type B, 1 port	Type B, 1 port	
LAN	RJ45, 10/100 Base-T	RJ45, 10/100 Base-T	
SFP/SFP+	MSA compliant	MSA compliant	In optical hardware option
Audio Jack	3.5 mm headphone jack	3.5 mm headphone jack	
External Power	5.5 mm barrel connector	5.5 mm barrel connector	
Speaker	Built-in speaker	Built-in speaker	
Display			
Type	Resistive touch screen	Resistive touch screen	
Size	8”	8”	LCD backlight, transflective LCD with anti-glare coating
Resolution	800 x 600	800 x 600	

	JD785B/JD786B	JD788B	Supplemental Information
Power			
External DC Input	18 V DC	18 V DC	
Power Consumption	42 W	42 W	54 W maximum when charging battery
Battery			
	10.8 V, 7800 mA-h	10.8 V, 7800 mA-h	Lithium Ion
Operating Time	> 3 hours (Typical)	> 3 hours (Typical)	In balance mode
Charge Time	2.5 hours (80 %) 5 hours (100 %)	2.5 hours (80 %) 5 hours (100 %)	In case of a fully discharged battery
Storage Temperature	0 to 25°C (32 to 77°F)	0 to 25°C (32 to 77°F)	The battery pack should be stored in an environment with low humidity. Extended exposure to temperature above 45°C could degrade battery performance and life.
Data Storage			
Internal	Maximum 500 MB	Maximum 500 MB	
External	Limited to the size of USB flash drive	Limited to the size of USB flash drive	Supports USB 2.0 compatible memory devices
Environmental			
Operating Temperature			
AC Power	0 to 40°C (32 to 104°F)	0 to 40°C (32 to 104°F)	With no derating
Battery	0 to 40°C (32 to 104°F)	0 to 40°C (32 to 104°F)	At charging
	-10 to 55 °C (14 to 131 °F)	-10 to 55 °C (14 to 131 °F)	At discharging
Maximum Humidity	95% RH	95% RH	Non-condensing
Shock and Vibration	MIL-PRF-28800F Class 2	MIL-PRF-28800F Class 2	
Storage Temperature	-30 to 71°C (-22 to 160°F)	-30 to 71°C (-22 to 160°F)	With the battery pack removed
EMC			
	EN 61326-1:2013 CISPR11:2009 Class A	EN 61326-1:2013 CISPR11:2009 Class A	Complies with European EMC
Safety			
	EN 61010-1:2010 UL 61010-1:2012 & CAN/CSA C22.2 No. 61010-1-12	EN 61010-1:2010 UL 61010-4:2012 & CAN/CSA C22.2 No. 61010-1-12	Complies with European LVD Complies with TUV NRTL
Size and Weight (Standard Configuration)			
Weight	<4.6 kg (10.1 lb.)	<4.2 kg (9.3 lb.)	With battery
Size	295 x 195 x 82 (mm) 11.6 x 7.7 x 3.2 (Inch)	295 x 195 x 82 (mm) 11.6 x 7.7 x 3.2 (Inch)	Approximately (W x H x D)
Warranty			
	2 years	2 years	
Calibration Cycle			
	1 year	1 year	

JD740B series

	JD745B/JD746B	JD748B	Supplemental Information
Inputs and Outputs			
RF In			Spectrum Analyzer
Connector	Type-N female	Type-N female	
Impedance	50 Ω	50 Ω	Nominal
Damage Level	>+40 dBm, ±50 V DC	>+40 dBm, ±50 V DC	Nominal
Reflection/RF Out			Cable and Antenna Analyzer
Connector	Type-N female	Type-N female	
Impedance	50 Ω	50 Ω	Nominal
Damage Level	>+37 dBm, ±50 V DC	>+37 dBm, ±50 V DC	Nominal
RF In			Cable and Antenna Analyzer
Connector	Type-N female	N/A	
Impedance	50 Ω	N/A	Nominal
Damage Level	>+25 dBm, ±50 V DC	N/A	Nominal
External Trigger, GPS			
Connector	SMA female	SMA female	
Impedance	50 Ω	50 Ω	Nominal
External Ref			
Connector	SMA female	SMA female	
Impedance	50 Ω	50 Ω	Nominal
Input Frequency	10, 13, 15 MHz	10, 13, 15 MHz	
Input Range	-5 to +5 dBm	-5 to +5 dBm	
USB			
USB Host	Type A, 1 port	Type A, 1 port	
USB Client	Type B, 1 port	Type B, 1 port	
LAN	RJ45, 10/100 Base-T	RJ45, 10/100 Base-T	
SFP/SFP+	MSA compliant	MSA compliant	In optical hardware option
Audio Jack	3.5 mm headphone jack	3.5 mm headphone jack	
External Power	5.5 mm barrel connector	5.5 mm barrel connector	
Speaker	Built-in speaker	Built-in speaker	
Display			
Type	Resistive touch screen	Resistive touch screen	
Size	8”	8”	LCD backlight, transflective LCD with anti-glare coating
Resolution	800 x 600	800 x 600	

	JD745B/JD746B	JD748B	Supplemental Information
Power			
External DC Input	18 V DC	18 V DC	
Power Consumption	42 W	42 W	54 W maximum when charging battery
Battery			
	10.8 V, 7800 mA-h	10.8 V, 7800 mA-h	Lithium Ion
Operating Time	> 3 hours (Typical)	> 3 hours (Typical)	In balance mode
Charge Time	2.5 hours (80 %) 5 hours (100 %)	2.5 hours (80 %) 5 hours (100 %)	In case of a fully discharged battery
Storage Temperature	0 to 25°C (32 to 77°F)	0 to 25°C (32 to 77°F)	The battery pack should be stored in an environment with low humidity. Extended exposure to temperature above 45°C could degrade battery performance and life.
Data Storage			
Internal	Maximum 500 MB	Maximum 500 MB	
External	Limited to the size of USB flash drive	Limited to the size of USB flash drive	Supports USB 2.0 compatible memory devices
Environmental			
Operating Temperature			
AC Power	0 to 40°C (32 to 104°F)	0 to 40°C (32 to 104°F)	With no derating
Battery	0 to 40°C (32 to 104°F)	0 to 40°C (32 to 104°F)	At charging
	-10 to 55 °C (14 to 131 °F)	-10 to 55 °C (14 to 131 °F)	At discharging
Maximum Humidity	95% RH	95% RH	Non-condensing
Shock and Vibration	MIL-PRF-28800F Class 2	MIL-PRF-28800F Class 2	
Storage Temperature	-30 to 71°C (-22 to 160°F)	-30 to 71°C (-22 to 160°F)	With the battery pack removed
EMC			
	IEC/EN 61326-1:2013 CISPR11:2009 Class A	IEC/EN 61326-1:2013 CISPR11:2009 Class A	Complies with European EMC
Safety			
	EN 61010-1:2010 UL 61010-1:2012 & CAN/CSA C22.2 No. 61010-1-12	EN 61010-1:2010 UL 61010-4:2012 & CAN/CSA C22.2 No. 61010-1-12	Complies with European LVD Complies with TUV NRTL
Size and Weight (Standard Configuration)			
Weight	<4.04 kg (8.9 lb.)	<3.75 kg (8.3 lb.)	With battery
Size	295 x 195 x 82 (mm) 11.6 x 7.7 x 3.2 (Inch)	295 x 195 x 82 (mm) 11.6 x 7.7 x 3.2 (Inch)	Approximately (W x H x D)
Warranty			
	2 years	2 years	
Calibration Cycle			
	1 year	1 year	

Appendix B – Cable list

Cable Type	Relative Propagation Velocity (V¦)	Nominal Attenuation dB/m @ 1000 MHz
FSJ1-50A	0.84	0.197
FSJ250	0.83	0.134
FSJ4-50B	0.81	0.119
HCC 12-50J	0.915	0.092
HCC 158-50J	0.95	0.023
HCC 300-50J	0.96	0.014
HCC 312-50J	0.96	0.013
HCC 78-50J	0.915	0.042
HF 4-1/8” Cu2Y	0.97	0.01
HF 5” Cu2Y	0.96	0.007
HF 6-1/8”Cu2Y	0.97	0.006
HJ4.5-50	0.92	0.054
HJ4-50	0.914	0.087
HJ5-50	0.916	0.042
HJ7-50A	0.921	0.023
LDF12-50	0.88	0.022
LDF4-50A	0.88	0.077
LDF5-50A	0.89	0.043
LDF6-50	0.89	0.032
LDFF7-50A	0.88	0.027
LMR100	0.8	0.792
LMR1200	0.88	0.044
LMR1700	0.89	0.033
LMR200	0.83	0.344
LMR240	0.84	0.262
LMR400	0.85	0.135
LMR500	0.86	0.109
LMR600	0.87	0.087
LMR900	0.87	0.056
RG142	0.69	0.443
RG17, 17A	0.659	0.18
RG174	0.66	0.984
RG178B	0.69	1.509
RG187, 188	0.69	1.017
RG213/U	0.66	0.292
RG214	0.659	0.292
RG223	0.659	0.165
RG55, 55A, 55B	0.659	0.541
RG58, 58B	0.659	1.574
RG58A, 58C	0.659	0.787
RG8, 8A, 10, 10A	0.659	0.262
RG9, 9A	0.659	0.289
HFSC-12D(1/2")	0.81	0.112
HFC-12D(1/2")	0.88	0.072
HFC-22D(7/8")	0.88	0.041
HFC-33D(1_1/4")	0.88	0.0294
HFC-42D(1_5/8")	0.87	0.0243
RFCX-12D(1/2")	0.88	0.088
RFCX-22D(7/8")	0.88	0.049
RFCX-33D(1_1/4")	0.88	0.038
RFCX-42D(1_5/8")	0.87	0.028
RFCL-22D(7/8")	0.88	0.044
RFCL-33D(1_1/4")	0.88	0.034
RFCL-42D(1_5/8")	0.87	0.0315

Appendix C – Band, frequency & channel standard

Standard	Uplink			Downlink		
	Start Freq (MHz)	Stop Freq (MHz)	Valid Channels	Start Freq (MHz)	Stop Freq (MHz)	Valid Channels
GSM						
GSM 450	450.40	457.60	259≤n≤293	460.40	467.60	259≤n≤293
GSM 480	478.80	486.00	306≤n≤340	488.80	496.00	306≤n≤340
GSM 850	824.00	849.00	128≤n≤251	869.00	894.00	128≤n≤251
P-GSM 900	890.00	915.00	1≤n≤124	935.00	960.00	1≤n≤124
E-GSM 900	880.00	915.00	0≤n≤124	925.00	960.00	0≤n≤124
			975≤n≤1023			975≤n≤1023
R-GSM 900	876.00	915.00	0≤n≤124	921.00	960.00	0≤n≤124
			955≤n≤1023			955≤n≤1023
R-GSM 900 (China)	885.00	889.00	999≤n≤1019	930.00	934.00	999≤n≤1019
DCS 1800	1710.00	1785.00	512≤n≤885	1805.00	1880.00	512≤n≤885
PCS 1900	1850.00	1910.00	512≤n≤810	1930.00	1990.00	512≤n≤810
CDMA						
Band 0 (800)	824.00	849.00	1≤n≤799	869.00	894.00	1≤n≤799
			991≤n≤1023			991≤n≤1023
Band 1 (NA PCS)	1850.00	1910.00	0≤n≤1199	1930.00	1990.00	0≤n≤1199
Band 2 (TACS)	872.0125	914.9875	0≤n≤1000	917.0125	959.9875	0≤n≤1000
			1329≤n≤2047			1329≤n≤2047
Band 3 (JTACS)	887.0125	924.9875	1≤n≤799	832.0125	869.9875	1≤n≤799
			801≤n≤1039			801≤n≤1039
			1041≤n≤1199			1041≤n≤1199
			1201≤n≤1600			1201≤n≤1600
Band 4 (KR PCS)	1750.00	1780.00	0≤n≤599	1840.00	1870.00	0≤n≤599
Band 5 (450)	411.675	483.480	1≤n≤300	421.6750	493.4800	1≤n≤300
			539≤n≤871			539≤n≤871
			1039≤n≤1473			1039≤n≤1473
			1792≤n≤2016			1792≤n≤2016
Band 6 (2100)	1920.00	1980.00	0≤n≤1199	2100.00	2170.00	0≤n≤1199
Band 7 (700)	776.00	794.00	0≤n≤359	746.00	764.00	0≤n≤359
Band 8 (1800)	1710.00	1784.95	0≤n≤1499	1805.00	1879.95	0≤n≤1499
Band 9 (900)	880.00	914.95	0≤n≤699	925.00	959.95	0≤n≤699
Band 10 (2nd 800)	806.000	900.975	0≤n≤719	851.000	939.975	0≤n≤719
			720≤n≤919			720≤n≤919
WCDMA						
Band Global						
Band 1 (2100-General)	1920.0	1980.0	9612≤n≤9888	2110.0	2170.0	10562≤n≤10838
Band 2 (1900-General)	1850.0	1910.0	9262≤n≤9538	1930.0	1990.0	9662≤n≤9938
Band 2 (1900-Additional)			12≤n≤287			412≤n≤687
Band 3 (1800-General)	1710.0	1780.0	937≤n≤1288	1805.0	1880.0	1162≤n≤1513
Band 4 (1700-General)	1710.0	1775.0	1312≤n≤1513	2110.0	2155.0	1537≤n≤1738
Band 4 (1700-Additional)			1662≤n≤1862			1887≤n≤2087
Band 5 (850-General)	824.0	849.0	4132≤n≤4233	869.0	894.0	4357≤n≤4458
Band 5 (850-Additional)			782≤n≤862			1007≤n≤1087
Band 6 (800-General)	830.0	840.0	4162≤n≤4188	875.0	885.0	4387≤n≤4413
Band 6 (800-Additional)			812≤n≤837			1037≤n≤1062
Band 7 (2600-General)	2500.0	2570.0	2012≤n≤2338	2620.0	2690.0	2237≤n≤2563
Band 7 (2600-Additional)			2362≤n≤2687			2587≤n≤2912
Band 8 (900-General)	880.0	915.0	2712≤n≤2863	925.0	960.0	2937≤n≤3088
Band 9 (1700-General)	1749.9	1784.9	8762≤n≤8912	1844.9	1879.9	9237≤n≤9387
Band 10 (1700-General)	1710.0	1770.0	2887≤n≤3163	2110.0	2170.0	3112≤n≤3388
Band 10 (1700-Additional)			3187≤n≤3462			3412≤n≤3687
Band 11 (1500-General)	1427.9	1447.9	3487≤n≤3562	1475.9	1495.9	3712≤n≤3787
Band 12 (700-General)	699.0	716.0	3617≤n≤3678	729.0	746.0	3842≤n≤3903
Band 12 (700-Additional)			3707≤n≤3767			3932≤n≤3992
Band 13 (700-General)	777.0	787.0	3792≤n≤3818	746.0	756.0	4017≤n≤4043
Band 13 (700-Additional)			3842≤n≤3867			4067≤n≤4092
Band 14 (700-General)	788.0	798.0	3892≤n≤3918	758.0	768.0	4117≤n≤4143
Band 14 (700-Additional)			3942≤n≤3967			4167≤n≤4192
Band 19 (800-General)	830.0	845.0	312≤n≤363	875.0	890.0	712≤n≤763
Band 19 (800-Additional)			387≤n≤437			787≤n≤837
Band 20 (800-General)	832.0	862.0	4287≤n≤4413	791.0	821.0	4512≤n≤4638

Band 21 (1500-General)	1447.9	1462.9	462≤n≤512	1495.9	1510.9	862≤n≤912
Band 22 (3500-General)	3410.0	3490.0	4437≤n≤4813	3510.0	3590.0	4662≤n≤5038
Band 25 (1900-General)	1850.0	1915.0	4887≤n≤5188	1930.0	1995.0	5112≤n≤5413
Band 25 (1900-Additional)			5212≤n≤5512			5437≤n≤5737
Band 26 (800-General)	814.0	849.0	5537≤n≤5688	859.0	894.0	5762≤n≤5913
Band 26 (800-Additional)			5712≤n≤5862			5937≤n≤6087
LTE - FDD						
Band Global						
Band 1 (2100)	1920.0	1980.0	18000≤n≤18599	2110.0	2170.0	0≤n≤599
Band 2 (1900)	1850.0	1910.0	18600≤n≤19199	1930.0	1990.0	600≤n≤1199
Band 3 (1800)	1710.0	1785.0	19200≤n≤19949	1805.0	1880.0	1200≤n≤1949
Band 4 (1700)	1710.0	1755.0	19950≤n≤20399	2110.0	2155.0	1950≤n≤2399
Band 5 (850)	824.0	849.0	20400≤n≤20649	869.0	894.0	2400≤n≤2649
Band 7 (2600)	2500.0	2570.0	20750≤n≤21449	2620.0	2690.0	2750≤n≤3449
Band 8 (900)	880.0	915.0	21450≤n≤21799	925.0	960.0	3450≤n≤3799
Band 9 (1700)	1749.9	1784.9	21800≤n≤22149	1844.9	1879.9	3800≤n≤4149
Band 10 (1700)	1710.0	1770.0	22150≤n≤22749	2110.0	2170.0	4150≤n≤4749
Band 11 (1500)	1427.9	1447.9	22750≤n≤22949	1475.9	1495.9	4750≤n≤4949
Band 12 (700)	699.0	716.0	23010≤n≤23179	729.0	746.0	5010≤n≤5179
Band 13 (700)	777.0	787.0	23180≤n≤23279	746.0	756.0	5180≤n≤5279
Band 14 (700)	788.0	798.0	23280≤n≤23379	758.0	768.0	5280≤n≤5379
Band 17 (700)	704.0	716.0	23730≤n≤23849	734.0	746.0	5730≤n≤5849
Band 18 (800)	815.0	830.0	23850≤n≤23999	860.0	875.0	5850≤n≤5999
Band 19 (800)	830.0	845.0	24000≤n≤24149	875.0	890.0	6000≤n≤6149
Band 20 (800)	832.0	862.0	24150≤n≤24449	791.0	821.0	6150≤n≤6449
Band 21 (1500)	1447.9	1462.9	24450≤n≤24599	1495.9	1510.9	6450≤n≤6599
Band 22 (3500)	3410.0	3490.0	24600≤n≤25399	3510.0	3590.0	6600≤n≤7399
Band 23 (2100)	2000.0	2020.0	25500≤n≤25699	2180.0	2200.0	7500≤n≤7699
Band 24 (1500)	1626.5	1660.5	25700≤n≤26039	1525.0	1559.0	7700≤n≤8039
Band 25 (1900)	1850.0	1915.0	26040≤n≤26689	1930.0	1995.0	8040≤n≤8689
Band 26 (800)	814.0	849.0	26690≤n≤27039	859.0	894.0	8690≤n≤9039
LTE - TDD						
Band Global						
Band 33 (1900)	1900.0	1920.0	36000≤n≤36199			
Band 34 (2100)	2010.0	2025.0	36200≤n≤36349			
Band 35 (1850)	1850.0	1910.0	36350≤n≤36949			
Band 36 (1930)	1930.0	1990.0	36950≤n≤37549			
Band 37 (1910)	1910.0	1930.0	37550≤n≤37749			
Band 38 (2570)	2570.0	2620.0	37750≤n≤38249			
Band 39 (1880)	1880.0	1920.0	38250≤n≤38649			
Band 40 (2300)	2300.0	2400.0	38650≤n≤39649			
Band 41 (2496)	2496.0	2690.0	39650≤n≤41589			
Band 42 (3400)	3400.0	3600.0	41590≤n≤43589			
Band 43 (3600)	3600.0	3800.0	43590≤n≤45589			
TD-SCDMA						
FBN 0	1785.0	1805.0	0≤n≤92			
FBN 1	1900.0	1920.0	0≤n≤92			
FBN 2	1920.0	1980.0	0≤n≤255			
FBN 3	1920.0	1980.0	0≤n≤36			
FBN 4	1980.0	2010.0	0≤n≤142			
FBN 5	2010.0	2025.0	0≤n≤67			
FBN 6	2100.0	2170.0	0≤n≤255			
FBN 7	2100.0	2170.0	0≤n≤36			
FBN 8	2170.0	2220.0	0≤n≤242			
WiMAX						
ProfR1 (1.25 2150)	2150.625	2159.375	0≤n≤7			
ProfR2 (1.25 2305)	2305.625	2320.625	0≤n≤12			
ProfR3 (1.25 2361)	2361.875	2375.625	13≤n≤24			
ProfR4 (1.25 2500)	2500.625	2688.125	0≤n≤150			
ProfR5 (1.25 3400)	3400.625	3700.625	0≤n≤240			
ProfR6 (3.5 2598)	2524.750	2591.250	0≤n≤38	2598.750	2665.250	0≤n≤38
ProfR7 (3.5 3461)	3411.750	3443.250	0≤n≤18	3461.750	3493.250	0≤n≤18
ProfR8 (3.5 3551)	3501.750	3598.000	0≤n≤55	3551.750	3648.000	0≤n≤55
ProfR9 (3.5 3651)	3601.750	3698.000	0≤n≤55	3651.750	3748.000	0≤n≤55
ProfR10 (3.5 3751)	3701.750	3798.000	0≤n≤55	3751.750	3848.000	0≤n≤55
ProfR11 (7 2600)	2526.500	2589.500	0≤n≤36	2600.50	2663.50	0≤n≤36
ProfR12 (7 3463)	2413.500	3441.500	0≤n≤16	3463.50	3491.50	0≤n≤16
ProfR13 (7 3553)	3503.500	3596.250	0≤n≤53	3553.50	3646.25	0≤n≤53

ProfR14 (7 3653)	3603.500	3696.250	0≤n≤53	3653.50	3746.25	0≤n≤53
ProfR15 (7 3753)	3703.500	3796.250	0≤n≤53	3753.50	3846.25	0≤n≤53
ProfR26 (10 5275)	5275.000	5335.000	55≤n≤67			
ProfR27 (10 5740)	5740.000	5830.000	148≤n≤166			
ProfR28 (10 5735)	5735.000	5845.000	147≤n≤169			
ProfR29 (8.75 2304)	2304.375	2395.625	0≤n≤730			

Appendix D – VSWR-Return loss conversion table

This information is for the Cable and Antenna Analyzer mode of the JD785B/JD745B Base Station Analyzer and the JD786B/JD746B RF Analyzer.

- Return Loss=$20\log_{10}$(VSWR+1/VSWR-1) (dB)
- VSWR=($10^{R.L./20}$+1/$10^{R.L./20}$-1)

VSWR	Return Loss (dB)	Trans. Loss (dB)	Volt. Refl Coeff	Power Trans (%)	Power Refl (%)	VSWR	Return Loss (dB)	Trans. Loss (dB)	Volt. Refl Coeff	Power Trans (%)	Power Refl (%)
1.00	--	0.000	0.00	100.0	0.0	1.64	12.3	0.263	0.24	94.1	5.9
1.01	46.1	0.000	0.00	100.0	0.0	1.66	12.1	0.276	0.25	93.8	6.2
1.02	40.1	0.000	0.01	100.0	0.0	1.68	11.9	0.289	0.25	93.6	6.4
1.03	36.6	0.001	0.01	100.0	0.0	1.70	11.7	0.302	0.26	93.3	6.7
1.04	34.2	0.002	0.02	100.0	0.0	1.72	11.5	0.315	0.26	93.0	7.0
1.05	32.3	0.003	0.02	99.9	0.1	1.74	11.4	0.329	0.27	92.7	7.3
1.06	30.7	0.004	0.03	99.9	0.1	1.76	11.2	0.342	0.28	92.4	7.6
1.07	29.4	0.005	0.03	99.9	0.1	1.78	11.0	0.356	0.28	92.1	7.9
1.08	28.3	0.006	0.04	99.9	0.1	1.80	10.9	0.370	0.29	91.8	8.2
1.09	27.3	0.008	0.04	99.8	0.2	1.82	10.7	0.384	0.29	91.5	8.5
1.10	26.4	0.010	0.05	99.8	0.2	1.84	10.6	0.398	0.30	91.3	8.7
1.11	25.7	0.012	0.05	99.7	0.3	1.86	10.4	0.412	0.30	91.0	9.0
1.12	24.9	0.014	0.06	99.7	0.3	1.88	10.3	0.426	0.31	90.7	9.3
1.13	24.3	0.016	0.06	99.6	0.4	1.90	10.2	0.440	0.31	90.4	9.6
1.14	23.7	0.019	0.07	99.6	0.4	1.92	10.0	0.454	0.32	90.1	9.9
1.15	23.1	0.021	0.07	99.5	0.5	1.94	9.9	0.468	0.32	89.8	10.2
1.16	22.6	0.024	0.07	99.5	0.5	1.96	9.8	0.483	0.32	89.5	10.5
1.17	22.1	0.027	0.08	99.4	0.6	1.98	9.7	0.497	0.33	89.2	10.8
1.18	21.7	0.030	0.08	99.3	0.7	2.00	9.5	0.512	0.33	88.9	11.1
1.19	21.2	0.033	0.09	99.2	0.8	2.50	7.4	0.881	0.43	81.6	18.4
1.20	20.8	0.036	0.09	99.2	0.8	3.00	6.0	1.249	0.50	75.0	25.0
1.21	20.4	0.039	0.10	99.1	0.9	3.50	5.1	1.603	0.56	69.1	30.9
1.22	20.1	0.043	0.10	99.0	1.0	4.00	4.4	1.938	0.60	64.0	36.0
1.23	19.7	0.046	0.10	98.9	1.1	4.50	3.9	2.255	0.64	59.5	40.5
1.24	19.4	0.050	0.11	98.9	1.1	5.00	3.5	2.553	0.67	55.6	44.4
1.25	19.1	0.054	0.11	98.8	1.2	5.50	3.2	2.834	0.69	52.1	47.9
1.26	18.8	0.058	0.12	98.7	1.3	6.00	2.9	3.100	0.71	49.0	51.0
1.27	18.5	0.062	0.12	98.6	1.4	6.50	2.7	3.351	0.73	46.2	53.8
1.28	18.2	0.066	0.12	98.5	1.5	7.00	2.5	3.590	0.75	43.7	56.3
1.29	17.9	0.070	0.13	98.4	1.6	7.50	2.3	3.817	0.76	41.5	58.5
1.30	17.7	0.075	0.13	98.3	1.7	8.00	2.2	4.033	0.78	39.5	60.5
1.32	17.2	0.083	0.14	98.1	1.9	8.50	2.1	4.240	0.79	37.7	62.3
1.34	16.8	0.093	0.15	97.9	2.1	9.00	1.9	4.437	0.80	36.0	64.0
1.36	16.3	0.102	0.15	97.7	2.3	9.50	1.8	4.626	0.81	34.5	65.5
1.38	15.9	0.112	0.16	97.5	2.5	10.00	1.7	4.807	0.82	33.1	66.9
1.40	15.8	0.122	0.17	97.2	2.8	11.00	1.6	5.149	0.83	30.6	69.4
1.42	15.2	0.133	0.17	97.0	3.0	12.00	1.5	5.466	0.85	28.4	71.6
1.44	14.9	0.144	0.18	96.7	3.3	13.00	1.3	5.762	0.86	26.5	73.5
1.46	14.6	0.155	0.19	96.5	3.5	14.00	1.2	6.040	0.87	24.9	75.1
1.48	14.3	0.166	0.19	96.3	3.7	15.00	1.2	6.301	0.88	23.4	76.6
1.50	14.0	0.177	0.20	96.0	4.0	16.00	1.1	6.547	0.88	22.1	77.9
1.52	13.7	0.189	0.21	95.7	4.3	17.00	1.0	6.780	0.89	21.0	79.0
1.54	13.4	0.201	0.21	95.5	4.5	18.00	1.0	7.002	0.89	19.9	80.1
1.56	13.2	0.213	0.22	95.2	4.8	19.00	0.9	7.212	0.90	19.0	81.0
1.58	13.0	0.225	0.22	94.9	5.1	20.00	0.9	7.413	0.90	18.1	81.9
1.60	12.7	0.238	0.23	94.7	5.3	25.00	0.7	8.299	0.92	14.8	85.2
1.62	12.5	0.250	0.24	94.4	5.6	30.00	0.6	9.035	0.94	12.5	87.5

Appendix E – Cyclic prefix table

This information is for the LTE – FDD Signal Analyzer mode and the LTE – TDD Signal Analyzer mode of the JD785B/JD745B Base Station Analyzer and the JD788B/JD748B Signal Analyzer. Following table shows OFDM parameter details by different bandwidth.

Bandwidth	Configuration (Downlink)		Cyclic Prefix Length	
			TS	µs
20 MHz	Normal CP	Δf=15 kHz	160 for l=0 144 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	512 for l=0,1,…,5	16.667
		Δf=7.5 kHz	1024 for l=0,1,2	33.333
15 MHz	Normal CP	Δf=15 kHz	120 for l=0 108 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	384 for l=0,1,…,5	16.667
		Δf=7.5 kHz	768 for l=0,1,2	33.333
10 MHz	Normal CP	Δf=15 kHz	80 for l=0 72 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	256 for l=0,1,…,5	16.667
		Δf=7.5 kHz	512 for l=0,1,2	33.333
5 MHz	Normal CP	Δf=15 kHz	40 for l=0 36 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	128 for l=0,1,…,5	16.667
		Δf=7.5 kHz	248 for l=0,1,2	33.333
3 MHz	Normal CP	Δf=15 kHz	20 for l=0 18 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	64 for l=0,1,…,5	16.667
		Δf=7.5 kHz	128 for l=0,1,2	33.333
1.4 MHz	Normal CP	Δf=15 kHz	10 for l=0 9 for l=1,2,..,6	5.208 4.6875
	Extended CP	Δf=15 kHz	32 for l=0,1,…,5	16.667
		Δf=7.5 kHz	64 for l=0,1,2	33.333

Appendix F – Motorola CDMA/EV-DO LMF

Motorola's CDMA/EV-DO base stations (BTS) are optimized with the assistance of Local Maintenance Facility (LMF), a Motorola's software tool that interfaces with the cell site and the instrument. The optimization process identifies the accumulated loss (or gain) for all receiving and transmitting paths at the cell site and stores that value in the system's database.

Using JD700B series LMF interface

An emulation interface to LMF has been implemented in JDSU's base station analyzer (JD785B/ JD745B) in order to perform BTS optimization procedures. The scope of this emulation is to do maintenance tests of TX Calibration and TX Audit required in routine maintenance practices with or without the use of an external power sensor. Using the external power sensor, you can get highly accurate measurement results.

Setting up for a LMF test

Procedure

1 To connect your instrument both with BTS and PC, do one of the following:
   - Internal power sensor: Connect the Motorola CDMA/EV-DO BTS with the Spectrum Analyzer RF In 50 Ω port of JD785B/JD745B and connect the WinLMF running PC with JD785B/JD745B via a hub as illustrated in the Figure 285.
   - External power sensor: Connect an external power sensor to the USB Host port of JD785B/ JD745B and to the BTS and connect the WinLMF running PC with JD785B/JD745B via a hub as illustrated in the Figure 286.

Figure 285 Using internal power sensor

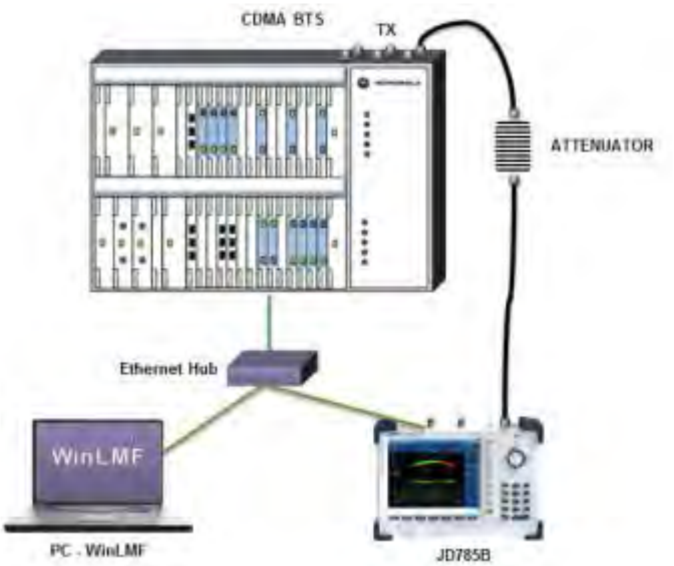
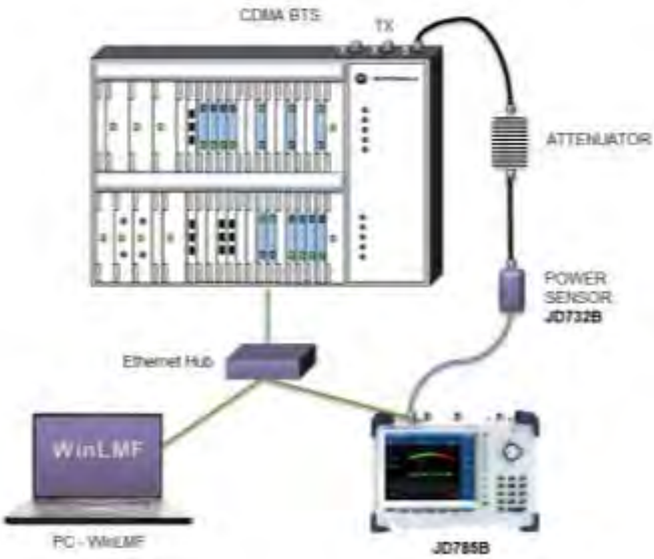


Figure 286 Using external power sensor



Performing a LMF test

Procedure

1. Press the ***SYSTEM*** hot key.
2. To set the IP address, complete the following steps:
   - **a** Select **System Configuration > Ethernet Config**.
   - **b** Toggle the **Mode** soft key and select **Static**.
   - **c** Press the **Field > IP Address** soft key.
   - **d** Set the IP address as "**192.167.10.1**".
3. Select **Remote Interface > LAN > LMF**.
4. To set up the LMF settings, complete the following steps:
   - **a** Press the **LMF Settings** soft key.
   - **b** Select the power measurement and BTS option from the following choices:
     - **External PM 800 MHz Band** for external measurement on cellular basestation
     - **External PM 1900 MHz Band** for external meausrement on PCS basestation
     - **Internal PM 800 MHz Band** for internal measurement on celluar basestation
     - **Internal PM 1900 MHz Band** for internal measurement on PCS basestation
5. To select the measurement mode, complete the following steps:
   - **a** Press the **MODE** hard key.
   - **b** Press the **Power Meter** soft key.
   - **c** Select **Internal RF Power Meter** or **External RF Power Meter** depending on your LMF settings. The measurement result is displayed on the screen.

Appendix G – Bluetooth connection

JD700B series' Bluetooth mode is used for communication between the instrument and your computer with JDRemote or a storage device in order to use the following services if needed.

- Bluetooth Personal Area Network (PAN) profile service for JDRemote.
- Bluetooth File Transfer Profile (FTP) or Object Push Profile (OPP) service for file transfer from the instrument to a Bluetooth storage device.

The Bluetooth Connectivity option includes a pair of Bluetooth USB Parani-UD100 Adapters and 5 dBi Dipole Antennas as well as the BlueSoleil application software.

Installing and setting up Bluetooth software

The BlueSoleil application must be installed in your computer prior to making a Bluetooth connection. After installing the software, you must disable DHCP Server option in order to use the PAN service properly.

Procedure

1 Insert the provided CD-ROM into your computer and install the software as instructed.
The BlueSoleil Space shortcut icon appears on the desktop.

> **NOTE**
> For more information on installation, refer to the Quick Start Guide or the User Guide provided with the adapter.

2 Double-click the **BlueSoleil Space** shortcut icon on your computer desktop to launch the application.
The BlueSoleil program window appears.

3 Right-click the **My Device** icon (the orange ball) in the center of the window, and then click **Properties > Services** tab.
The My Device Properties window appears.

4 Select the **Bluetooth Personal Area Network** from the list, and then click the **Properties** button.
The Bluetooth Personal Area Network Properties window appears.

5 Click the **Options** tab, and then uncheck the **Enable DHCP Server** option.

> **NOTE**
> You must uncheck it to disable this option as the Enable DHCP Server option is checked by default.

6 Click the **OK** button.
The Bluetooth Personal Area Network Properties window dismisses.

7 Click the **OK** button.
The My Device Properties window dismisses.

Making Bluetooth connection

The JD700B series detects a connected Parani-UD100 USB Bluetooth Adapter automatically.

Procedure

1 Connect the 5 dBi Dipole Antenna to the Parani-UD100 Bluetooth USB Adapter: one for the computer and the other for JD700B series.

2 Plug in the Bluetooth adapters to the USB port of the computer and the instrument.
The instrument detects the connected adapter and turns the Bluetooth mode on automatically. The Bluetooth icon appears in the status bar at the top of the instrument screen.

3 Double-click the **BlueSoleil Space** icon on the computer desktop to launch the application if not opened already.
The BlueSoleil program window appears.

4 Double-click the **My Device** icon (orange ball) in the center of the application window to search the JD700B series.
You can view an added icon around the orange ball labeled with the detected JD700B series' BD address or model and serial numbers.

5 Right-click the device icon for the JD700B series, and then click the **Pair**.
The Bluetooth Passkey window appears.

6 Enter **0000** in the Passkey box, and then click the **OK** button.
The word "Paired" appears on the window. The instrument also turns the Bluetooth Mode on automatically and displays the paired device and service information on the screen.

7 Double-click the device icon for the JD700B series to search services.

8 Right-click the icon for the JD700B series, and then select either the **Connect Bluetooth Personal Area Network** or the **Connect Bluetooth File Transfer**.

NOTE
Select one of these services as needed. If the Connect Bluetooth Personal Area Network is selected, a fixed IP address (192.168.10.10) is assigned for JD700B series and this address must be typed into the TCP/IP setting on JDViewer or JDRemote. See "Setting up communication in application" on page 538 for more information.

Setting up communication in application

If the Connect Bluetooth Personal Area Network service is selected on BlueSoleil, you need to configure communication setting on the application JDViewer or JDRemote by entering the fixed IP address for the instrument.

JDViewer setup

Procedure

1 Launch the JDViewer application.

2 Go to **Settings > Communication**.
The Settings dialog box appears.

3 Click the drop-down list in the Instrument pane, and then select the instrument series to be communicated.

4 In the Connection Method pane, select the **TCP/IP**, and then enter **192**.**168**.**10**.**10** without dots.

5 Click **OK** to finish the communication setup.

6 Go to **Load > Connect** to make a connection between the instrument and JDViewer.
JD700B series and JDViewer become ready for communication.

JDRemote setup

Procedure

1 Launch the JDRemote application.
The Select Model dialog box appears.

2 Select the **740A, 780A Series**, and then click the **OK** button.

3 Right-click on the JDRemote window, and then click the **Communication**.
The Communication dialog box appears.

4 Select the **TCP/IP**, and then enter **192**.**168**.**10**.**10** without dots.

5 Click **OK** to finish the communication setup.

6 Right-click on the JDRemote window, and then click the **Connect**.
This enables communication between the instrument and JDRemote.

7 Right-click on the JDRemote window, and then click the **Start**.
JD700B series and JDRemote become ready for communication.

8 *Optional.* To adjust the image quality, complete the following steps:

   a Right-click on the JDRemote.

   b Click the **Quality**.

   c Select the image quality option among **High**, **Medium**, or **Low**.
   You can improve refresh rate, if experiencing low-quality signal, by adjusting the image quality in JDRemote.

Turning Bluetooth mode on/off manually

JD700B series turns the Bluetooth Mode on automatically if connected. You can also turn it on and off manually.

Procedure

1 Press the ***SYSTEM*** hot key.

2 Press the **System Configuration > Remote Interface > Bluetooth** soft key.
The Bluetooth screen appears with the device information.

3 Toggle the **Bluetooth** soft key between **On** and **Off** to turn it on and off.
Connecting or disconnecting the adapter also turns the mode on or off automatically.

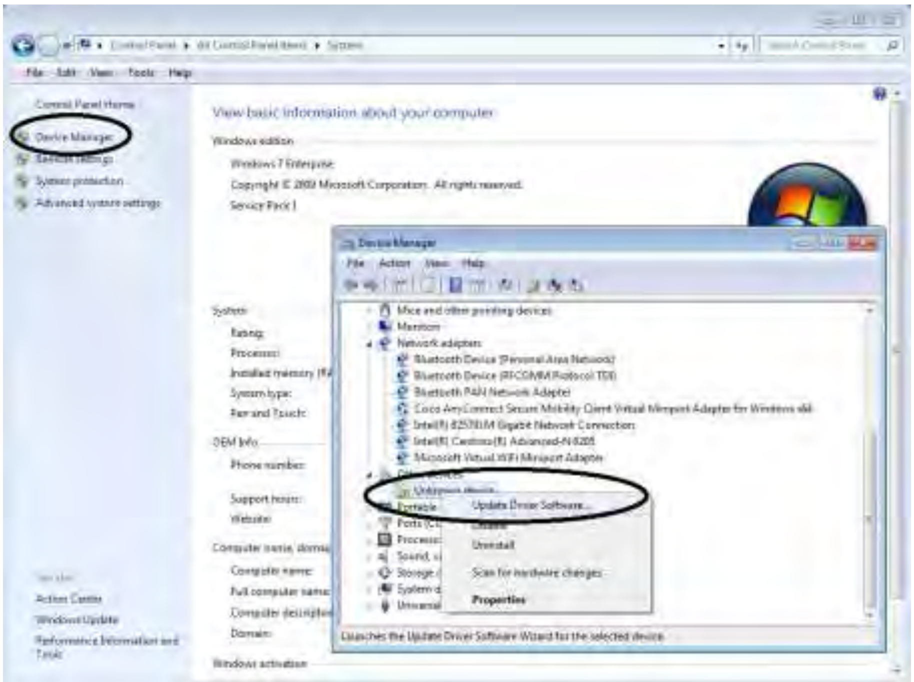
Appendix H – Device driver installation

JD700B series can be controlled from the application software JDViewer or JDRemote installed on your computer. You must install driver software for the instrument on to the computer if USB Client connection is used for communication.

Procedure

1. Go to **Control Panel > System > Device Manager**.
   The Device Manager window appears.
2. Right-click the **Unknown Device** under the **Other Devices**, and then click the **Update Driver Software**.
   The Update Driver Software – Unknown Device window appears as shown in **Figure 287** below.
3. Select the **Browse my computer for driver software**, and then click the **Browse** button to search for the location where the driver software is.
   The Browse For Folder window appears.
4. Search for the **JDRemote** folder, and then select the driver folder for the installed OS.
   For example, OSDisk (C:) > Program Files (x86) > JDRemote > Driver > Win7 > 64bit.
5. Click the **OK** button.
   The Browse For Folder window dismisses.
6. Click the **Next** button to start installation.
   If the Windows Security window appears, select the **Install this driver software anyway**.
   Installing driver software starts.
7. Click the **Close** button at the end of the installation.

Figure 287 Device manager screen



Appendix I – Ordering information

JD785B Base Station Analyzer

JD785B		
9 kHz to 8 GHz	Spectrum Analyzer	
5 MHz to 6 GHz	Cable and Antenna Analyzer [1]	
10 MHz to 8 GHz	RF Power Meter	Internal mode

Options

NOTE: Upgrade options for the JD785B use the designation JD785BU before the respective last three-digit option number.

JD785B001	2-Port Transmission Measurements [2]	
JD785B002	Bias Tee	(Requires option 01)
JD785B003	High Power CW Signal Generator	
JD785B008	Optical Hardware [3]	
JD785B010	GPS Receiver and Antenna	
JD785B011	Interference Analyzer [4, 5]	
JD785B012	Channel Scanner	
JD785B013	Bluetooth Connectivity	
JD785B020	cdmaOne/cdma2000 Signal Analyzer	
JD785B021	EV-DO Signal Analyzer	(Requires option 20)
JD785B022	GSM/GPRS/EDGE Signal Analyzer	
JD785B023	WCDMA/HSPA+ Signal Analyzer	
JD785B025	TD-SCDMA Signal Analyzer	
JD785B026	Mobile WiMAX Signal Analyzer	
JD785B028	LTE-FDD Signal Analyzer	
JD785B029	LTE-TDD Signal Analyzer	
JD785B030	LTE Advanced-FDD Signal Analyzer	(Requires option 28)
JD785B031	LTE Advanced-TDD Signal Analyzer	(Requires option 29)
JD785B040	cdmaOne/cdma2000 OTA Analyzer [5]	(Requires option 10)
JD785B041	EV-DO OTA Analyzer [5]	(Requires option 10)
JD785B042	GSM/GPRS/EDGE OTA Analyzer [5]	(Requires option 10)
JD785B043	WCDMA/HSPA+ OTA Analyzer [5]	(Requires option 10)
JD785B045	TD-SCDMA OTA Analyzer [5]	(Requires option 10)
JD785B046	Mobile WiMAX OTA Analyzer [5]	(Requires option 10)
JD785B048	LTE-FDD OTA Analyzer [5]	(Requires option 10)
JD785B049	LTE-TDD OTA Analyzer [5]	(Requires option 10)
JD785B060	RFoCPRI 614M & 1.2G Interference Analyzer [6]	(Requires option 08)
JD785B061	RFoCPRI 2.4G Interference Analyzer [6]	(Requires option 08)
JD785B062	RFoCPRI 3.1G Interference Analyzer [6]	(Requires option 08)
JD785B063	RFoCPRI 4.9G Interference Analyzer [6]	(Requires option 08)
JD785B064	RFoCPRI 6.1G Interference Analyzer [6]	(Requires option 08)
JD785B065	RFoCPRI 9.8G Interference Analyzer [6]	(Requires option 08)
JD785B200	Calibration Service for Asia, North America	
JD785B201	Calibration Service for Latin America, EMEA	
JD785B250	Warranty extension of 1 year for Asia, North America	
JD785B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories	
JD70050326	AC/DC Power Adapter for JD700B Series [7]
G710550335	Cross LAN Cable (1.5 m) [7]
GC73050515	USB A to B Cable (1.8 m) [7]
GC72450518	> 1 G Byte USB Memory [7]
G710550325	Rechargeable Lithium Ion Battery [7]
G710550323	Automotive Cigarette Lighter 12 V DC Adapter [7]
G710550316	Stylus Pen [7]
JD700B361	JD700B Series User’s Guide and Application Software – CD

[1] Requires calibration kit
[2] Requires dual port calibration kit
[3] Requires RFoCPRI options
[4] Highly recommended adding JD785B010
[5] Highly recommended adding G70005035x and/or G70005036x
[6] Requires proper SFP/SFP+ transceiver and optical tap.
[7] Standard accessories can be purchased separately.

JD786B RF Analyzer

JD786B		
9 kHz to 8 GHz	Spectrum Analyzer	
5 MHz to 6 GHz	Cable and Antenna Analyzer [1]	
10 MHz to 8 GHz	RF Power Meter	Internal mode

Options		
NOTE: Upgrade options for the JD786B use the designation JD786BU before the respective last three-digit option number.		
JD786B001	2-Port Transmission Measurements [2]	
JD786B002	Bias Tee	(Requires option 01)
JD786B003	High Power CW Signal Generator	
JD786B008	Optical Hardware [3]	
JD786B010	GPS Receiver and Antenna	
JD786B011	Interference Analyzer [4,5]	
JD786B012	Channel Scanner	
JD786B013	Bluetooth Connectivity	
JD786B060	RFoCPRI 614M & 1.2G Interference Analyzer [6]	(Requires option 08)
JD786B061	RFoCPRI 2.4G Interference Analyzer [6]	(Requires option 08)
JD786B062	RFoCPRI 3.1G Interference Analyzer [6]	(Requires option 08)
JD786B063	RFoCPRI 4.9G Interference Analyzer [6]	(Requires option 08)
JD786B064	RFoCPRI 6.1G Interference Analyzer [6]	(Requires option 08)
JD786B065	RFoCPRI 9.8G Interference Analyzer [6]	(Requires option 08)
JD786B200	Calibration Service for Asia, North America	
JD786B201	Calibration Service for Latin America, EMEA	
JD786B250	Warranty extension of 1 year for Asia, North America	
JD786B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories	
JD70050326	AC/DC Power Adapter for JD700B Series [7]
G710550335	Cross LAN Cable (1.5 m) [7]
GC73050515	USB A to B Cable (1.8 m) [7]
GC72450518	> 1 G Byte USB Memory [7]
G710550325	Rechargeable Lithium Ion Battery [7]
G710550323	Automotive Cigarette Lighter 12 V DC Adapter [7]
G710550316	Stylus Pen [7]
JD700B361	JD700B Series User's Guide and Application Software – CD

[1] Requires calibration kit
[2] Requires dual port calibration kit
[3] Requires RFoCPRI options
[4] Highly recommended adding JD786B010
[5] Highly recommended adding G70005035x and/or G70005036x
[6] Requires proper SFP/SFP+ transceiver and optical tap
[7] Standard accessories can be purchased separately.

JD788B Signal Analyzer

JD788B		
9 kHz to 8 GHz	Spectrum Analyzer	
10 MHz to 8 GHz	RF Power Meter	Internal mode

Options

NOTE: Upgrade options for the JD788B use the designation JD788BU before the respective last three-digit option number.

JD788B001	2-Port Transmission Measurements [1]	(Requires option 07)
JD788B003	High Power CW Signal Generator	(Requires option 07)
JD788B007	Signal Generator Hardware	
JD788B008	Optical Hardware [2]	
JD788B009	20 MHz Demodulation Hardware	
JD788B010	GPS Receiver and Antenna	
JD788B011	Interference Analyzer [3,4]	
JD788B012	Channel Scanner	
JD788B013	Bluetooth Connectivity	
JD788B020	cdmaOne/cdma2000 Signal Analyzer	(Requires option 09)
JD788B021	EV-DO Signal Analyzer	(Requires options 09 and 20)
JD788B022	GSM/GPRS/EDGE Signal Analyzer	(Requires option 09)
JD788B023	WCDMA/HSPA+ Signal Analyzer	(Requires option 09)
JD788B025	TD-SCDMA Signal Analyzer	(Requires option 09)
JD788B026	Mobile WiMAX Signal Analyzer	(Requires option 09)
JD788B028	LTE-FDD Signal Analyzer	(Requires option 09)
JD788B029	LTE-TDD Signal Analyzer	(Requires option 09)
JD788B030	LTE Advanced-FDD Signal Analyzer	(Requires options 09 and 28)
JD788B031	LTE Advanced-TDD Signal Analyzer	(Requires options 09 and 29)
JD788B040	cdmaOne/cdma2000 OTA Analyzer [4]	(Requires options 09 and 10)
JD788B041	EV-DO OTA Analyzer [4]	(Requires options 09 and 10)
JD788B042	GSM/GPRS/EDGE OTA Analyzer [4]	(Requires options 09 and 10)
JD788B043	WCDMA/HSPA+ OTA Analyzer [4]	(Requires options 09 and 10)
JD788B045	TD-SCDMA OTA Analyzer [4]	(Requires options 09 and 10)
JD788B046	Mobile WiMAX OTA Analyzer [4]	(Requires options 09 and 10)
JD788B048	LTE-FDD OTA Analyzer [4]	(Requires options 09 and 10)
JD788B049	LTE-TDD OTA Analyzer [4]	(Requires options 09 and 10)
JD788B060	RFoCPRI 614M & 1.2G Interference Analyzer [5]	(Requires option 08)
JD788B061	RFoCPRI 2.4G Interference Analyzer [5]	(Requires option 08)
JD788B062	RFoCPRI 3.1G Interference Analyzer [5]	(Requires option 08)
JD788B063	RFoCPRI 4.9G Interference Analyzer [5]	(Requires option 08)
JD788B064	RFoCPRI 6.1G Interference Analyzer [5]	(Requires option 08)
JD788B065	RFoCPRI 9.8G Interference Analyzer [5]	(Requires option 08)
JD788B200	Calibration Service for Asia, North America	
JD788B201	Calibration Service for Latin America, EMEA	
JD788B250	Warranty extension of 1 year for Asia, North America	
JD788B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories	
JD70050326	AC/DC Power Adapter for JD700B Series [6]
G710550335	Cross LAN Cable (1.5 m) [6]
GC73050515	USB A to B Cable (1.8 m) [6]
GC72450518	> 1 G Byte USB Memory [6]
G710550325	Rechargeable Lithium Ion Battery [6]
G710550323	Automotive Cigarette Lighter 12 V DC Adapter [6]
G710550316	Stylus Pen [6]
JD700B361	JD700B Series User’s Guide and Application Software – CD

[1] Requires dual port calibration kit
[2] Requires RFoCPRI options

[3] Highly recommended adding JD788B010
[4] Highly recommended adding G70005035x and/or G70005036x
[5] Requires proper SFP/SFP+ transceiver and optical pad
[6] Standard accessories can be purchased separately.

JD745B Base Station Analyzer

JD745B		
100 kHz to 4 GHz	Spectrum Analyzer	
5 MHz to 4 GHz	Cable and Antenna Analyzer [1]	
10 MHz to 4 GHz	RF Power Meter	Internal mode

Options

NOTE: Upgrade options for the JD745B use the designation JD745BU before the respective last three-digit option number.

JD745B001	2-Port Transmission Measurements [2]	
JD745B002	Bias Tee	(Requires option 01)
JD745B003	CW Signal Generator	
JD745B008	Optical Hardware [3]	
JD745B010	GPS Receiver and Antenna	
JD745B011	Interference Analyzer [4, 5]	
JD745B012	Channel Scanner	
JD745B013	Bluetooth Connectivity	
JD745B020	cdmaOne/cdma2000 Signal Analyzer	
JD745B021	EV-DO Signal Analyzer	(Requires option 20)
JD745B022	GSM/GPRS/EDGE Signal Analyzer	
JD745B023	WCDMA/HSPA+ Signal Analyzer	
JD745B025	TD-SCDMA Signal Analyzer	
JD745B026	Mobile WiMAX Signal Analyzer	
JD745B028	LTE-FDD Signal Analyzer	
JD745B029	LTE-TDD Signal Analyzer	
JD745B030	LTE Advanced-FDD Signal Analyzer	(Requires option 28)
JD745B031	LTE Advanced-TDD Signal Analyzer	(Requires option 29)
JD745B040	cdmaOne/cdma2000 OTA Analyzer [5]	(Requires option 10)
JD745B041	EV-DO OTA Analyzer [5]	(Requires option 10)
JD745B042	GSM/GPRS/EDGE OTA Analyzer [5]	(Requires option 10)
JD745B043	WCDMA/HSPA+ OTA Analyzer [5]	(Requires option 10)
JD745B045	TD-SCDMA OTA Analyzer [5]	(Requires option 10)
JD745B046	Mobile WiMAX OTA Analyzer [5]	(Requires option 10)
JD745B048	LTE-FDD OTA Analyzer [5]	(Requires option 10)
JD745B049	LTE-TDD OTA Analyzer [5]	(Requires option 10)
JD745B060	RFoCPRI 614M & 1.2G Interference Analyzer [6]	(Requires option 08)
JD745B061	RFoCPRI 2.4G Interference Analyzer [6]	(Requires option 08)
JD745B062	RFoCPRI 3.1G Interference Analyzer [6]	(Requires option 08)
JD745B063	RFoCPRI 4.9G Interference Analyzer [6]	(Requires option 08)
JD745B064	RFoCPRI 6.1G Interference Analyzer [6]	(Requires option 08)
JD745B065	RFoCPRI 9.8G Interference Analyzer [6]	(Requires option 08)
JD745B200	Calibration Service for Asia, North America	
JD745B201	Calibration Service for Latin America, EMEA	
JD745B250	Warranty extension of 1 year for Asia, North America	
JD745B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories

JD70050326	AC/DC Power Adapter for JD700B Series [7]
G710550335	Cross LAN Cable (1.5 m) [7]
GC73050515	USB A to B Cable (1.8 m) [7]
GC72450518	> 1 G Byte USB Memory [7]
G710550325	Rechargeable Lithium Ion Battery [7]

G710550323	Automotive Cigarette Lighter 12 V DC Adapter [7]	
G710550316	Stylus Pen [7]	
JD700B361	JD700B Series User's Guide and Application Software – CD	

[1] Requires calibration kit
[2] Requires dual port calibration kit
[3] Requires RFoCPRI options
[4] Highly recommended adding JD745B010
[5] Highly recommended adding G70005035x and/or G70005036x
[6] Requires proper SFP/SFP+ transceiver and optical tap.
[7] Standard accessories can be purchased separately.

JD746B RF Analyzer

JD746B		
100 kHz to 4 GHz	Spectrum Analyzer	
5 MHz to 4 GHz	Cable and Antenna Analyzer [1]	
10 MHz to 4 GHz	RF Power Meter	Internal mode

Options

NOTE: Upgrade options for the JD746B use the designation JD746BU before the respective last three-digit option number.

JD746B001	2-Port Transmission Measurements [2]	
JD746B002	Bias Tee	(Requires option 01)
JD746B003	CW Signal Generator	
JD746B008	Optical Hardware [3]	
JD746B010	GPS Receiver and Antenna	
JD746B011	Interference Analyzer [4,5]	
JD746B012	Channel Scanner	
JD746B013	Bluetooth Connectivity	
JD746B060	RFoCPRI 614M & 1.2G Interference Analyzer [6]	(Requires option 08)
JD746B061	RFoCPRI 2.4G Interference Analyzer [6]	(Requires option 08)
JD746B062	RFoCPRI 3.1G Interference Analyzer [6]	(Requires option 08)
JD746B063	RFoCPRI 4.9G Interference Analyzer [6]	(Requires option 08)
JD746B064	RFoCPRI 6.1G Interference Analyzer [6]	(Requires option 08)
JD746B065	RFoCPRI 9.8G Interference Analyzer [6]	(Requires option 08)
JD746B200	Calibration Service for Asia, North America	
JD746B201	Calibration Service for Latin America, EMEA	
JD746B250	Warranty extension of 1 year for Asia, North America	
JD746B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories

JD70050326	AC/DC Power Adapter for JD700B Series [7]
G710550335	Cross LAN Cable (1.5 m) [7]
GC73050515	USB A to B Cable (1.8 m) [7]
GC72450518	> 1 G Byte USB Memory [7]
G710550325	Rechargeable Lithium Ion Battery [7]
G710550323	Automotive Cigarette Lighter 12 V DC Adapter [7]
G710550316	Stylus Pen [7]
JD700B361	JD700B Series User's Guide and Application Software – CD

[1] Requires calibration kit
[2] Requires dual port calibration kit
[3] Requires RFoCPRI options
[4] Highly recommended adding JD746B010
[5] Highly recommended adding G70005035x and/or G70005036x
[6] Requires proper SFP/SFP+ transceiver and optical tap
[7] Standard accessories can be purchased separately.

JD748B Signal Analyzer

JD748B		
100 kHz to 4 GHz	Spectrum Analyzer	
10 MHz to 4 GHz	RF Power Meter	Internal mode

Options

NOTE: Upgrade options for the JD748B use the designation JD748BU before the respective last three-digit option number.

JD748B001	2-Port Transmission Measurements [1]	(Requires option 07)
JD748B003	CW Signal Generator	(Requires option 07)
JD748B007	Signal Generator Hardware	
JD748B008	Optical Hardware [2]	
JD748B009	20 MHz Demodulation Hardware	
JD748B010	GPS Receiver and Antenna	
JD748B011	Interference Analyzer [3,4]	
JD748B012	Channel Scanner	
JD748B013	Bluetooth Connectivity	
JD748B020	cdmaOne/cdma2000 Signal Analyzer	(Requires option 09)
JD748B021	EV-DO Signal Analyzer	(Requires options 09 and 20)
JD748B022	GSM/GPRS/EDGE Signal Analyzer	(Requires option 09)
JD748B023	WCDMA/HSPA+ Signal Analyzer	(Requires option 09)
JD748B025	TD-SCDMA Signal Analyzer	(Requires option 09)
JD748B026	Mobile WiMAX Signal Analyzer	(Requires option 09)
JD748B028	LTE-FDD Signal Analyzer	(Requires option 09)
JD748B029	LTE-TDD Signal Analyzer	(Requires option 09)
JD748B030	LTE Advanced-FDD Signal Analyzer	(Requires options 09 and 28)
JD748B031	LTE Advanced-TDD Signal Analyzer	(Requires options 09 and 29)
JD748B040	cdmaOne/cdma2000 OTA Analyzer [4]	(Requires options 09 and 10)
JD748B041	EV-DO OTA Analyzer [4]	(Requires options 09 and 10)
JD748B042	GSM/GPRS/EDGE OTA Analyzer [4]	(Requires options 09 and 10)
JD748B043	WCDMA/HSPA+ OTA Analyzer [4]	(Requires options 09 and 10)
JD748B045	TD-SCDMA OTA Analyzer [4]	(Requires options 09 and 10)
JD748B046	Mobile WiMAX OTA Analyzer [4]	(Requires options 09 and 10)
JD748B048	LTE-FDD OTA Analyzer [4]	(Requires options 09 and 10)
JD748B049	LTE-TDD OTA Analyzer [4]	(Requires options 09 and 10)
JD748B060	RFoCPRI 614M & 1.2G Interference Analyzer [5]	(Requires option 08)
JD748B061	RFoCPRI 2.4G Interference Analyzer [5]	(Requires option 08)
JD748B062	RFoCPRI 3.1G Interference Analyzer [5]	(Requires option 08)
JD748B063	RFoCPRI 4.9G Interference Analyzer [5]	(Requires option 08)
JD748B064	RFoCPRI 6.1G Interference Analyzer [5]	(Requires option 08)
JD748B065	RFoCPRI 9.8G Interference Analyzer [5]	(Requires option 08)
JD748B200	Calibration Service for Asia, North America	
JD748B201	Calibration Service for Latin America, EMEA	
JD748B250	Warranty extension of 1 year for Asia, North America	
JD748B251	Warranty extension of 1 year for Latin America, EMEA	

Standard Accessories	
JD70050326	AC/DC Power Adapter for JD700B Series [6]
G710550335	Cross LAN Cable (1.5 m) [6]
GC73050515	USB A to B Cable (1.8 m) [6]
GC72450518	> 1 G Byte USB Memory [6]
G710550325	Rechargeable Lithium Ion Battery [6]
G710550323	Automotive Cigarette Lighter 12 V DC Adapter [6]
G710550316	Stylus Pen [6]
JD700B361	JD700B Series User’s Guide and Application Software – CD

[1] Requires dual port calibration kit

[2] Requires RFoCPRI options
[3] Highly recommended adding JD748B010
[4] Highly recommended adding G70005035x and/or G70005036x
[5] Requires proper SFP/SFP+ transceiver and optical pad
[6] Standard accessories can be purchased separately.

JD700B Series Common Options

Optional RF Power Sensors	
JD731B	Directional Power Sensor. Peak and Average power 300 to 3800 MHz
JD732B	Terminating Power Sensor. Average Power 20 to 3800 MHz
JD733A	Directional Power Sensor. Peak and Average power 150 to 3500 MHz
JD734B	Terminating power sensor, Peak Power 20 to 3800 MHz
JD736B	Terminating power sensor, Dual (Average/Peak) power 20 to 3800 MHz

Optional Optical Power Meters	
MP-60A	USB Optical Power Meter, with software, 2.5 mm and 1.25 mm interfaces, 30" USB extender, carrying pouch
MP-80A	USB Optical Power Meter-High Power, with software, 2.5 mm and 1.25 mm interfaces, 30" USB extender, carrying pouch

Optional Calibration Kits	
JD78050509	Y- Calibration Kit Type-N(m), DC to 6 GHz, 50 Ω
JD78050510	Y- Calibration Kit DIN(m), DC to 6 GHz, 50 Ω
JD78050507	Dual Port Type-N 6 GHz Calibration Kit
JD78050508	Dual Port DIN 6 GHz Calibration Kit

Optional Fiber Microscope Kits	
FBP-SD101	FBP-P5000i Digital Probe, FiberChekPRO SW, Case, and Tips
FBP-MTS-101	FBP-P5000i Digital Probe, FiberChekPRO SW, Case, and Tips
FIT-SD103	FBP-P5000i Digital Probe, MP-60 USB Power Meter, FiberChekPRO SW, Case, Tips and Adapters
FIT-SD103-C	FBP-P5000i Digital Probe, MP-60 USB Power Meter, FiberChekPRO SW, Case, Tips and Adapters
FIT-SD113	FBP-P5000i Digital Probe, MP-60 USB Power Meter, FiberChekPRO SW, Case, Tips and Adapters

Optional RF Cables	
G710050530	RF Cable DC to 8 GHz Type-N(m) to Type-N(m), 1.0 m
G710050531	RF Cable DC to 8 GHz Type-N(m) to Type-N(f), 1.5 m
G710050532	RF Cable DC to 8 GHz Type-N(m) to Type-N(f), 3.0 m
G710050533	RF Cable DC to 18 GHz Type-N(m) to SMA(m), 1.5 m
G710050534	RF Cable DC to 18 GHz Type-N(m) to QMA(m), 1.5 m
G710050535	RF Cable DC to 18 GHz Type-N(m) to SMB(m),1.5 m
G710050536	RF Cable DC to 6 GHz Type-N(m) to DIN(f), 1.5 m
G700050540	Phase-Stable RF Cable w Grip DC to 6 GHz Type-N(m) to Type-N(f), 1.5 m
G700050541	Phase-Stable RF Cable w Grip DC to 6 GHz Type-N(m) to DIN(f), 1.5 m

Optional RF Omni Antennas		
G700050353	RF Omni Antenna	Type-N(m), 806 MHz to 896 MHz
G700050354	RF Omni Antenna	Type-N(m), 870 MHz to 960 MHz
G700050355	RF Omni Antenna	Type-N(m), 1.71 GHz to 2.17 GHz

G700050356	RF Omni Antenna	Type-N(m), 720 MHz to 800 MHz
G700050357	RF Omni Antenna	Type-N(m), 2.3 GHz to 2.7 GHz

Optional RF Yagi Antennas		
G700050363	RF Yagi Antenna	Type-N(f), 1.75 GHz to 2.39 GHz, 9.8 dBd
G700050364	RF Yagi Antenna	Type-N(f), 806 MHz to 896 MHz, 10.2 dBd
G700050365	RF Yagi Antenna	Type-N(f), 866 MHz to 960 MHz, 10.2 dBd
G700050366	RF Yagi Antenna	SMA(f), 700 MHz to 4 GHz, 1.85 dBd

Optional RF Adapters	
G700050571	Adapter Type-N(m) to DIN(f), DC to 7.5 GHz, 50 Ω
G700050572	Adapter DIN(m) to DIN(m), DC to 7.5 GHz, 50 Ω
G700050573	Adapter Type-N(m) to SMA(f) DC to 18 GHz, 50 Ω
G700050574	Adapter Type-N(m) to BNC(f), DC to 4 GHz, 50 Ω
G700050575	Adapter Type-N(f) to Type-N(f), DC to 18 GHz, 50 Ω
G700050576	Adapter Type-N(m) to DIN(m), DC to7.5 GHz, 50 Ω
G700050577	Adapter Type-N(f) to DIN(f), DC to 7.5 GHz, 50 Ω
G700050578	Adapter Type-N(f) to DIN(m), DC to 7.5 GHz, 50 Ω
G700050579	Adapter DIN(f) to DIN(f), DC to 7.5 GHz, 50 Ω
G700050580	Adapter Type-N(m) to Type-N(m), DC to 11 GHz, 50 Ω
G700050581	Adapter N(m) to QMA(f), DC to 6.0 GHz, 50 Ω
G700050582	Adapter N(m) to QMA(m), DC to 6.0 GHz, 50 Ω

StrataSync Subscription	
SS-CA-BSA-AM-01	StrataSync for CellAdvisor BSA - Asset Management-1 Yr.
SS-CA-BSA-TDM-01	StrataSync for CellAdvisor BSA - Test Data Management-1 Yr.
SS-CA-RFA-AM-01	StrataSync for CellAdvisor RFA - Asset Management-1 Yr.
SS-CA-RFA-TDM-01	StrataSync for CellAdvisor RFA - Test Data Management-1 Yr.
SS-CA-SA-AM-01	StrataSync for CellAdvisor SA - Asset Management-1 Yr.
SS-CA-SA-TDM-01	StrataSync for CellAdvisor SA - Test Data Management-1 Yr.

Optional Miscellaneous	
G710050581	Attenuator 40 dB, 100 W, DC to 4 GHz (Unidirectional)
G710050585	RF Directional Coupler, 700 to 4000 MHz, 30 dB, 50 W Input/Output; Type-N(m) to Type-N(f), Tap Off; Type-N(f) [1]
G710050586	RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) [1]
G710050587	4x1 RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) [2]
JD74050341	Soft carrying case
JD71050342	Hard Carrying Case
JD70050342	Hard Carrying Case with wheels
JD70050343	CellAdvisor Backpack Carrying Case
JD70050006	USB Bluetooth Dongle and 5 dBi Dipole Antenna
G710550324	External Battery Charger
JD700B362	JD700B Series User's Guide – Printed Version

[1] Highly recommended for LTE testing
[2] Highly recommended for LTE Advanced testing

Appendix J – RoHS information

This appendix describes the RoHS (Restriction of Hazardous Substances) information, which is a mandatory requirement from China. The RoHS directive consists in the restriction on the use of certain hazardous substances in electrical or electronic equipment sold or used in the European Union, after July 1, 2006. These substances are: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers.

JD780B series

Concerned products : JD785B, JD786B, JD788B

“中国 RoHS”

《电子信息产品污染控制管理办法》（信息产业部，第 39 号）

附录 (Additional Information required for the Chinese Market only)

本附录按照“中国 RoHS”的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

产品系列: **JD780B**
(Product Family)

环保使用期限：

本标识标注于产品主体之上，表明该产品或其配件含有有毒、有害物质（详情见下表）。

其中的数字代表在正常操作条件下至少在产品生产日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。

有关正常操作条件，请参见产品用户手册。

产品生产日期请参见产品的原始校准证书。

有毒、有害物质的类型和所在部件

	有毒、有害物质和元素					
元器件 (Component)	铅(Pb)	汞 (Hg)	镉(Cd)	六价铬(CR^{6+})	多溴联苯(PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	O	O	O	O	O
内部配线 (Internal wiring)	O	O	O	O	O	O
显示器 (Display)	O	O	O	O	O	O
键盘 (Keypad)	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O
电工零件 (Electro-mechanical parts)	O	O	O	O	O	O
金属外壳零件和紧扣件 (Metal case parts and fixings)	O	O	O	O	O	O
塑料外壳零件 (Plastic case parts)	O	O	O	O	O	O
标签和胶带 (Labels and tapes)	O	O	O	O	O	O
配件 (Accessories)						
外接电缆和适配器 (External cables and adapters)	X	O	O	O	X	X
USB 记忆 (USB Memory)	X	O	O	O	O	O
手册和其它印刷材料 (Handbooks and other printed material)	O	O	O	O	O	O
包装箱和携带 (Carrying case and strap)	O	O	O	O	O	O
其它配件 (Other accessories)	X	O	O	O	X	X
AC/ DC 电源适配器 (AC/DC Power Adapters)	O	O	O	O	O	O
O：代表该部分中所有均质材料含有的该有毒、有害物质含量低于 SJ/T11363-2006 标准的限值。						
X：代表该部分中所有均质材料含有的该有毒、有害物质含量高于 SJ/T11363-2006 标准的限值。						

JD740B series

Concerned products : JD745B, JD746B, JD748B

"中国 RoHS"

《电子信息产品污染控制管理办法》（信息产业部，第 39 号）

附录 (Additional Information required for the Chinese Market only)

本附录按照"中国 RoHS"的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

产品系列: **JD740B**
(Product Family)

环保使用期限：

本标识标注于产品主体之上，表明该产品或其配件含有有毒、有害物质（详情见下表）。

其中的数字代表在正常操作条件下至少在产品生产日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。

有关正常操作条件，请参见产品用户手册。

产品生产日期请参见产品的原始校准证书。

有毒、有害物质的类型和所在部件

	有毒、有害物质和元素					
元器件 (Component)	铅(Pb)	汞 (Hg)	镉(Cd)	六价铬(CR^{6+})	多溴联苯(PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	O	O	O	O	O
内部配线 (Internal wiring)	O	O	O	O	O	O
显示器 (Display)	O	O	O	O	O	O
键盘 (Keypad)	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O
电工零件 (Electro-mechanical parts)	O	O	O	O	O	O
金属外壳零件和紧扣件 (Metal case parts and fixings)	O	O	O	O	O	O
塑料外壳零件 (Plastic case parts)	O	O	O	O	O	O
标签和胶带 (Labels and tapes)	O	O	O	O	O	O
配件 (Accessories)						
外接电缆和适配器 (External cables and adapters)	X	O	O	O	X	X
USB 记忆 (USB Memory)	X	O	O	O	O	O
手册和其它印刷材料 (Handbooks and other printed material)	O	O	O	O	O	O
包装箱和绑带 (Carrying case and strap)	O	O	O	O	O	O
其它配件 (Other accessories)	X	O	O	O	X	X
AC/ DC 电源适配器 (AC/DC Power Adapters)	O	O	O	O	O	O

O：代表该部分中所有均质材料含有的该有毒、有害物质含量低于 SJ/T11363-2006 标准的限值。

X：代表该部分中所有均质材料含有的该有毒、有害物质含量高于 SJ/T11363-2006 标准的限值。

Appendix K – On-screen keyboard

You can use the on-screen keyboard to type in texts, file names, and folder names.

Adding or deleting letters

Procedure

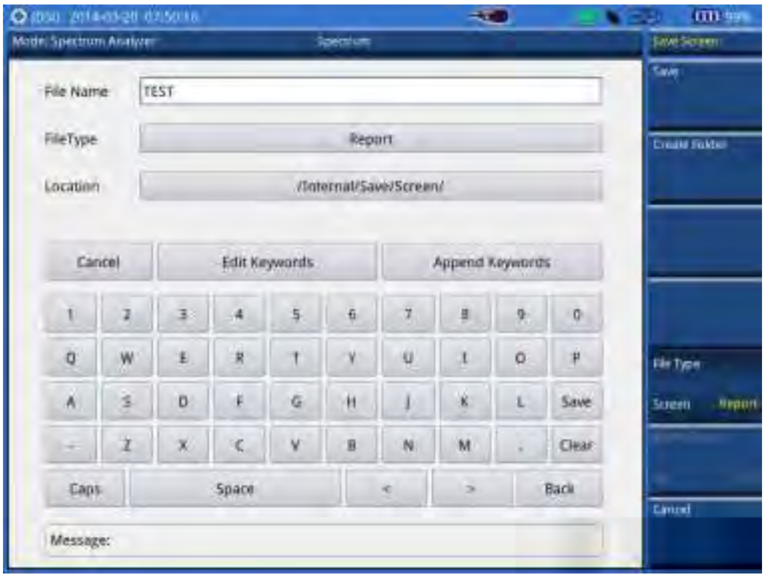
8 Tap keys on the on-screen keyboard. As you type, each letter is displayed in the name field. If you want to change the letter case between uppercase and lowercase, tap the **Caps** key.

9 To delete a letter, tap the **Back** key on the keyboard or press the backspace key on the keypad.

10 To move the cursor along the name field, tap the **<** or **>** key, turn the rotary knob, or touch in between letters in the name field.

11 To delete all the letters displayed in the name field, tap the **Clear** key on the on-screen keyboard.

Figure 288 On-screen keyboard



Editing or adding a custom keyword

You can edit and delete a keyword or add a new one, as you desire.

Procedure

1 Tap the **Edit Keywords** bar on the on-screen keyboard.
The edit keywords keyboard appears.

2 To edit a keyword, select the keyword box and then change the letters.

3 To delete a keyword, select the keyword box and then tap the **Clear** key.

4 To add a keyword, select a blank keyword box and then type in a keyword.

5 Tap the **Save** key on the keyboard to save and continue saving.

Figure 289 Edit keywords keyboard

Appending a keyword

You can append a factory-stored or custom-defined keyword, as you want.

Procedure

1 Tap the **Append Keywords** bar on the on-screen keyboard.
The append keywords window appears.

2 To append a keyword, complete the following steps:

a Select the keyword tag button to view available keywords for the tag.

b Select one keyword, from the following choices for each keyword tag:

Keyword tag	Keyword (tag value)
Site-ID*	SiteA, SiteB, and SiteC
Sector*	Alpha, Beta, and Gamma
Technology*	GSM900, WCDMA850, and LTE180
Test Type*	RL, VSWR, DTF-RL, DTF-VSWR, and CL
Termination*	Open, Load, and Antenna
Custom	Any keywords you have added

c To delete the keyword you have added to the keyword field, tap the **Delete** button.

d To clear the keyword field, tap the **Clear** button.

3 *Optional*. You can edit any of the custom keyword tags or tag values by tapping the **Edit Tags Values** or **Edit Tags** button, but not the factory keyword tags marked with the asterisk (*).

> **NOTE**
> You must keep the keywords marked with the asterisk (*) intact as the StrataSync server uses them when transferring data.

4 Select the **Separator** option from the choices: hyphen **[-]**, underscore **[_]**, and **None**.

5 Select the **As a filename** option between **On** and **Off**. If you select **Off**, the keyword will not be placed in a file name, but in the trace/PNG file information.

6 Tap the **Save and Exit** button to save and exit or the **Keyboard** button to return to the keyboard.

Figure 290 Append keywords window

JDSU

Network and Service Enablement Regional Sales

North America	Latin America	Asia Pacific	EMEA	www.jdsu.com
Toll Free: 1 855 ASK JDSU	Tel: +55 11 5503 3800	Tel: +852 2892 0990	Tel: +49 7121 86 2222	
Tel: +1 240 404 2999	Fax:+55 11 5505 1598	Fax:+852 2892 0770	Fax:+49 7121 86 1222	
Fax:+1 240 404 2195				

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