User's and Programming Guide

Agilent Technologies
ESG Family Signal Generators Option 200
Fully Coded 3GPP W-CDMA Personality

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1 The Fully Coded W-CDMA Personality

This guide provides information specific to the Option 200 Fully Coded W-CDMA personality. This chapter contains an overview of Option 200.

NOTE   This option requires the installation of Option UN8 (hardware Revision C or greater), Real-Time Baseband Generator. Refer to the Option UN8 user's and programming guide for information.

Overview

The Option 200 personality provides fully coded signals for W-CDMA, compliant to the following 3GPP Technical Specifications:

- downlink (base station simulation) 3G TS 25.101 V3.5 (2000-12)[1]

- uplink (user equipment simulation) 3G TS 25.141 V3.4 (2000-12)

This option supports pre-configured reference measurement channels for conformance testing, special channels (UDI 64k, multiple-block UDI ISDN, and AMR speech) for service verification, physical channels with user-configurable fields, and editing capability of transport channels.

Downlink Channels

The signal generator in the downlink mode supports the following channels:

NOTE	The synchronization channel (SCH) is a downlink signal used for cell search. The SCH consists of two sub channels, the primary synchronization channel (P-SCH) and the secondary synchronization channel (S-SCH). The 10 ms radio frames of the P-SCH and S-SCH are divided into 15 slots, each 2560-chips long.

P-SCH	The P-SCH consists of a modulated code, 256-chips long, transmitted once every slot. The primary synchronization code is the same for every cell in the system.
S-SCH	The S-SCH consists of a repeating synchronization code sequence transmitted in parallel with the P-SCH. The sequence is 15 slots in length, consisting of modulated codes, each 256-chips long and indicating to which of the code groups the cell's downlink scrambling code belongs.
CPICH	The common pilot channel is a fixed rate physical channel that carries a pre-defined bit/symbol sequence.
P-CCPCH	The primary common control physical channel is a fixed rate physical channel used to carry the broadcast transport channel (BCH) and the incrementing system frame number (SFN).
PICH	The paging indicator channel is a fixed rate physical channel used to carry the paging indicators (PI).
OCNS	The orthogonal coded noise source is required so that the total power spectral density of the base station (BS) is 0 dB.

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1. The 3GPP W-CDMA user equipment performance tests described in this manual conform to 3G TS 25.101 v3.3 (2000-06). For information on the additional equipment required to perform receiver tests conforming to 3G TS 25.101 v3.5 (2000-12), call your nearest Agilent Technologies Sales and Service office.

DPCH   The dedicated physical channel contains a time multiplex of a dedicated physical data channel (DPDCH) and a dedicated physical control channel (DPCCH). Refer to Figure 1-1.

This downlink mode supports slot formats 0–16 for DPDCH channels with editing capability.

Within the DPCCH channel, the transmit power control (TPC) field enables the user to select a pattern of commands to vary the power level and also has trigger output capability. In addition, user arbitrary pattern files are supported. The transport format combination indicator (TFCI) accepts 10 bit user inputs (default value 0000000000).

The user can configure up to four QPSK W-CDMA channels simultaneously or the required synchronization channels (PSCH, SSCH, CPICH, PCCPCH) on a single ESG. The actual number of channels supported on a single ESG depends upon the selected channel types and their associated power levels.

The two-ESG configuration combines the baseband outputs to support both data and synchronization channels. See "Two ESG Downlink Measurement Setup" on page 2-6. Using two ESGs, a stimulus can be provided to perform bit error rate analysis of user equipment (UE) designs based on the requirements outlined in the 3GPP specification. Baseband signals are combined to provide the required 3GPP conformance test channels. The amplitude and carrier frequency of each ESG are independent to allow for adjacent channel selectivity, intermodulation response rejection, and blocking tests. With the same configuration, two phones can be tested simultaneously for increased throughput.

Figure 1-1   Example Downlink DPCH Coding
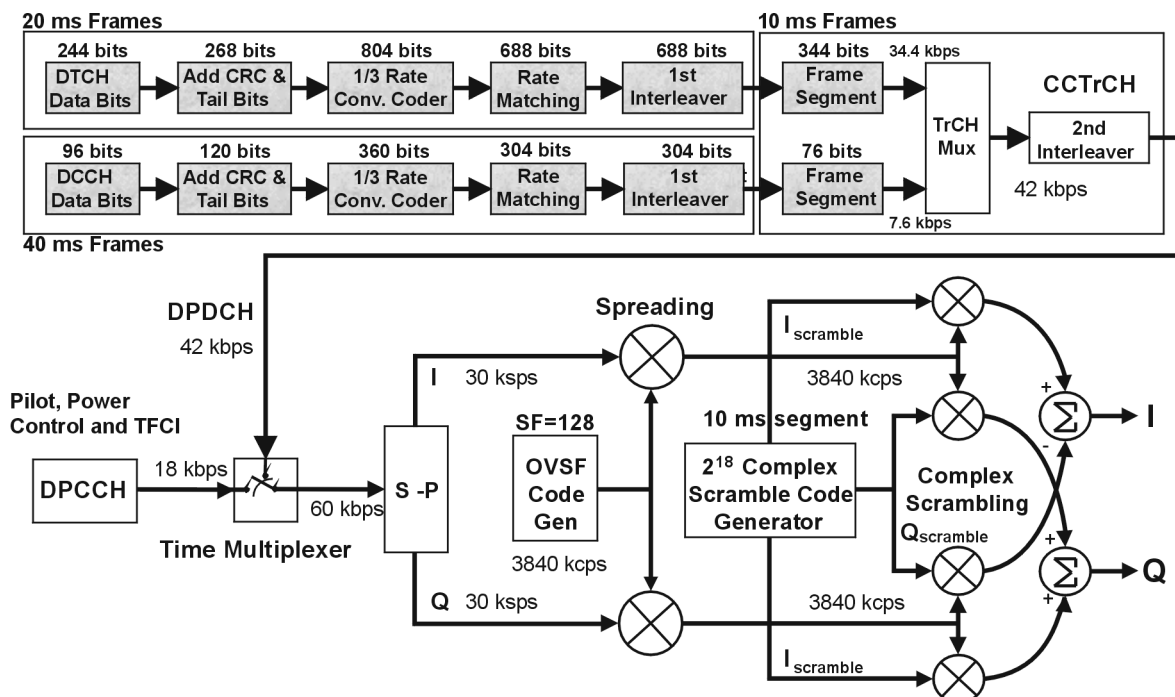
NOTE: Shaded areas of the graphic indicate pre-calculated values based on the user's collection of data and coding parameters. Multiplexing, scrambling and spreading are done real-time.

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Uplink Channel

The signal generator in the uplink mode supports the following channels:

DPCCH The dedicated physical control channel carries the layer 1 control information. This channel is code multiplexed onto the I and Q channels using BPSK modulation. A typical configuration for the associated DPCCH runs at 15 ksps with 10 bits in each timeslot.

This mode supports slot formats 0 to 5 for DPCCH channel with editing capability. Refer to Table 4-10.

Within the DPCCH channel, the transmit power control (TPC) field enables the user to select a pattern of commands to vary the power level and also has trigger output capability. In addition, user arbitrary pattern files are supported. The transport format combination indicator (TFCI) accepts a 10 bit user pattern (default value 0000000000). The feedback information (FBI) bit is used for closed loop transmit diversity or to select the base station when in soft handoff conditions. Given its 15 kbps rate, the DPCCH has 10 bits available in each slot which are allocated for the pilot bits, TFCI bits, FBI bits, and TPC bits, according to the slot format selection. In the case of slot format 2, 5 bits are allocated for the embedded Pilot channel, 2 bits for TPC, 1 bit for FBI, and 2 bits for optional TFCI.

DPDCH The dedicated physical data channel carries whatever transport channel data is mapped to it. The data rates on the DPDCH are multiples of the base rate of 15 kbps. These data rates are after error coding, rate matching, and multiplexing of transport channels. Each data rate configuration is identified by a slot format number. This channel is code multiplexed onto the I and Q channels using the BPSK modulation. A typical DPDCH running at 60 ksps has 40 data bits in each 667 microsecond timeslot.

This mode supports slot formats 0 to 6 for DPDCH channel with editing capability. Refer to Table 4-11.

When compared with the downlink DPCCH and DPDCH coding, the uplink DPCCH and DPDCH coding are individually made as shown in Figure 1-2.

Figure 1-2 Uplink DPCCH and DPDCH Coding
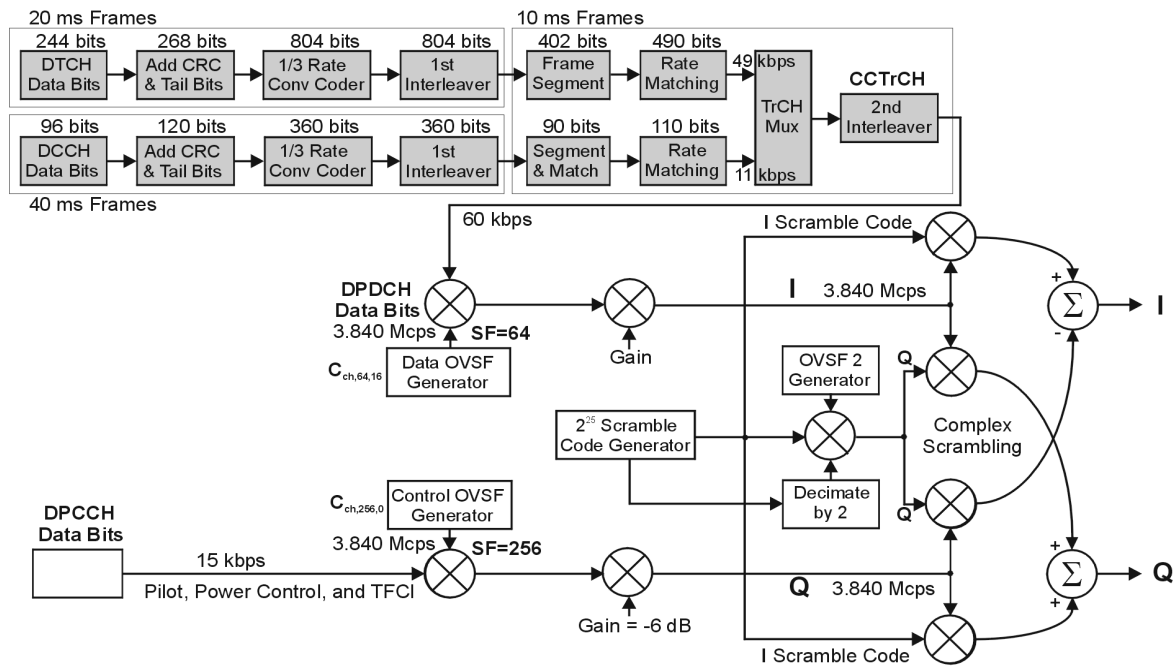
NOTE: Shaded areas of the graphic indicate pre-calculated values based on the user's collection
of data and coding parameters. Multiplexing and spreading are done real time.

w_ul_air_if

2   Using Functions

This chapter provides information on how to use functions that are unique to Option 200 ESG Family signal generators. The chapter is divided into the following sections:

- "Single ESG Downlink Measurement Setup" on page 2-2
- "Two ESG Downlink Measurement Setup" on page 2-6
- "3GPP W-CDMA User Equipment Performance Tests" on page 2-18
- "Uplink Measurement Setup" on page 2-76
- "3GPP W-CDMA Base Station Performance Testing" on page 2-79
- "Troubleshooting" on page 2-115

You can configure Option 200 using either one or two signal generators.

A setup using a single ESG to test a subset of receiver parameters is provided on page 2-2.

A dual-output setup using two ESGs to test W-CDMA receiver designs is provided on page 2-6.

For 3GPP performance testing configurations, see "Two ESG Downlink Measurement Setup" on page 2-6.

The material in this chapter is presented with the assumption that you have a working knowledge of the ESG. For basic operating information, refer to the quick start guide and user's guide.

For information on the operational theory of Option 200, refer to chapter 4.

NOTE   References to preset refer to normal, factory preset conditions (**Utility** > **Power On/Preset** > **Normal**), *not* user preset.

Hardkeys and softkeys are denoted by **Bold** text; data fields within a setup editor are denoted by `Courier Font`.

Examples:

I/Q > **I/Q Source (Ext I/Q)** > **Int I/Q**

Hardkey   Softkey   Data Field

Mode > **CDMA** > **W-CDMA** > **BS Setup** > `Filter`
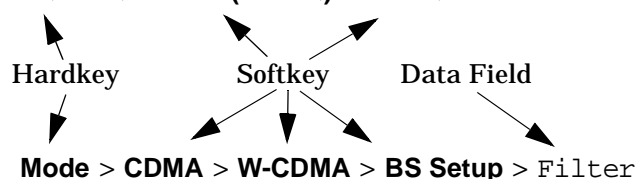
Single ESG Downlink Measurement Setup

This setup provides four 3GPP channels with fully coded signal generation capability, which can be used to test a subset of 3GPP receiver parameters (such as receiver control or data transmission and code domain power adjustment).

Required Equipment

- one ESG-D/DP Family Signal Generator with Option 200

- one E4406A VSA Series Transmitter Tester with Option BAF

- BNC cables as needed

Refer to Figure 2-1 and make the necessary connections between the ESG and the E4406A.

Figure 2-1 ESG Downlink Equipment Setup
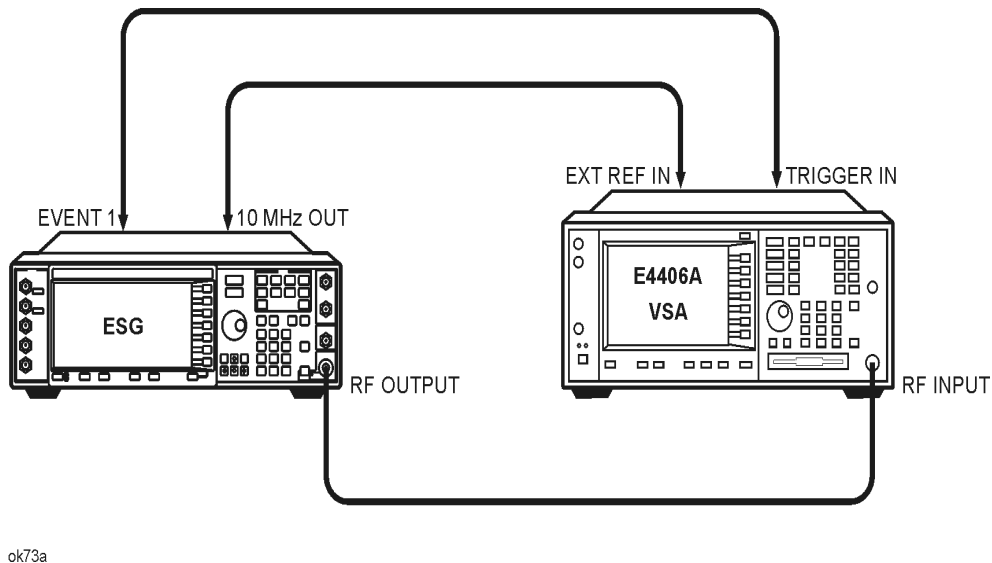
ok73a

Configuring the ESG

NOTE   The following signal generator settings are used for example purposes. Change them as needed for your device under test (DUT).

---

1. Press **Preset**.

2. Press **Frequency** > **2.14** > **GHz** then press **Amplitude** > **–30** > **dBm**.

3. Press **Mode** > **Real-time I/Q BaseBand** (if it appears) > **CDMA** > **W-CDMA**.

4. Press **BS Setup**.

This opens the base station (BS) setup editor. The highlight bar can be moved by rotating the front panel knob or pressing the arrow keys.

The following default values are displayed.

Filter   RNYQ (root Nyquist)

Chip Rate   3.840000 Mcps

Scrambling Code   0

5. Press **Return** to reopen the W-CDMA menu.

6. Press the **Link Control** softkey.

This opens the Link Control setup editor and a predefined configuration is enabled. Refer to the following table.

Table 2-1 Predefined Downlink W-CDMA Physical Layer Configuration

Channel	Parameter	Setting
1	PhyCH Type	PSCH
	Power	−8.30 dB
2	PhyCH Type	SSCH
	Power	−8.30 dB
	Secondary Scramble Code Group	0
3	PhyCH Type	P-CCPCH
	Power	−5.30 dB
	Channel Code	1
	BCH Data	0000
4	PhyCH Type	CPICH
	Power	−3.30 dB
	Channel Code	0

7. Press **Adjust Code Domain Power** > **Scale To 0dB**.

Notice that the power levels have changed on each channel. This has scaled the channel power levels to the proper amplitudes for transmission (the sum of the new power levels equals zero). The power ratios between the channels remain unchanged.

NOTE   Adjusting the code domain power applies to active channels only.

8. Press **W-CDMA Off On**. On is now highlighted and the `WCDMA` and `I/Q` annunciators are displayed.

9. Activate the RF output power by pressing **RF On/Off** until `the RF ON` annunciator is displayed.

Configuring the E4406A Option BAF VSA Series Transmitter Tester

This section explains how to set up the E4406A Option BAF VSA to display the downlink stimulus configured in the previous section.

Perform the following steps to view the code domain display:

1. Press **Preset**.

2. Set the VSA to use an external reference and ensure that it is set to 10 MHz.

   Press: **System** > **Reference** > **Freq Ref Int Ext** > **10** > **MHz**

   Ext is now underscored.

3. Choose the W-CDMA option.

   Press: **Mode** > **More (1 of 2)** > **W-CDMA (3GPP)**

4. Set the VSA to receive a base station signal.

   Press: **Mode Setup** > **Radio** (ensure that **BTS** is underscored)

5. Set the center frequency to 2.14 GHz.

   Press: **FREQUENCY** > **Center Freq** > **2.14** > **GHz**
   Press: **SPAN** > **10** > **MHz**

6. Select code domain measurement.

   Press: **MEASURE** > **More (1 of 2)** > **Code Domain**

7. Adjust the code domain spread code range.

   Press: **SPAN** > **Scale/Div** > **64**

NOTE   Ensure that the center frequency is set appropriately for your DUT.

The following figure shows the VSA code domain display.

Two ESG Downlink Measurement Setup

This setup provides the capability to test 3GPP receiver designs for capability to test adjacent channel selectivity, blocking, intermodulation, maximum input, receiver sensitivity, and spurious response.

The following example configures a 3GPP receiver test stimulus.

Required Equipment

- two ESG-D Family Signal Generators with Option 200 and UN8
- one E4406A VSA Series Transmitter Tester with Option BAF
- one function generator (with an external frequency reference input or a 10 MHz frequency reference output) capable of providing an external ESG data clock input with the following characteristics:
  - wave type: square
  - amplitude: 2.5 V_{rms}
  - frequency: 3.84 MHz
  - DC offset: +1.25 V
- 13 BNC cables (long, equal lengths)
- 6 BNC cables (short, equal lengths)
- 6 BNC tee splitters
- 3 BNC to BNC connectors
- 3 Type-N to BNC adapters (for ESG and VSA RF Output)

System Configuration Process

The two-ESG system configuration process is divided into the following subsections:

Connect the Equipment

1. Refer to Figure 2-2 and connect the two ESGs as shown:

NOTE   This denotes a short cable. ▬▬▬▬▬▬

This denotes a long cable. ▬▬▬▬▬

Figure 2-2 ESG Downlink Equipment Setup
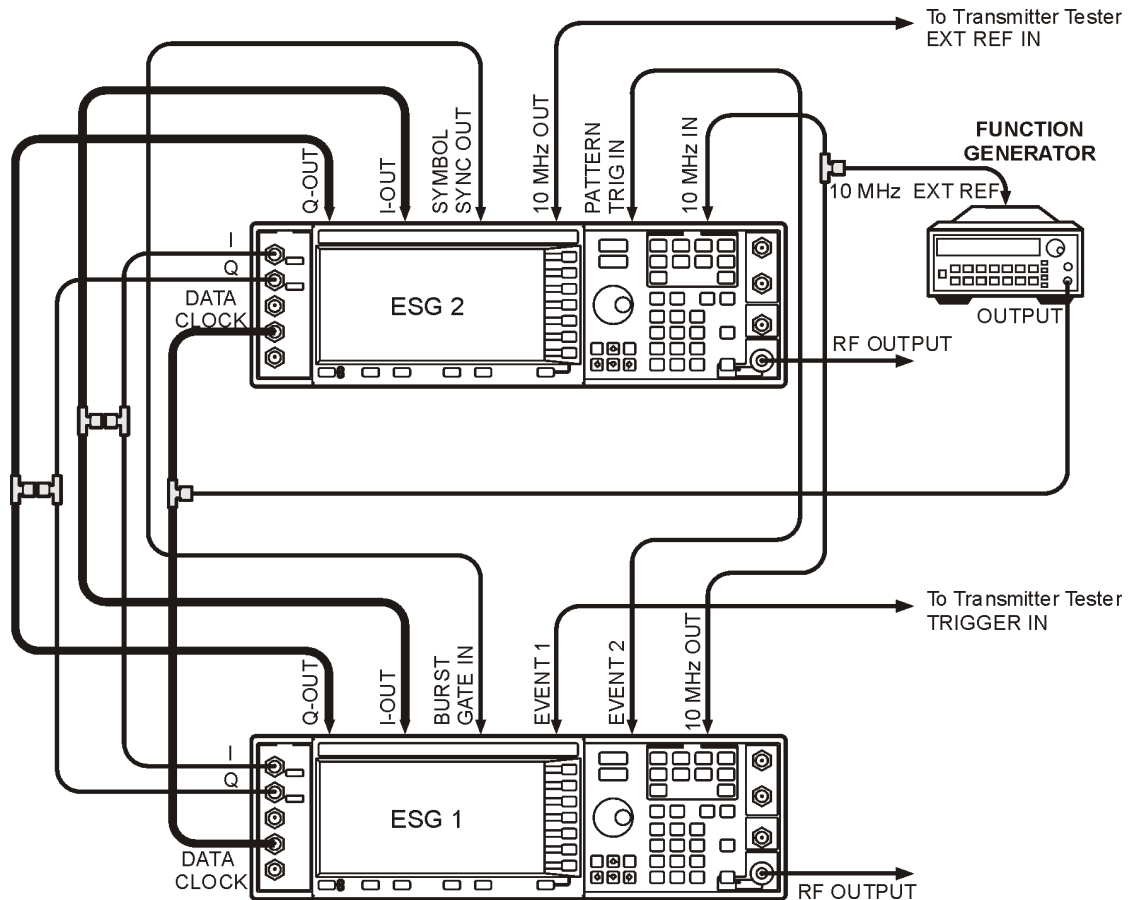
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2. Turn on the function generator and set the following characteristics:

wave type:	square wave
amplitude:	2.5 V$_{rms}$
frequency:	3.84 MHz
DC offset:	+1.25 V

3. Turn on the signal generators and the transmitter tester.

The W-CDMA Configuration

The following tables summarize the signal generator's parameter settings for the W-CDMA configuration. This predefined configuration is later modified to provide the stimuli for several W-CDMA performance tests described in the section entitled, "3GPP W-CDMA User Equipment Performance Tests" on page 2-18.

Table 2-2 Predefined W-CDMA Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	–8.30 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	–8.30 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	–5.30 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	–3.30 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	–10.30 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Transport CH (See Table 4-12.)
	Symbol Rate	7.500 ksps
	TFCI Pattern	0000000000 (Arbitrary Value)
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0 (Arbitrary Value)
ESG 2 Channel 2	Channel State	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	–8.30 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State	Off

Table 2-3 Predefined W-CDMA Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup (For details, see Table 4-12.)	12.20 kbps

Table 2-4 Predefined W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BTS Setup (both ESGs)	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock (both ESGs)	Ext
Phase Polarity	ESG 1: Normal ESG 2: Normal
Two ESG Setup (Relative Power Mapping)	ESG 1: enter values as required (See page 2-14.) ESG 2: enter values as required
W-CDMA Off/On (both ESGs)	On

Table 2-5 Predefined W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency	2140.00 MHz (ESG 1) (Arbitrary Value) 2140.00 MHz (ESG 2) (Arbitrary Value)
Amplitude	−80.00 dBm (ESG 1) −52.00 dBm (ESG2)
RF Off/On	On (ESG 1) Off (ESG 2)
Mod Off/On (both ESGs)	On
I Q Int/Ext	Ext

Configure ESG 1

1. Press **Preset**.

2. Press **Frequency** > **2.14** > **GHz** then press **Amplitude** > **–80** > **dBm**.

3. Press **Mode** > **Real-time I/Q BaseBand** (if it appears) > **CDMA** > **W-CDMA** > **BBG Data Clock Ext Int**.

4. Press **BS Setup**.

   This opens the base station (BS) setup editor. The highlight bar can be moved by rotating the front panel knob or pressing the arrow keys.

   The following default values are displayed.

Filter	RNYQ (root Nyquist)
Chip Rate	3.840000 Mcps
Scrambling Code	0

NOTE Both ESGs must have the same parameter settings.

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5. Press **Return** to reopen the W-CDMA menu.

6. Press the **Link Control** softkey.

   This opens the Link Control setup editor and a predefined configuration is enabled. Refer to the following table.

Table 2-6 Predefined Downlink W-CDMA Physical Layer Configuration

Channel	Parameter	Setting
1	PhyCH Type	PSCH
	Power	–8.30 dB
2	PhyCH Type	SSCH
	Power	–8.30 dB
	Secondary Scramble Code Group	0
3	PhyCH Type	P-CCPCH
	Power	–5.30 dB
	Channel Code	1
	BCH Data	0000
4	PhyCH Type	CPICH
	Power	–3.30 dB
	Channel Code	0

7. Press **Return** to reopen the W-CDMA menu.

Configure ESG 2

1. Press **Preset**.

2. Press **Frequency** > **2.14** > **GHz** and then **Amplitude** > **–52** > **dBm**.

3. Press **Mode** > **Real-time I/Q BaseBand** (if it appears) > **CDMA** > **W-CDMA** > **BBG Data Clock Ext Int**.

4. Press **BS Setup**.

   This opens the base station (BS) setup editor. The highlight bar can be moved by rotating the front panel knob or pressing the arrow keys.

   The following default values are displayed.

Filter	RNYQ (root Nyquist)
Chip Rate	3.840000 Mcps
Scrambling Code	0

NOTE   Both ESGs must have the same parameter settings.

---

5. Press **Return** to reopen the W-CDMA menu.

6. Press the **Link Control** softkey.

This opens the Link Control setup editor and a predefined configuration is enabled. Refer to the following table.

Table 2-7 Predefined Downlink W-CDMA Physical Layer Configuration

Channel	Parameter	Setting
1	PhyCH Type	PSCH
	Power	−8.30 dB
2	PhyCH Type	SSCH
	Power	−8.30 dB
	Secondary Scramble Code Group	0
3	PhyCH Type	P-CCPCH
	Power	−5.30 dB
	Channel Code	1
	BCH Data	0000
4	PhyCH Type	CPICH
	Power	−3.30 dB
	Channel Code	0

7. Press the following key sequences to configure the individual channels:

   a. **2** > **Enter** > **Channel State Off On** (**Off** is now highlighted)

   b. **4** > **Enter** > **Channel State Off On** (**Off** is now highlighted)

   c. **1** > **Enter** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Power > **–10.3** > **dB** > Data >
       Edit Item > **Transport CH** > Slot Format > **11** > **Enter** > **Apply Channel Setup**

   The following figure displays the channel setup.

   d. **3** > **Enter** > **PhyCH Type** > **PICH** > **PhyCH Setup** > Power > **–8.3** > **dB** >
       Apply Channel Setup

   The following figure displays the channel setup.

8. Press **Return** to reopen the W-CDMA menu.

Adjust the Relative Power Mapping

Once the signal generators are configured as described in the previous steps, follow the steps in this section to perform the relative power mapping procedure. Relative power mapping assures proper channel power levels between the two ESGs and an overall code domain power of 0 dB. For more information, see "Understanding Relative Power Mapping" on page 4 -24.

1. To adjust the relative power mapping, return to the W-CDMA menu.
   Press **More (1 of 2)** > **2 Box Setup** on both ESGs.

2. The percent power adjustment sets the parameters that will allow the scale to 0 dB function to scale all channels to 0 dB. This aligns the displayed power of both ESGs to match the code domain measurement values on the transmitter tester. To adjust percent power:

   a. On ESG 1, highlight the `% Power Other ESG:` data field and enter the `% Power This ESG` value from ESG 2. Press **Enter** to terminate the entry.

   b. On ESG 2, highlight the `% Power Other ESG:` data field and enter the `% Power This ESG` value from ESG 1. Press **Enter** to terminate the entry.

ESG 2

a. Enter this value here.

b. Enter this value here.

ESG 1

3. The individual ESG voltage adjustments are made to align the channel voltages between the signal generators by making adjustments to the I/Q voltage scale. While this scales the channels relative to each other, the total sum may be greater or less than 0 dB. To adjust total voltage:

   a. On ESG 1, highlight the `Voltage Other ESG:` data field and enter the `Voltage This ESG` value from ESG 2. Press **Enter** to terminate the entry.

   b. On ESG 2, highlight the `Voltage Other ESG:` data field and enter the `Voltage This ESG` value from ESG 1 into the `Voltage Other ESG:` data field on ESG 2. Press **Enter** to terminate the entry. The resulting I/Q voltage scale is displayed on the ESGs.

4. To scale the overall code domain power to 0 dB, press **Scale to 0dB** on both ESGs. The voltage and power values may change to reflect the power scaling. Press **Return** on *both* ESGs to open the W-CDMA menu.

NOTE   Pressing **Scale To 0 dB** on both ESGs scales the individual channel power levels so that the *sum of the code domain power generated by both ESGs* equals 0 dB. This does not change the total, as set by the amplitude key.

Generate the Signal at the RF Output

Perform the following steps on both ESGs to generate a signal at the RF outputs.

1. Press **W-CDMA Off On. On** is now highlighted and the WCDMA and I/Q annunciators are displayed.

2. Press **I/Q** > **I/Q Source** > **Ext I/Q.** This sets the I/Q source to external.

3. Press **RF On/Off**. The RF ON annunciator is now displayed.

4. Connect the RF OUTPUT of ESG 2 to the RF INPUT of the VSA.

Configure the E4406A Option BAF VSA Series Transmitter Tester

This section explains how to set up the E4406A Option BAF VSA to display the downlink ESG parameters that were configured in the previous section.

Perform the following steps to show the code domain display:

1. Connect the RF OUTPUT from one of the signal generators to the RF INPUT of the transmitter tester.

2. Press **Preset**.

3. Set the VSA to use an external reference and ensure that it is set to 10 MHz.

   Press: **System** > **Reference** > **Freq Ref Int Ext** > **10** > **MHz**

   Ext is now underscored.

4. Choose the W-CDMA option.

   Press: **Mode** > **More (1 of 2)** > **W-CDMA (3GPP)**

5. Set the VSA to receive a base station signal.

   Press: **Mode Setup** > **Radio** (ensure that **BTS** is underscored)

6. Set the center frequency to 2.14 GHz and the span to 10 MHz.

   Press: **FREQUENCY** > **Center Freq** > **2.14** > **GHz**
   Press: **SPAN** > **10** > **MHz**

7. Select code domain measurement.

   Press: **MEASURE** > **More (1 of 2)** > **Code Domain**

8. Adjust the code domain spread code range.

   Press: **SPAN** > **Scale/Div** > **64**

NOTE   Ensure that the center frequency is set appropriately for your DUT.

The following figure shows the VSA code domain display.
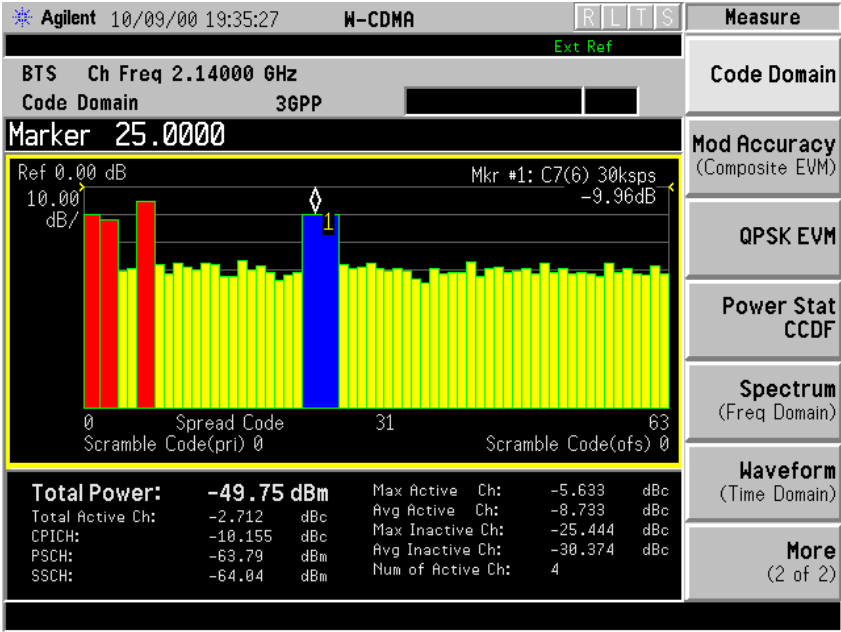
3GPP W-CDMA User Equipment Performance Tests

This section includes signal generator configurations that will provide a stimulus for bit-error-ratio analysis of user equipment (UE) designs based on the requirements outlined in the 3GPP W-CDMA specification.[1]

This section includes performance test summaries, test-specific signal generator settings, test system configurations, step-by-step instructions in the form of example test procedures, and example performance test records for testing the following performance specifications:

- "Reference Sensitivity Level (3G TS 25.101.7.3)" on page 2-21
- "Maximum Input Level (3G TS 25.101.7.4)" on page 2-28
- "Adjacent Channel Selectivity (3G TS 25.101.7.5)" on page 2-35
- "Blocking Characteristics (3G TS 25.101.7.6)" on page 2-42
- "Spurious Response (3G TS 25.101.7.7)" on page 2-57
- "Intermodulation Characteristics (3G TS 25.101.7.8)" on page 2-65
- "Spurious Emissions (3G TS 25.101.7.9)" on page 2-74[2]

NOTE   Most 3GPP specification performance tests require a dual-output, two-ESG system configuration. Before continuing, you must connect and configure the dual-output, two-ESG system. Follow the instructions detailed in "Two ESG Downlink Measurement Setup" on page 2-6.

After the system has been connected and configured, proceed to the desired performance test.

The performance test procedures based on these specifications can be performed in any order. Each test contains the required signal generator settings, test setups, and test procedures.

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1. *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06).*

2. Performance test summary and test station setup only. Detailed VSA configuration and test procedures can be found in "Chapter 3. Making W-CDMA (3GPP) Measurements" of the *Agilent Technologies E4406A VSA Series Transmitter Tester W-CDMA Measurement Guide*.

Required Equipment

The following equipment must be calibrated and must perform within the limits of its published specifications.

- two ESG signal generators configured as a dual-output, two-ESG W-CDMA mobile test solution

- E4406A VSA Series W-CDMA transmitter tester

- function generator (with an external frequency reference input) capable of providing an external ESG data clock input with the following characteristics:

  — wave type: square

  — amplitude: 2.5 V_{rms}

  — frequency: 3.84 MHz

  — DC offset: +1.25 V

- 83712B synthesized CW generator (or another signal source capable of providing CW at an amplitude range of −46 dBm to −15 dBm with an RF output frequency range of 2.11 GHz to 12.75 GHz)

- a UE test mode designed to allow the controller to assign the UE a dedicated physical channel on which to receive and demodulate the transmitted data[1]

- A system controller and software capable of providing control data to the UE

- software and/or hardware (a BER test platform) capable of measuring, calculating and storing the UE's bit error ratio (BER) while exposed to the test stimulus

- microwave frequency combiner

- BNC cables, tee splitters and adapters

- adapters and antennae as required by the UE

NOTE   All ESG signal parameters are specified at the front panel RF OUTPUT connector. Losses due to cabling and signal combining must be considered when performing the tests.

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1. The signal generator does not receive nor act upon uplink data from the UE.

ESG Physical Layer and Transport Layer Configuration

The physical layer and transport layer channelizations are configured separately. Physical layer configurations change as required for each individual performance test. The specified channel types and power levels are modified to provide the required stimulus for performing the individual performance specification tests.

The ESG provides a single-softkey solution for configuring factory-defined transport layer channelization. This predefined reference measurement channel is used as the transport layer configuration throughout the specification performance tests. For specific information regarding transport layer channelization based on this factory-defined setting, see "Understanding the Reference Measurement Channel" on page 4-18.

Reference Sensitivity Level (3G TS 25.101.7.3)

This section explains how to complete a reference sensitivity level performance test on your user equipment (UE). It includes a process definition, signal generator configurations, test system connections, abbreviations, an example test procedure and performance test record.

Specification Definition

Reference sensitivity level is a measure of the minimum receiver input power at the antenna port at which the bit error ratio does not exceed a specified value.[1]

Performance Test Objective

The objective of this performance test is to determine the Reference Sensitivity Level (RSL) performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) at a specified minimum power level measured at the UE antenna port.

Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

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1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06).*
2. Defined as the ratio dBm/3.84 Mcps.

Process

ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-8, Table 2-9, Table 2-10, and Table 2-11.

| NOTE | Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted. |

Table 2-8 RSL Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−8.3 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−8.3 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−5.3 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−3.3 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−10.3 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Ref 12 (See Table 4-12.)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	Channel State Off/On	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−8.3 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-9 RSL Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps (ESG 2)

[1] For details, see Table 4-12.

Table 2-10 RSL W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-11 RSL W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency	2140.0 MHz (ESG 1)
Amplitude[1]	–80.0 dBm (ESG 1)
RF Off/On[2]	On (ESG 1) Off (ESG 2)
Mod Off/On	On (ESG 1)

[1] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (–80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–106.7 dBm) in accordance with the 3GPP specification for this performance test.

[2] No RF output is required from ESG 2 for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA reference level sensitivity test on your UE. Complete the subsections of this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-3 Reference Level Sensitivity Equipment Setup
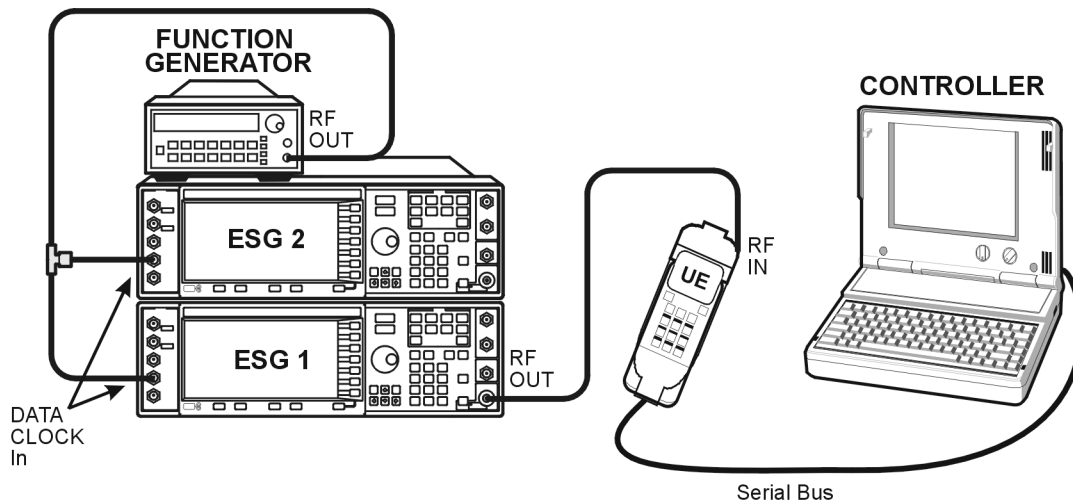
1. Connect the UE to the test system as shown in Figure 2-3.

   a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

   b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

   From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

   These call acquisition functions include:

   a. acquiring the primary synchronization channel (P-SCH),

   b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

   c. acquiring and synchronizing to the common pilot channel (CPICH),

   d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

   The controller (or BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) at an arbitrary amplitude. This process verifies that the BER of the UE is within specification prior to decreasing the amplitude of $\hat{I}_{or}$.

4. In Table 2-12, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   - If the measured value is within the limits, continue to subsection 2.

   - If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. Reference Sensitivity Level Measurement

Complete the following steps to perform a reference sensitivity level measurement on your UE.

1. Decrease the amplitude level of $\hat{I}_{or}$.

   In accordance with the 3GPP W-CDMA RF specification, decrease the amplitude of $\hat{I}_{or}$ to −106.7 dBm.

   On ESG 1: Press **Amplitude** > **−106.7** > **dBm**.

2. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) at the decreased amplitude.

   The controller (or BER test platform) is measuring the bit error ratio of the UE with an $\hat{I}_{or}$ amplitude of −106.7 dBm.

3. In Table 2-12, record the measured BER value in the column titled, "Minimum Amplitude BER Value."

4. Compare the recorded BER value in the column titled, "Minimum Amplitude BER Value" to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following table to record the data from the RSL performance test.

Table 2-12 RSL Performance Test Record

Verification BER Value	Minimum Amplitude BER Value	Specification Limitations	PASS/FAIL Status
		BER $\leq$ 0.001	

Maximum Input Level (3G TS 25.101.7.4)

This section explains how to complete a maximum input level performance test on your user equipment (UE). It includes a process definition, signal generator configurations, test system connections, abbreviations, an example test procedure and performance test record.

Specification Definition

Maximum input level is a measure of the maximum receiver input power at the antenna port, which does not degrade the specified BER performance.[1]

Performance Test Objective

The objective of this performance test is to determine the Maximum Input Level (MIL) performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) at a specified maximum power level measured at the UE antenna port.
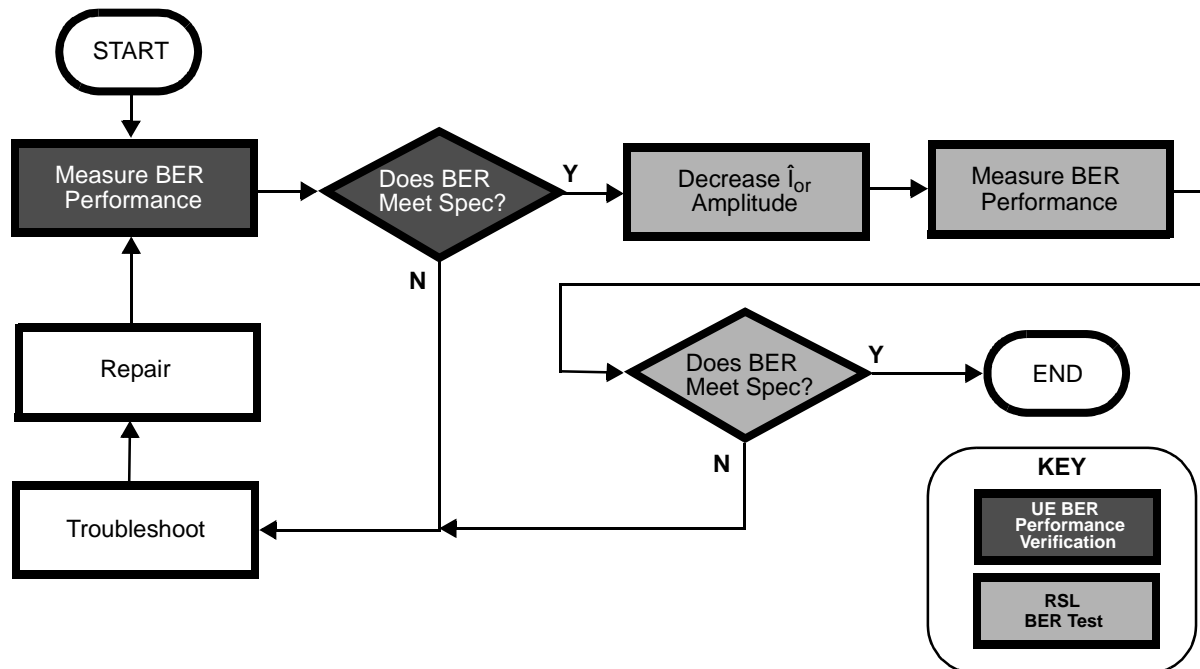
Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06).*
2. Defined as the ratio dBm/3.84 Mcps.

Process

ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-13, Table 2-14, Table 2-15, and Table 2-16.

| NOTE | Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted. |

Table 2-13 MIL Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−15.0 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−15.0 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−12.0 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−10.0 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−19.0 dB
	Channel Code	6 (Arbitrary value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Ref 12 (See Table 4-12)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	PhyCH Type	OCNS
	Power	−1.37 dB
	Data	PN9
	Symbol Rate	30.00 kHz
	Channel Code	6
	SecSrc Code OS	0
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−15.0 dB
	Channel Code	3 (Arbitrary value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-14 MIL Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps

[1] For details, see Table 4-12.

Table 2-15 MIL W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-16 MIL W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency	2140.0 MHz (ESG 1)
Amplitude[1]	–80.0 dBm (ESG 1)
RF Off/On[2]	On (ESG 1) Off (ESG 2)
Mod Off/On	On (ESG 1)

[1] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (–80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–25.0 dBm) in accordance with the 3GPP specification for this performance test.

[2] No RF output is required from ESG 2 for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA maximum input level test on your UE. Complete the subsections of this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-4 Maximum Input Level Equipment Setup
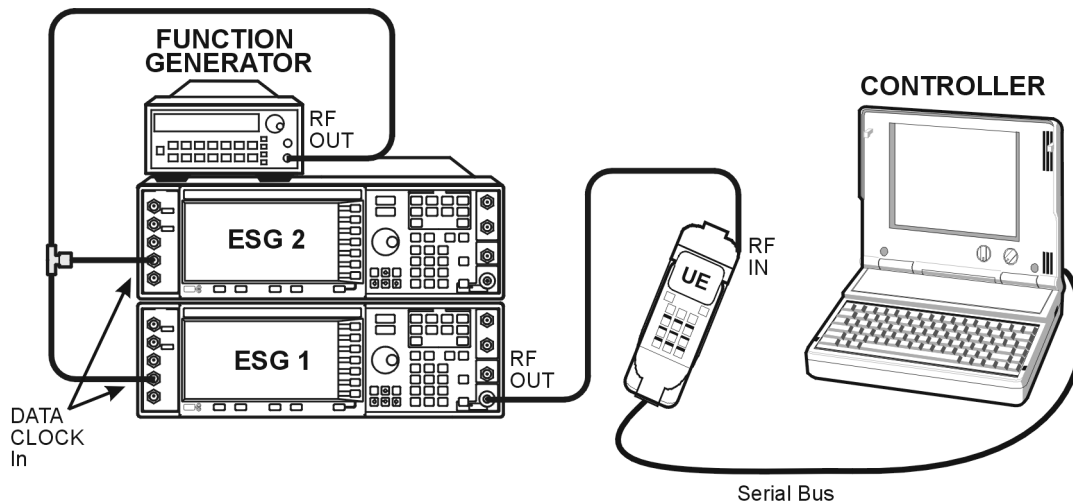
1. Connect the UE to the test system as shown in Figure 2-4.

   a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

   b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

   From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

   These call acquisition functions include:

   a. acquiring the primary synchronization channel (P-SCH),

   b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

   c. acquiring and synchronizing to the common pilot channel (CPICH),

   d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

The controller (or BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) at an arbitrary amplitude. This process verifies that the BER of the UE is within specification prior to increasing the amplitude of $\hat{I}_{or}$.

4. In Table 2-17, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. Maximum Input Level Measurement

Complete the following steps to perform a maximum input level measurement on your UE.

1. Increase the amplitude of $\hat{I}_{or}$ to the required value.

In accordance with the 3GPP W-CDMA RF specification, increase the amplitude of $\hat{I}_{or}$ to −25.0 dBm.

On ESG 1:

Press **Amplitude** > **−25** > **dBm**.

2. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) at the increased amplitude.

The controller (or BER test platform) is measuring the bit error ratio of the UE with an $\hat{I}_{or}$ amplitude of −25.0 dBm.

3. In Table 2-17, record the measured BER value in the column titled, "Maximum Amplitude BER Value."

4. Compare the recorded BER value in the column titled, "Maximum Amplitude BER Value" to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following table to record the data from the MIL performance test.

Table 2-17 MIL Performance Test Record

Verification BER Value	Maximum Amplitude BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Adjacent Channel Selectivity (3G TS 25.101.7.5)

This section explains how to complete an adjacent channel selectivity performance test on your user equipment (UE). It includes a process definition, signal generator configuration, test system connections, abbreviations, an example test procedure and performance test record.

Specification Definition

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a W-CDMA signal at its assigned frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.[1]

Performance Test Objective

The objective of this performance test is to determine the ACS performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of a specified adjacent channel interferer.
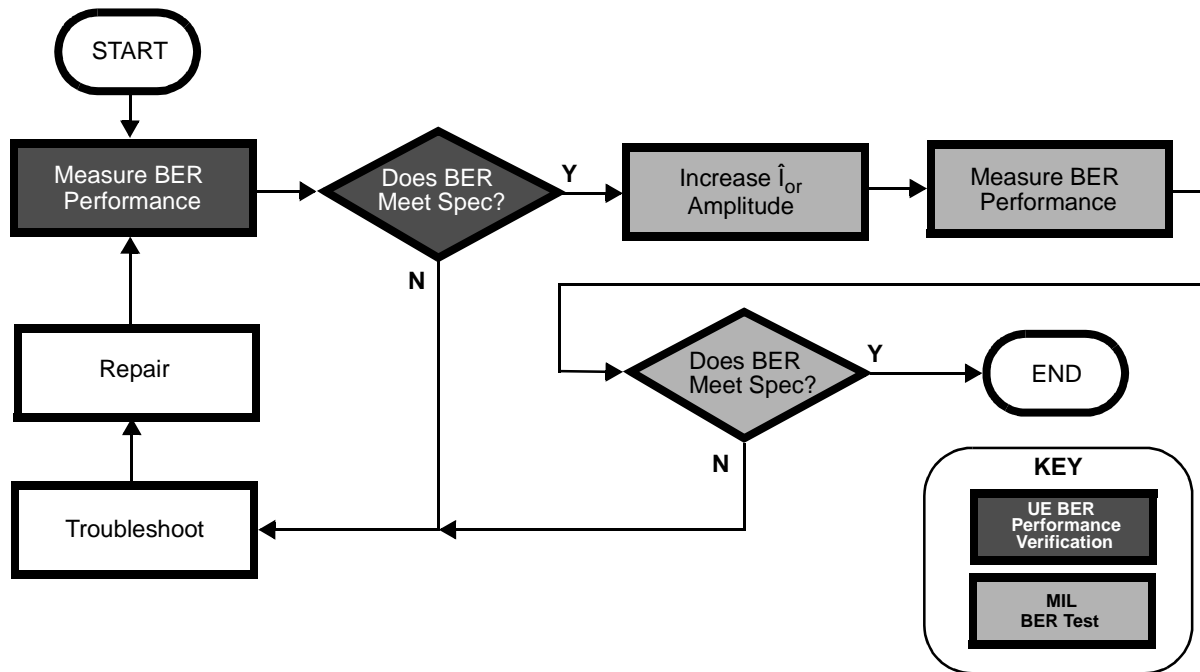
Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

I_{oac} the received power spectral density of the adjacent channel interferer as measured at the UE antenna connector[3]

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06).*
2. Defined as the ratio dBm/3.84 Mcps.
3. Undefined in 3G TS 25.101 V3.3.

Process
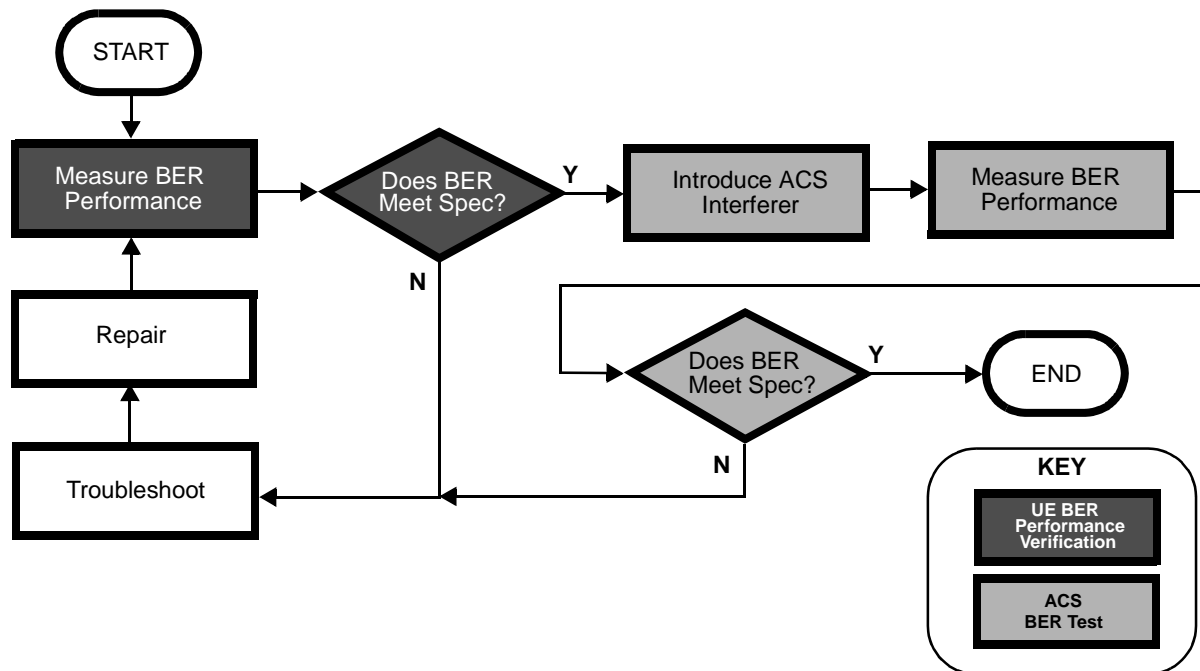
ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-18, Table 2-19, Table 2-20, and Table 2-21.

NOTE   Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted.

Table 2-18 ACS Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−8.3 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−8.3 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−5.3 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−3.3 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−10.3 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Ref 12 (See Table 4-12.)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	Channel State Off/On	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−8.3 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-19 ACS Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps (ESG 2)

[1] For details, see Table 4-12.

Table 2-20 ACS W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-21 ACS W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency[1]	2140.0 MHz (ESG 1) (Arbitrary Value) 2145.0 MHz or 2135.0 MHz (ESG 2)
Amplitude[2]	−80.0 dBm (ESG 1) (Arbitrary Value) −52.0 dBm (ESG 2)
RF Off/On[3]	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] The frequency of the unwanted signal generated at the output of ESG 2 must be ±5 MHz from the fundamental waveform generated at the output of ESG 1.

[2] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (−80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (−92.7 dBm) in accordance with the 3GPP specification for this performance test.

[3] The RF output of ESG 2 remains off until the initial BER verification measurement has been performed. After BER verification, the RF output of ESG 2 (the interferer) will be applied to the UE in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA adjacent channel selectivity test on your UE. Complete the subsections of this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-5 BER Verification Equipment Setup
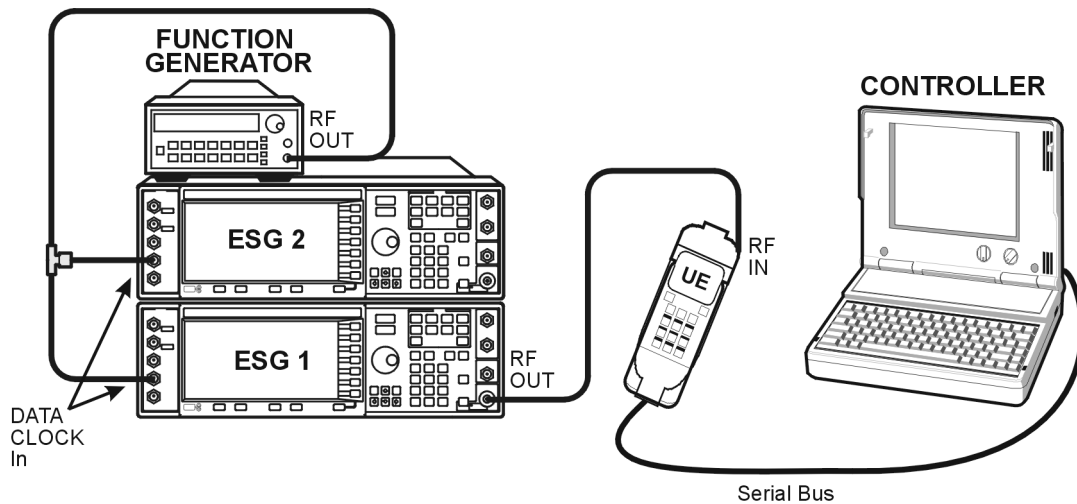
1. Connect the UE to the test system as shown in Figure 2-5.

    a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

    b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

    From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

    These call acquisition functions include:

    a. acquiring the primary synchronization channel (P-SCH),

    b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

    c. acquiring and synchronizing to the common pilot channel (CPICH),

    d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

   The controller (or BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) only. This process verifies that the BER of the UE is within specification prior to the introduction of the adjacent channel interferer.

4. In Table 2-22, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. ACS Measurements

Complete the following steps to perform adjacent channel selectivity measurements on your UE.

Figure 2-6   ACS Measurement Equipment Setup
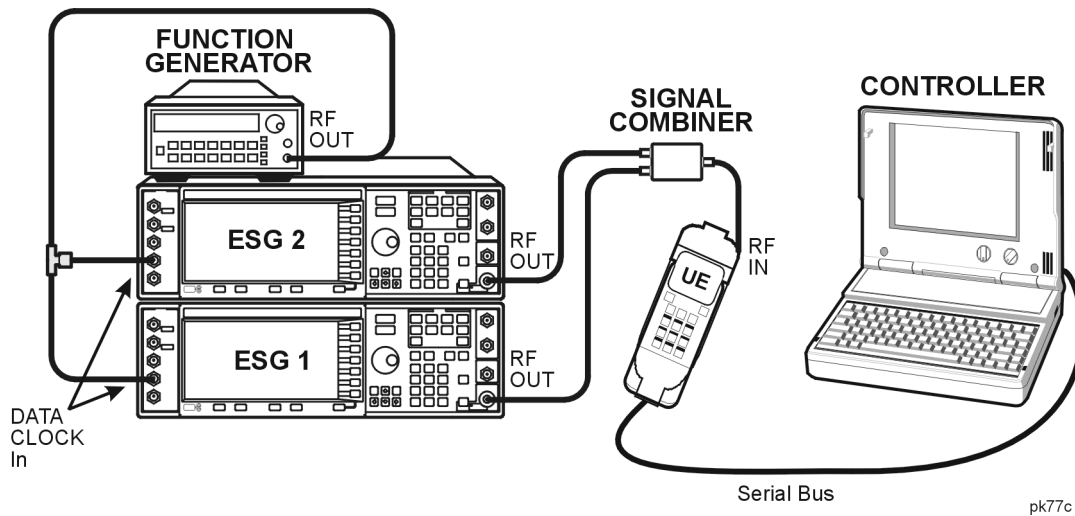
1. Connect the additional equipment to the test system as shown in Figure 2-6.

   a. Connect the RF output of ESG 1 to one input of the signal combiner.

   b. Connect the RF output of ESG 2 to one input of the signal combiner.

   c. Connect the signal combiner output to the RF input of the UE.

2. Adjust the amplitude of $\hat{I}_{or}$ to the required value.

   In accordance with the 3GPP specification, adjust the amplitude of $\hat{I}_{or}$ to −92.7 dBm.

   On ESG 1: Press **Amplitude** > −**92.7** > **dBm**.

3. Introduce the adjacent channel (I_{oac}) waveform.

   The adjacent channel stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of I_{oac} can be ±5 MHz from the center frequency of $\hat{I}_{or}$. The amplitude of I_{oac} is −52.0 dBm.

   On ESG 2:

   Press **RF On/Off** (or execute the appropriate SCPI command) until the `RF ON` annunciator is displayed.

4. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the adjacent channel interferer.

   The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the adjacent channel interferer I_{oac} (from ESG 2).

5. In Table 2-22, record the measured BER value in the column titled, "Adjacent Channel BER Value."

6. Compare the recorded BER value in the column titled, "Adjacent Channel BER Value" to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following table to record the data from the ACS performance test.

Table 2-22 ACS Performance Test Record

Verification BER Value	Adjacent Channel BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Blocking Characteristics (3G TS 25.101.7.6)

This section explains how to complete a blocking characteristics performance test on your user equipment (UE). It includes a process definition, signal generator configurations, test system connections, abbreviations, an example test procedure and performance test record.

NOTE   An external source capable of providing CW at an amplitude of –15 dBm across a frequency range of 4 to 12.750 GHz is required for band 3 out-of-band performance testing above 4 GHz (or the maximum RF output frequency of your ESG).

Specification Definition

The blocking characteristic is a measure of the receiver's ability to receive a desired signal at its assigned channel frequency in the presence of an undesired interferer on frequencies other than those of the spurious response or the adjacent channels, without this undesired input signal causing receiver performance degradation beyond a specified limit.[1]

Performance Test Objective

The objective of this performance test is to determine the in-band and out-of-band blocking characteristic performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of specified interferers at in-band and out-of-band frequencies (other than spurious response or adjacent channel frequencies).

Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

$I_{blocking}$ the received power spectral density of the modulated or CW blocking interferer as measured at the UE antenna connector[3]

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06).*
2. Defined as the ratio dBm/3.84 Mcps.
3. Undefined in 3G TS 25.101 V3.3.

Process

In-Band Blocking Characteristics

```
START
  │
  ▼
┌──────────────┐      ╱╲                 ┌──────────────┐      ┌──────────────┐
│ Measure &    │     ╱    ╲    Y         │ Introduce    │      │ Measure &    │
│ Record       │───▶│Does BER│─────────▶ │ 10 MHz Offset│────▶ │ Record       │
│ BER Performance│    ╲Meet Spec?╱       │In-Band Interferer│   │ BER Performance│
└──────────────┘      ╲  ╱                └──────────────┘      └──────────────┘
      ▲                │ N
      │                │
┌──────────────┐       │                 ┌──────────────┐      ┌──────────────┐
│  Repair      │       │                 │ Introduce    │      │ Measure &    │
│              │       │                 │ 15 MHz Offset│────▶ │ Record       │
└──────────────┘       │                 │In-Band Interferer│   │ BER Performance│
      ▲                │                 └──────────────┘      └──────────────┘
      │                │
┌──────────────┐       │                      ╱╲
│ Troubleshoot │◀──────┘                     ╱   ╲     Y       ┌────────┐
│              │◀──────────────────────────│Do BERs │─────────▶│  END   │
└──────────────┘                            ╲Meet Spec?╱        └────────┘
                                             ╲  ╱
                                              │ N
```

KEY

| UE BER Performance Verification |
| In-Band BER Test |

Out-of-Band Blocking Characteristics
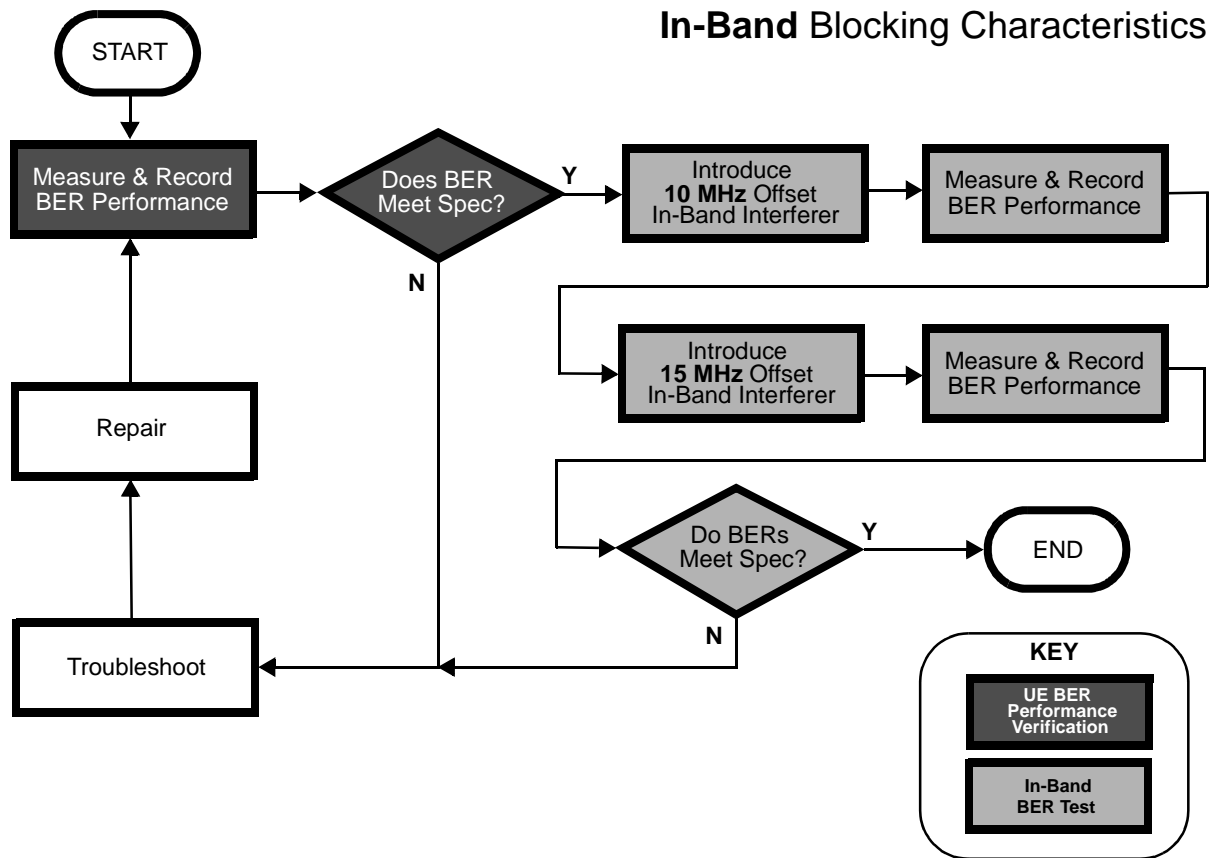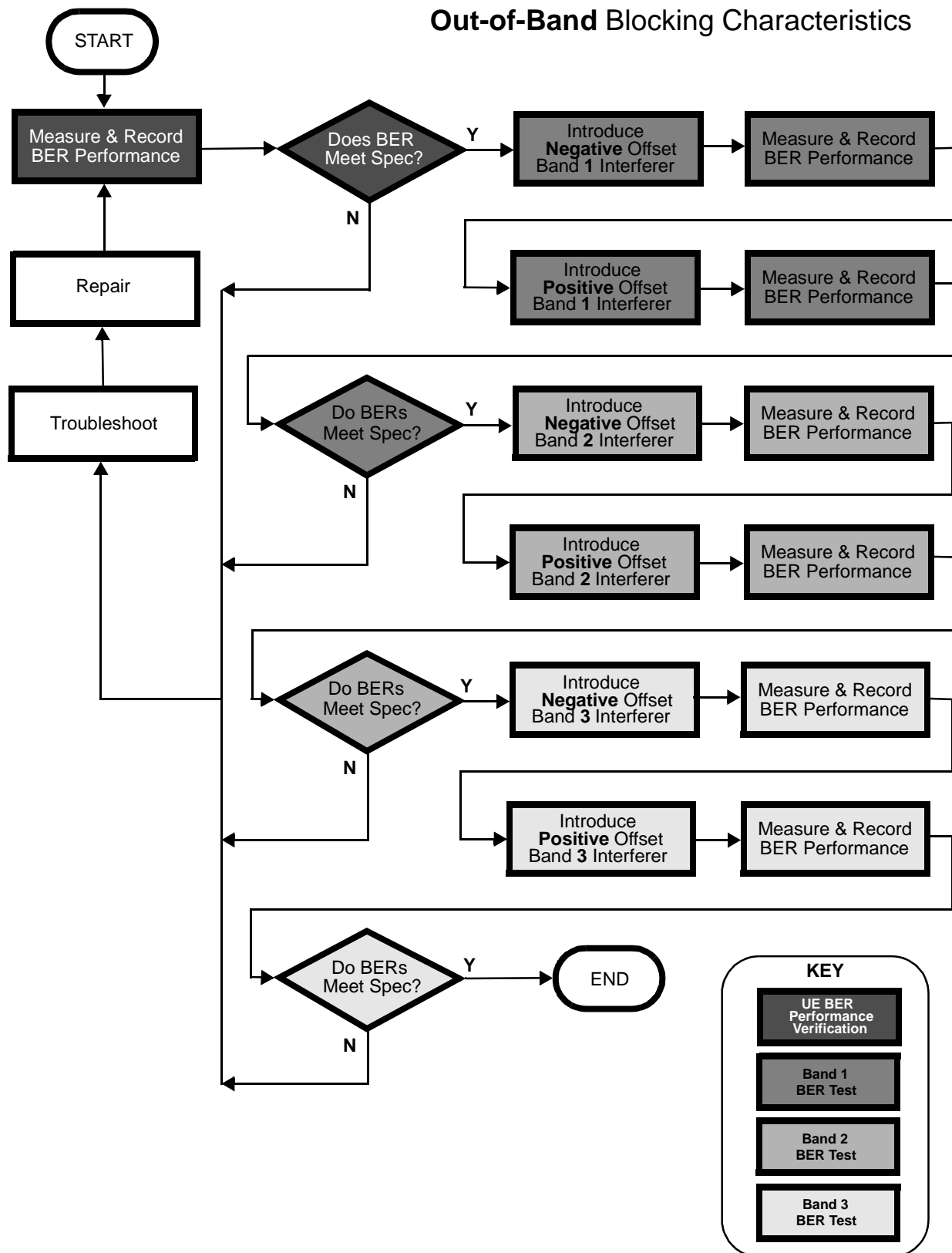
ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-23, Table 2-24, Table 2-25, and Table 2-26.

NOTE	Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted.

Table 2-23 Blocking Characteristics Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−8.3 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−8.3 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−5.3 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−3.3 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−10.3 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Ref 12 (See Table 4-12.)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	Channel State Off/On	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−8.3 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-24 Blocking Characteristics Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps (ESG 2)

[1] For details, see Table 4-12.

Table 2-25 Blocking Characteristics W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-26 Blocking Characteristics W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency[1]	2140.0 MHz (ESG 1) (Arbitrary Value) 2150.0 MHz or 2130.0 MHz (ESG 2)
Amplitude[2]	−80.0 dBm (ESG 1) (Arbitrary Value) −52.0 dBm (ESG 2)
RF Off/On[3]	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] The frequency of the unwanted signal generated at the output of ESG 2 must be ±10 MHz from the fundamental waveform generated at the output of ESG 1.

[2] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (−80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (−92.7 dBm) in accordance with the 3GPP specification for this performance test.

[3] The RF output of ESG 2 remains off until the initial BER verification measurement has been performed. After BER verification, the RF output of ESG 2 (the interferer) will be applied to the UE in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA blocking characteristics test on your UE. Complete the subsections of this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-7 BER Verification Equipment Setup
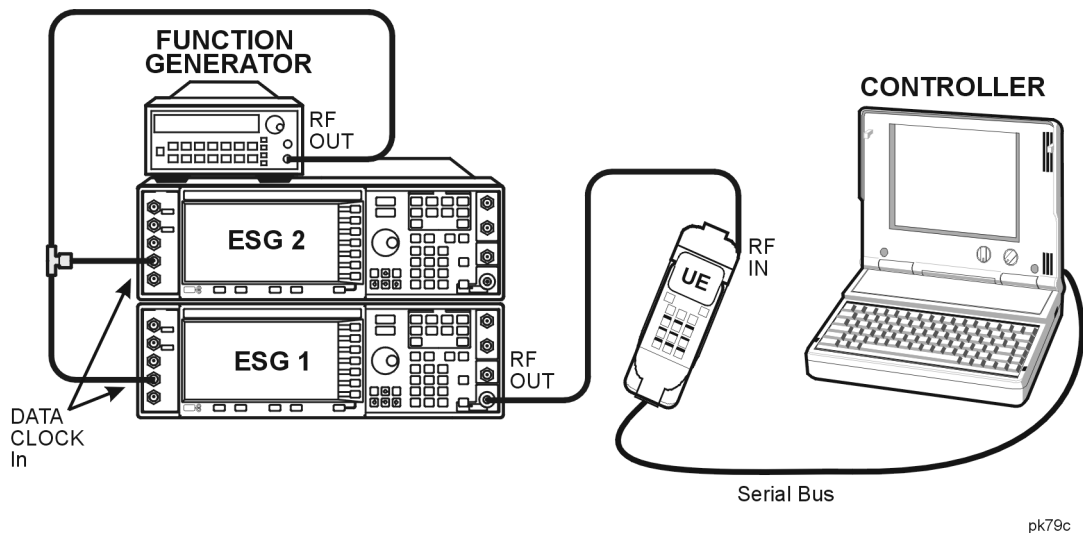
1. Connect the UE to the test system as shown in Figure 2-7.

   a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

   b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

   From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

   These call acquisition functions include:

   a. acquiring the primary synchronization channel (P-SCH),

   b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

   c. acquiring and synchronizing to the common pilot channel (CPICH),

   d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

   The controller or (BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) only. This process verifies that the BER of the UE is within specification prior to the introduction of the $I_{blocking}$ interferer.

4. In Table 2-27, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. In-Band Blocking Characteristics Measurements

Complete the following steps to make in-band blocking characteristics measurements on your UE.

Figure 2-8 Blocking Characteristics Measurements Equipment Setup 1
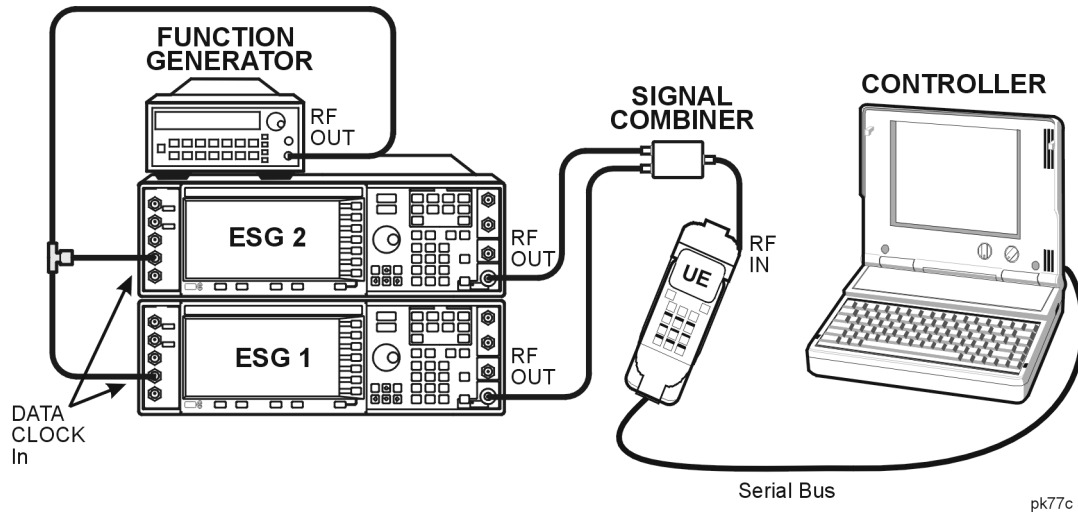
1. Connect the additional equipment to the test system as shown in Figure 2-8.

   a. Connect the RF output of ESG 1 to one input of the signal combiner.

   b. Connect the RF output of ESG 2 to one input of the signal combiner.

   c. Connect the signal combiner output to the RF input of the UE.

2. Adjust the amplitude of $\hat{I}_{or}$ to the required value.

In accordance with the 3GPP specification, adjust the amplitude of $\hat{I}_{or}$ to –92.7 dBm.

On ESG 1: Press **Amplitude** > **–92.7** > **dBm**.

3. Introduce the 10 MHz offset in-band interferer ($I_{blocking}$).

The first in-band interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this unwanted interferer ($I_{blocking}$) can be ±10 MHz from the center frequency of $\hat{I}_{or}$. The amplitude of $I_{blocking}$ is –52.0 dBm.

On ESG 2:

Press **RF On/Off** (or execute the appropriate SCPI command) until the `RF ON` annunciator is displayed.

4. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the 10 MHz offset in-band interferer.

The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the 10 MHz offset in-band interferer $I_{blocking}$ (from ESG 2).

5. In Table 2-27, record the measured BER value in the column titled, "10 MHz Offset Interferer BER Value."

6. Introduce the 15 MHz offset in-band interferer.

The second in-band interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this unwanted interferer ($I_{blocking}$) can be ±15 MHz from the center frequency of $\hat{I}_{or}$. The amplitude of $I_{blocking}$ is –44 dBm.

On ESG 2:

a. Press **Frequency** and enter a frequency value ±15 MHz from the center frequency of $\hat{I}_{or}$ to change the $I_{blocking}$ carrier frequency.

b. Press **Amplitude** > **–44** > **dBm** to change the $I_{blocking}$ amplitude.

c. Press **RF On/Off** until the `RF ON` annunciator is displayed on ESG 2 to activate the RF output.

7. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the 15 MHz offset in-band interferer.

The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the 15 MHz offset in-band interferer $I_{blocking}$ (from ESG 2).

8. In Table 2-27, record the measured BER value in the column titled, "15 MHz Offset Interferer BER Value."

9. In Table 2-27, compare both the BER values recorded in columns "10 MHz Offset Interferer BER Value" and "15 MHz Offset Interferer BER Value" to the allowable values in the column titled, "Specification Limitations" (both values must be within the allowable specification for a PASS status). Record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Subsection 3. Out-of-Band Blocking Characteristics Measurements

Complete the following subsections to measure out-of-band blocking characteristics on your UE.

Part A. Band 1 Out-of-Band Blocking Characteristics Measurements

1. Introduce the negative frequency offset CW interferer for band 1.

    The band 1 negative frequency offset interferer is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 1 interferer ($I_{blocking}$) must be between 2050 MHz and 2095 MHz. The amplitude of $I_{blocking}$ is −44 dBm.

    On ESG 2:

    a. Press **Mod On/Off** until the `MOD OFF` annunciator is displayed on ESG 2 to create an unmodulated CW signal.

    b. Press **Frequency** and enter a value between 2050 MHz and 2095 MHz to set the carrier frequency of the band 1 negative frequency offset CW interferer ($I_{blocking}$).

    c. Press **Amplitude** > **−44** > **dBm** to set the amplitude of the band 1 negative frequency offset CW interferer.

    d. Press **RF On/Off** until the `RF ON` annunciator is displayed on ESG 2 to activate the RF output.

2. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the negative frequency offset interferer for band 1.

    The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the band 1 negative frequency offset interferer $I_{blocking}$ (from ESG 2).

3. In Table 2-28, record the measured BER value in the column titled, "Negative Frequency Offset Interferer BER Value."

4. Introduce the positive frequency offset CW interferer for band 1.

    The band 1 positive frequency offset interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 1 interferer ($I_{blocking}$) must be between 2185 MHz and 2230 MHz. The amplitude of $I_{blocking}$ is −44 dBm.

On ESG 2:

a. Press **Frequency** and enter a value between 2185 MHz and 2230 MHz to set the carrier frequency of the band 1 positive frequency offset CW interferer.

b. Press **Amplitude** > **−44** > **dBm** to set the amplitude of the band 1 positive frequency offset CW interferer.

c. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

5. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the positive frequency offset interferer for band 1.

The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the positive frequency offset interferer $I_{blocking}$ (from ESG 2).

6. In Table 2-28, record the measured BER value in the column titled, "Positive Frequency Offset Interferer BER Value."

7. Compare both the BER values recorded in columns "Negative Frequency Offset Interferer BER Value" and "Positive Frequency Offset Interferer BER Value" to the allowable values in the column titled, "Specification Limitations" (both values must be within the allowable specification for a PASS status). Record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Part B. Band 2 Out-of-Band Blocking Characteristics Measurements

1. Introduce the negative frequency offset CW interferer for band 2.

The band 2 negative frequency offset interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 2 interferer ($I_{blocking}$) must be between 2025 MHz and 2050 MHz. The amplitude of $I_{blocking}$ is −30.0 dBm.

On ESG 2:

a. Press **Frequency** and enter a value between 2025 MHz and 2050 MHz to set the carrier frequency of the band 2 negative frequency offset CW interferer.

b. Press **Amplitude** > **−30** > **dBm** to set the amplitude of the band 2 negative frequency offset CW interferer.

c. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

2. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the negative frequency offset interferer for band 2.

The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the negative frequency offset interferer $I_{blocking}$ (from ESG 2).

3. In Table 2-29, record the measured BER value in the column titled, "Negative Frequency Offset Interferer BER Value."

4. Introduce the positive frequency offset CW interferer for band 2.

   The band 2 positive frequency offset interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 2 interferer ($I_{blocking}$) must be between 2230 MHz and 2255 MHz. The amplitude of $I_{blocking}$ is –30.0 dBm.

   On ESG 2:

   a. Press **Frequency** and enter a value between 2230 MHz and 2255 MHz to set the carrier frequency of the band 2 positive frequency offset CW interferer.

   b. Press **Amplitude** > **–30** > **dBm** to set the amplitude of the band 2 positive frequency offset CW interferer.

   c. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

5. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the positive frequency offset interferer for band 2.

   The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the positive frequency offset interferer $I_{blocking}$ (from ESG 2).

6. In Table 2-29, record the measured BER value in the column titled, "Positive Frequency Offset Interferer BER Value."

7. Compare both the BER values recorded in columns "Negative Frequency Offset Interferer BER Value" and "Positive Frequency Offset Interferer BER Value" to the allowable values in the column titled, "Specification Limitations" (both values must be within the allowable specification for a PASS status). Record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Part C. Band 3 Out-of-Band Blocking Characteristics Measurements

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NOTE
Additional equipment is required for band 3 out-of-band performance testing beyond the upper frequency limit of ESG 2:

- a signal combiner with three input ports and one output port

- an external source capable of providing CW at an amplitude of –15 dBm across a frequency range of x GHz (x = the upper RF output frequency limitations of ESG 2) to 12.750 GHz.

---

1. Introduce the negative frequency offset CW interferer for band 3.

   The band 3 negative frequency offset interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 3 interferer ($I_{blocking}$) must be between 1 MHz and 2025 MHz.

The amplitude of $I_{blocking}$ is −15 dBm.

On ESG 2:

a. Press **Frequency** and enter a value between 1 MHz and 2025 MHz to set the carrier frequency of the band 3 negative frequency offset CW interferer.

b. Press **Amplitude** > **−15** > **dBm** to set the amplitude of the band 3 negative frequency offset CW interferer.

c. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

2. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the negative frequency offset interferer for band 3.

The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the band 3 negative frequency offset interferer $I_{blocking}$ (from ESG 2).

3. In Table 2-30, record the measured BER value in the column titled, "Negative Frequency Offset Interferer BER Value."

4. Introduce the positive frequency offset CW interferer for band 3.

The band 3 positive frequency offset interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this band 3 interferer ($I_{blocking}$) must be between 2255 MHz and 12750 MHz (*see note at beginning of Part C*). The amplitude of $I_{blocking}$ is −15 dBm.

On ESG 2:

a. Press **Frequency** and enter a value between 2255 MHz and the maximum RF output frequency of your ESG to set the carrier frequency of the band 3 positive frequency offset CW interferer.

b. Press **Amplitude** > **−15** > **dBm** to set the amplitude of the band 3 positive frequency offset CW interferer.

c. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

To measure blocking characteristics at frequencies beyond the RF output limitations of ESG 2, connect the additional equipment, as shown in Figure 2-9..

Set the external source to:

a. signal type: CW

b. amplitude: −15 dBm

c. frequency: desired frequency up to 12.75 GHz

d. RF output: on

Figure 2-9. Out-of-Band Band 3 Blocking Characteristics Measurements Equipment Setup 2
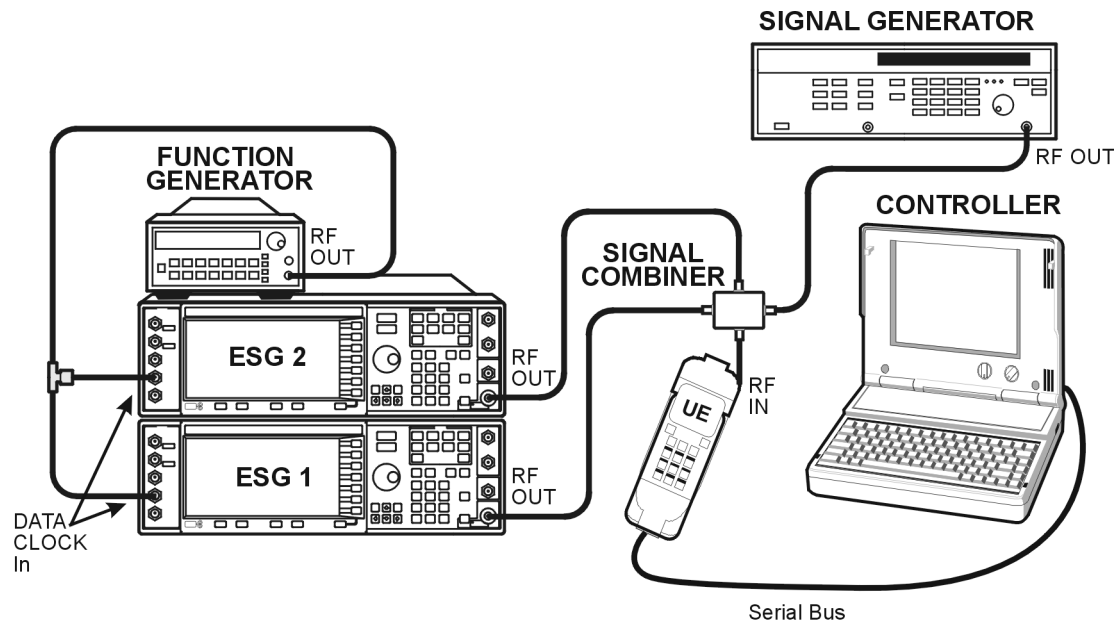
5. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the positive frequency offset interferer for band 3.

    The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the band 3 positive frequency offset interferer $I_{blocking}$ (from ESG 2).

6. In Table 2-30, record the measured BER value in the column titled, "Positive Frequency Offset Interferer BER Value."

7. Compare both the BER values recorded in columns "Negative Frequency Offset Interferer BER Value" and "Positive Frequency Offset Interferer BER Value" to the allowable values in the column titled, "Specification Limitations" (both values must be within the allowable specification for a PASS status). Record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following tables to record the data from the blocking characteristics performance test.

Table 2-27 In-Band Blocking Characteristics Performance Test Record

Verification BER Value	10 MHz Offset Interferer BER Value	15 MHz Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
			BER ≤ 0.001	

Table 2-28 Band 1 Out-of-Band Blocking Characteristics Measurements Performance Test Record

Negative Frequency Offset Interferer BER Value	Positive Frequency Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Table 2-29 Band 2 Out-of-Band Blocking Characteristics Measurements Performance Test Record

Negative Frequency Offset Interferer BER Value	Positive Frequency Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Table 2-30 Band 3 Out-of-Band Blocking Characteristics Measurements Performance Test Record

Negative Frequency Offset Interferer BER Value	Positive Frequency Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Spurious Response (3G TS 25.101.7.7)

This section explains how to complete a spurious response performance test on your user equipment (UE). It includes a process definition, signal generator configurations, test system connections, abbreviations, an example test procedure and performance test record.

Specification Definition

Spurious response is a measure of the receiver's ability to receive a desired signal on its assigned channel frequency without exceeding a given degradation due to the presence of an undesired CW interfering signal at any other frequency at which a response is obtained (i.e. for which the blocking limit is not met).[1]

Performance Test Objective

The objective of this performance test is to determine the spurious response performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of specified spurious response interferers.

Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

$I_{blocking}$ the received power of the CW blocking interferer as measured at the UE antenna connector[3]

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06)*.
2. Defined as the ratio dBm/3.84 Mcps.
3. Undefined in 3G TS 25.101 V3.3.

Process
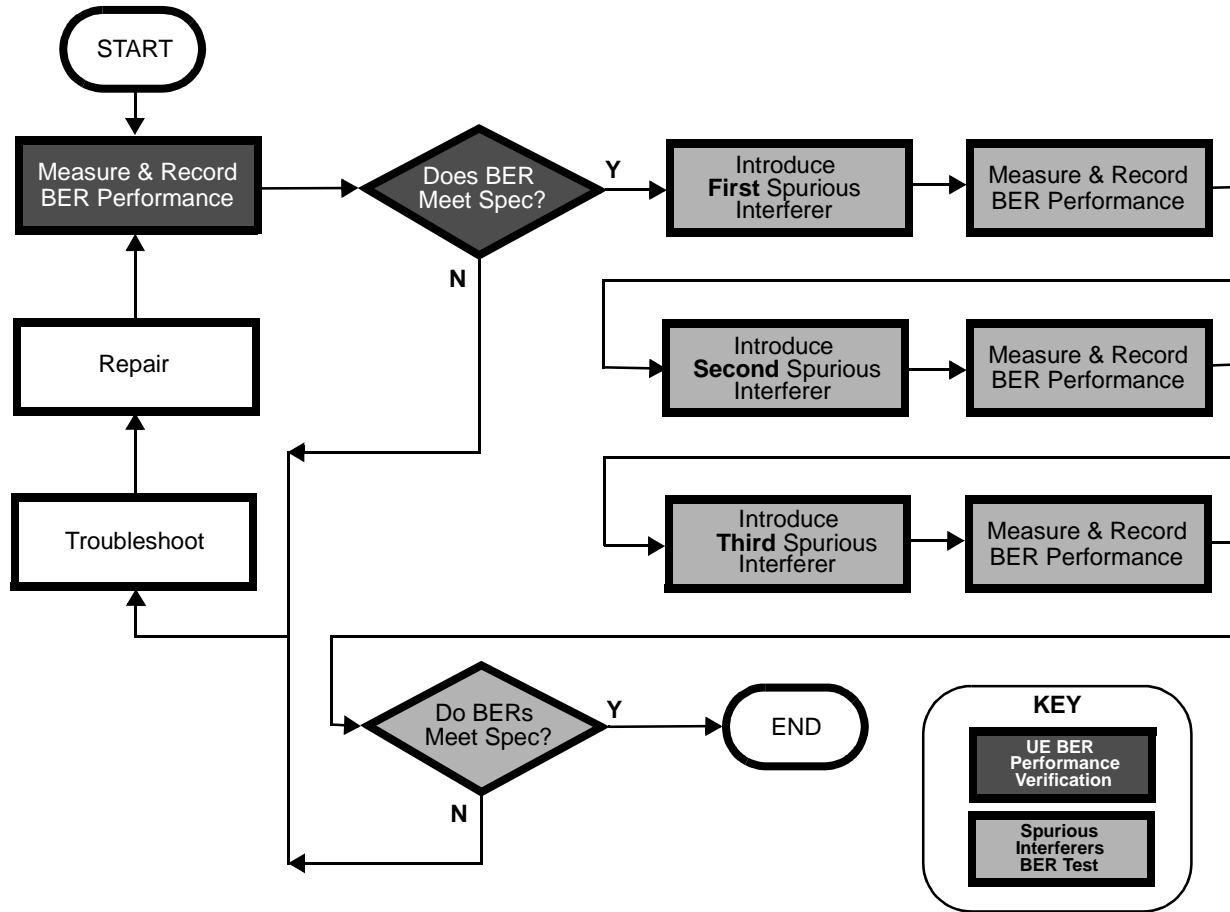
ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-31, Table 2-32, Table 2-33, and Table 2-34.

NOTE   Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted.

Table 2-31 Spurious Response Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−8.3 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−8.3 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−5.3 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−3.3 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−10.3 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Ref 12 (See Table 4-12.)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	Channel State Off/On	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−8.3 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-32 Spurious Response Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps (ESG 2)

[1] For details, see Table 4-12.

Table 2-33 Spurious Response W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-34 Spurious Response W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency	2140.0 MHz (ESG 1) (Arbitrary Value) Set to first spurious response frequency (ESG 2)
Amplitude[1]	–80.0 dBm (ESG 1) (Arbitrary Value) –44.0 dBm (ESG 2)
RF Off/On[2]	On (ESG 1) Off (ESG 2)
Mod Off/On[3]	On (ESG 1) Off (ESG 2)

[1] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (–80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–103.7 dBm) in accordance with the 3GPP specification for this performance test.

[2] The RF output of ESG 2 remains off until the initial BER verification measurement has been performed. After BER verification, the RF output of ESG 2 (the interferer) will be applied to the UE in accordance with the 3GPP specification for this performance test.

[3] ESG 2's modulation is switched off, in order to provide a spurious CW interferer.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA spurious response test on your UE. Complete the subsections of this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-10 BER Verification Equipment Setup
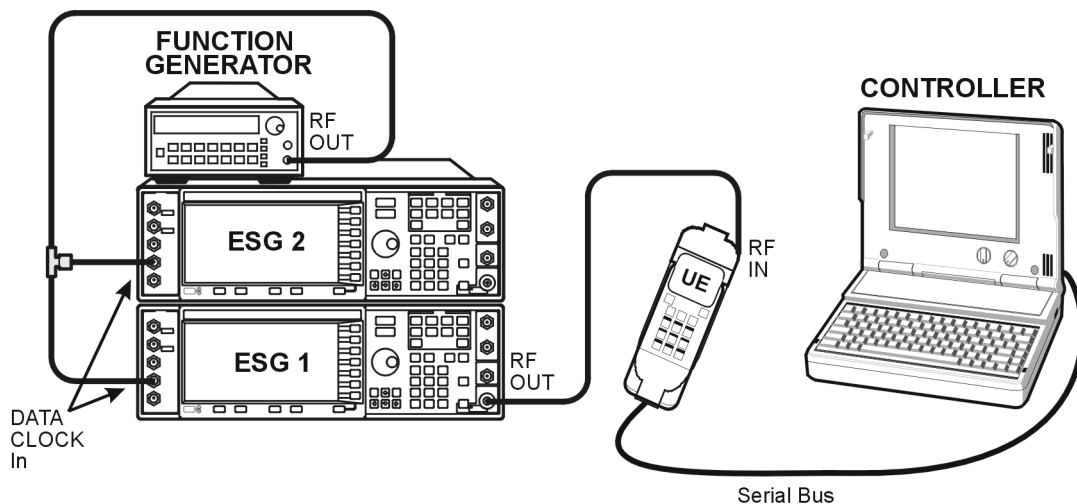
1. Connect the UE to the test system as shown in Figure 2-10.

   a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

   b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

   From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

   These call acquisition functions include:

   a. acquiring the primary synchronization channel (P-SCH),

   b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

   c. acquiring and synchronizing to the common pilot channel (CPICH),

   d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

    The controller (or BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) only. This process verifies that the BER of the UE is within specification prior to the introduction of the spurious response stimulus.

4. In Table 2-35, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

    • If the measured value is within the limits, continue to subsection 2.

    • If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. Spurious Response Measurements

Complete the following steps to make spurious response measurements on your UE.

Figure 2-11 Spurious Response Measurements Equipment Setup
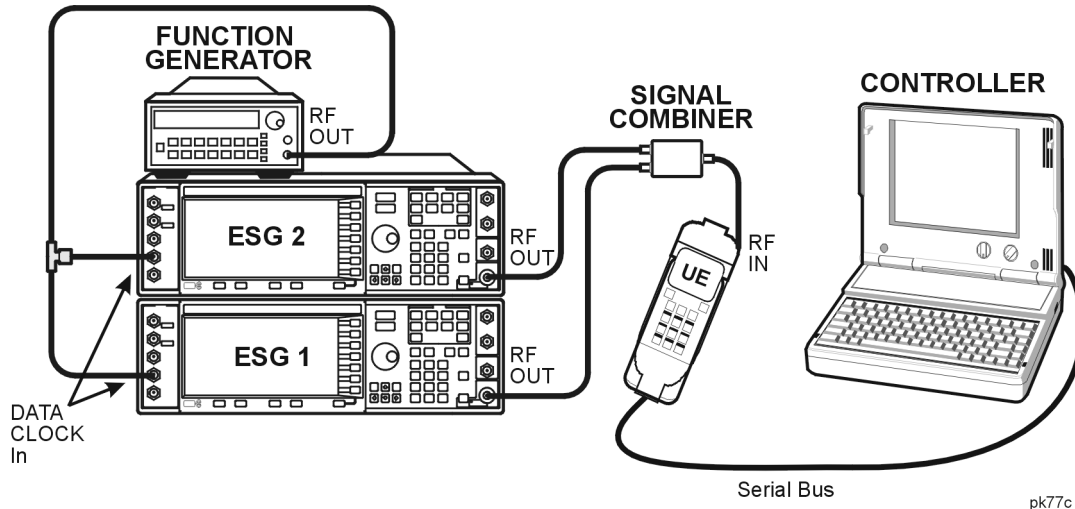
1. Connect the additional equipment to the test system as shown in Figure 2-11.

    a. Connect the RF output of ESG 1 to one input of the signal combiner.

    b. Connect the RF output of ESG 2 to one input of the signal combiner.

    c. Connect the signal combiner output to the RF input of the UE.

2. Adjust the amplitude of $\hat{I}_{or}$ to the required value.

    In accordance with the 3GPP specification, adjust the amplitude of $\hat{I}_{or}$ to −103.7 dBm.

    On ESG 1:

    Press **Amplitude** > **−103.7** > **dBm**.

3. Introduce the first spurious response ($I_{blocking}$) stimulus.

    $I_{blocking}$ is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the amplitude of $I_{blocking}$ is −44 dBm.

    On ESG 2:

    Activate the RF output on ESG 2 by pressing **RF On/Off** (or executing the appropriate SCPI command) until the RF ON annunciator is displayed on ESG 2.

4. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the first spurious response stimulus.

    The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the spurious response interferer $I_{blocking}$ (from ESG 2).

5. In Table 2-35, record the measured BER value in the column titled, "1st Spurious BER Value."

6. Introduce the next spurious response ($I_{blocking}$) stimulus.

    The next spurious response stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the amplitude of $I_{blocking}$ is −44 dBm.

    On ESG 2:

    a. Press **Frequency** and enter the value of your second spurious response frequency.

    b. Activate the RF output on ESG 2 by pressing **RF On/Off** (or executing the appropriate SCPI command) until the RF ON annunciator is displayed on ESG 2.

7. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the second spurious response stimulus.

    The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of both RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the second spurious response interferer $I_{blocking}$ (from ESG 2).

8. In Table 2-35, record the measured BER value in the column titled, "2nd Spurious BER Value."

9. Repeat Steps 6 and 7 for a third spurious response interferer.

10. In Table 2-35, record the measured BER value in the column titled, "3rd Spurious BER Value."

11. Compare all three recorded BER values (the 1st, 2nd, and 3rd spurious BER values must be within the allowable specification for a PASS status) to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following table to record the data from the spurious response performance test.

Table 2-35 Spurious Response Performance Test Record

Verification BER Value	1st Spurious BER Value	2nd Spurious BER Value	3rd Spurious BER Value	Specification Limitations	PASS/FAIL Status
				BER ≤ 0.001	

Intermodulation Characteristics (3G TS 25.101.7.8)

This section explains how to complete an intermodulation response rejection performance test on your user equipment (UE). It includes a process definition, signal generator configurations, test system connections, abbreviations, an example test procedure and performance test record.

NOTE   An external source capable of providing CW at an amplitude of –46 dBm across a frequency range of 2100 MHz to 2180 MHz is required for IRR performance testing.

Specification Definition

Intermodulation response rejection is a measure of the receiver's ability to receive a desired signal at its assigned channel frequency in the presence of two or more undesired interferers which have a specific frequency relationship (i.e. third- or higher-order mixing products within the frequency band of the desired channel) to the desired signal.[1]

Performance Test Objective

The objective of this performance test is to determine the Intermodulation Response Rejection (IRR) performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of two specified, frequency-related interferers.

Abbreviations

Definitions of abbreviations used throughout 3G TS 25.101 V3.3 and the following example performance test procedure:

$\hat{I}_{or}$ the received power spectral density[2] of the downlink as measured at the UE antenna connector

I_{ouw1} the received power of the unwanted CW interferer as measured at the UE antenna connector[3]

I_{ouw2} the received power spectral density of the unwanted modulated interferer as measured at the UE antenna connector[4]

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06)*.
2. Defined as the ratio dBm/3.84 Mcps.
3. Undefined in 3G TS 25.101 V3.3.
4. Undefined in 3G TS 25.101 V3.3.
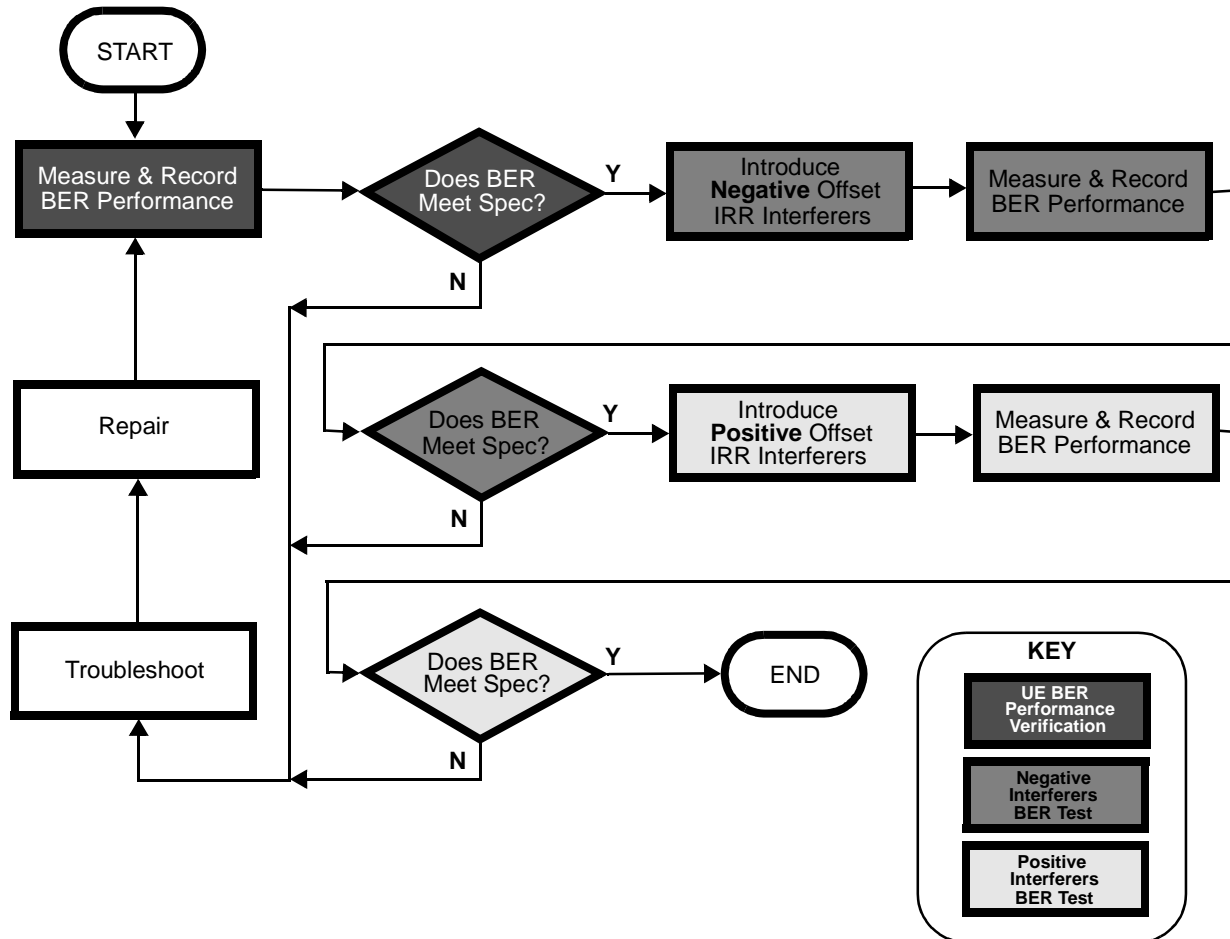
Process

ESG Configuration

For a connection diagram, see "Two ESG Downlink Measurement Setup" on page 2-6.

Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-36, Table 2-37, Table 2-38, and Table 2-39.

NOTE   Enter values on both signal generators, unless otherwise noted. **Channel State Off On** is set to **On** for all channels, unless otherwise noted.

Table 2-36 IRR Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1	PhyCH Type	PSCH
	Power	−8.3 dB
ESG 1 Channel 2	PhyCH Type	SSCH
	Power	−8.3 dB
	Secondary Scramble Code Grp	0
ESG 1 Channel 3	PhyCH Type	P-CCPCH
	Power	−5.3 dB
	Channel Code	1 (Fixed Value)
	BCH Data	0000
ESG 1 Channel 4	PhyCH Type	CPICH
	Power	−3.3 dB
	Channel Code	0 (Fixed Value)
ESG 2 Channel 1	PhyCH Type	DPCH
	Power	−10.3 dB
	Channel Code	6 (Arbitrary Value)
	SecScr Code OS	0
	TPC Pat Steps	1
	Data	Transport CH (See Table 4-12.)
	Symbol Rate	30.00 ksps
	TFCI Pattern	0000000000
	TPC Pattern	Up/Down
	Slot Format	11
	Time Offset	0
ESG 2 Channel 2	Channel State Off/On	Off
ESG 2 Channel 3	PhyCH Type	PICH
	Power	−8.3 dB
	Channel Code	3 (Arbitrary Value)
	Data	PN9
	PI Bits	288
	Paging Indicator	144
ESG 2 Channel 4	Channel State Off/On	Off

Table 2-37 IRR Transport Layer Configuration

Parameter	Setting
Reference Measurement Setup[1]	12.2 kbps (ESG 2)

[1] For details, see Table 4-12.

Table 2-38 IRR W-CDMA Baseband Signal Configuration

Parameter	Setting(s)
BS Setup	Filter: RNYQ Chip Rate: 3.840000 Mcps Scramble Code: 0
BBG Data Clock	Ext
Phase Polarity	Normal
Two Box Setup (Relative Power Mapping)	Enter values as required.[1]
W-CDMA Off/On	On

[1] For detailed information, see "Adjust the Relative Power Mapping" on page 2-14.

Table 2-39 IRR W-CDMA RF Carrier Configuration

Parameter	Setting
Frequency[1]	2140.0 MHz (ESG 1) (Arbitrary Value) 2120.0 MHz (ESG 2)
Amplitude[2]	–80.0 dBm (ESG 1) (Arbitrary Value) –46.0 dBm (ESG 2)
RF Off/On[3]	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] The frequency of the unwanted signal generated at the output of ESG 2 must be ±20 MHz from the center frequency of the fundamental waveform generated at the output of ESG 1. If a negative offset frequency is selected, the output frequency of the CW source must be set 10 MHz below the center frequency of the fundamental waveform. If a positive offset frequency is selected, the output frequency of the CW source must be set 10 MHz above the center frequency of the fundamental waveform.

[2] The amplitude of the RF output of ESG 1 is initially set to an arbitrary value (–80.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–92.7 dBm) in accordance with the 3GPP specification for this performance test.

[3] The RF output of ESG 2 remains off until the initial BER verification measurement has been performed. After BER verification, the RF output of ESG 2 (the interferer) will be applied to the UE in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA intermodulation response rejection test on your UE. Perform the procedures in the subsections sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your UE.

Figure 2-12 BER Verification Equipment Setup
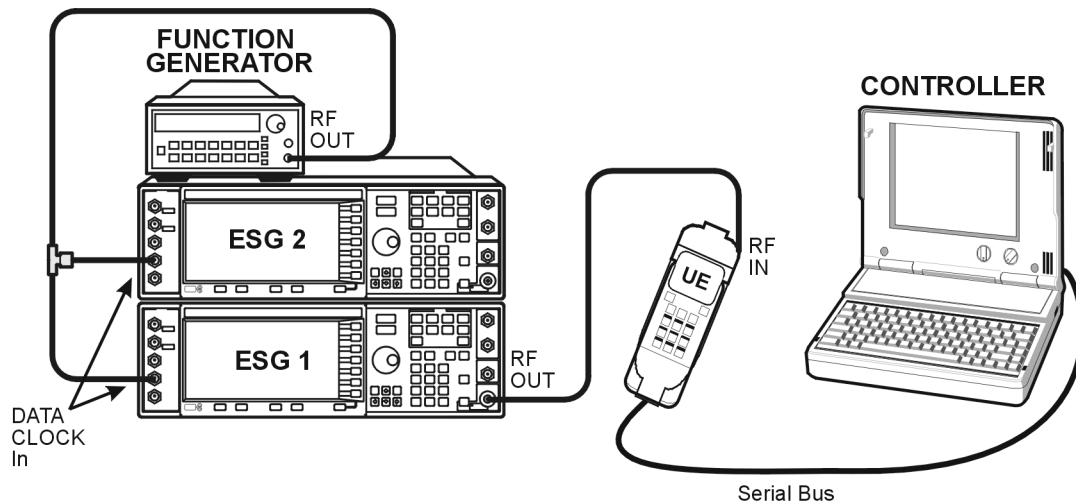
1. Connect the UE to the test system as shown in Figure 2-12.

   a. Using the appropriate cables, adapters, and antennae, connect the output of ESG 1 to the RF input of the UE.

   b. Connect the system controller (and the BER test platform) to the UE.

2. Perform call acquisition functions for the UE.

   From the system controller, perform all of the call acquisition functions required to enable the UE to demodulate transmitted data, in order to perform bit error ratio measurements.

   These call acquisition functions include:

   a. acquiring the primary synchronization channel (P-SCH),

   b. acquiring the secondary synchronization channel (S-SCH) and determining the secondary scramble code group,

   c. acquiring and synchronizing to the common pilot channel (CPICH),

   d. acquiring the primary common control physical channel (PCCPCH) and determining system frame number.

At this point, the controller must configure the UE into a test mode. With the UE operating in test mode, the controller assigns the UE a dedicated physical channel on which to receive and demodulate the transmitted data.

3. Measure the Bit Error Ratio (BER) of the data received by the UE on RMC 12.2 kbps (25.101 V3.3).

The controller (or BER test platform) is measuring the bit error ratio of the UE exposed to $\hat{I}_{or}$ (the RF output of ESG 1) only. This process verifies that the BER of the UE is within specification prior to the introduction of the frequency-related interferers.

4. In Table 2-40, record the measured BER value in the column titled, "Verification BER Value."

5. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the UE. After repair, return to Step 1 of this subsection.

Subsection 2. Negative Frequency Offset Interferers IRR Measurements

Complete the following steps to make negative frequency offset measurements on your UE.

Figure 2-13 IRR Measurements Equipment Setup
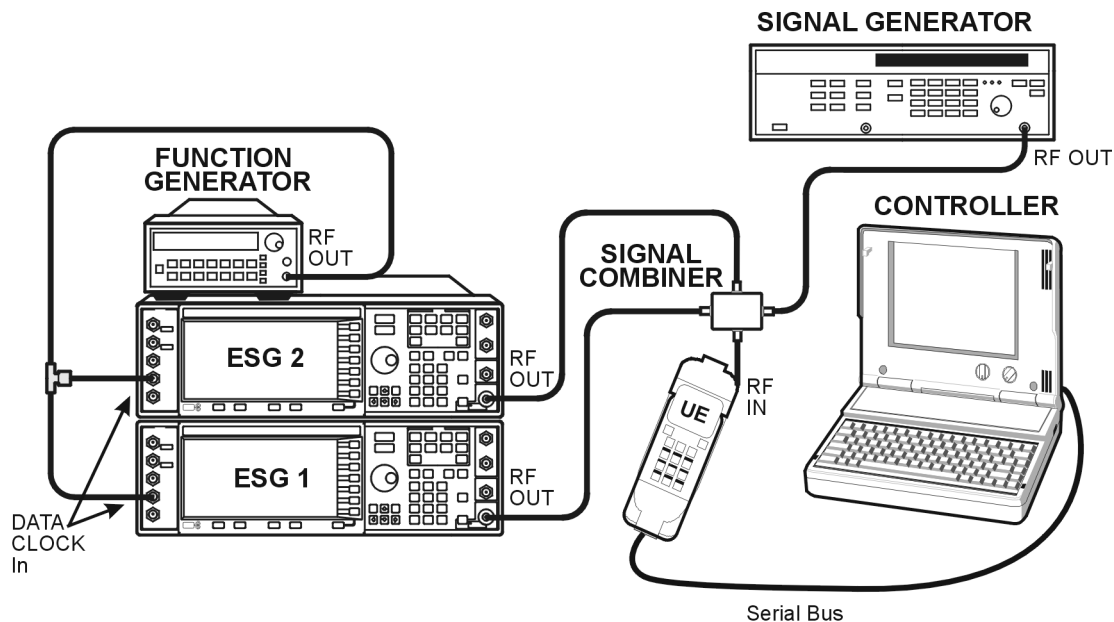
1. Connect the additional equipment to the test system as shown in Figure 2-13.

    a. Connect the RF output of ESG 1 to one input of the signal combiner.

    b. Connect the RF output of ESG 2 to one input of the signal combiner.

    c. Connect the RF output of the CW source to one input of the signal combiner.

    d. Connect the signal combiner output to the RF input of the UE.

2. Adjust the amplitude of $\hat{I}_{or}$ to the required value.

    In accordance with the 3GPP specification, adjust the amplitude of $\hat{I}_{or}$ to -92.7 dBm.

    On ESG 1:

    Press **Amplitude** > **−92.7** > **dBm**.

3. Introduce the negative frequency offset CW interferer (I_{ouw1}).

    I_{ouw1} is made available at the RF output of the CW source. In accordance with the 3GPP W-CDMA RF specification, the center frequency of I_{ouw1} is set 10 MHz below the center frequency of $\hat{I}_{or}$. The amplitude of I_{ouw1} is -46 dBm.

    On the CW source:

    Set the RF output frequency to 2130 MHz (or 10 MHz below the center frequency of $\hat{I}_{or}$).

    Set the RF output amplitude to -46 dBm.

    Activate the RF output.

4. Introduce the negative frequency offset modulated interferer (I_{ouw2}).

    I_{ouw2} is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of I_{ouw2} is set 20 MHz below the center frequency of $\hat{I}_{or}$. The amplitude of I_{ouw2} is -46 dBm.

    On ESG 2:

    Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

5. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the CW and modulated interferers (I_{ouw1} and I_{ouw2}).

6. The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of all three RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the negative frequency offset interferers I_{ouw1} and I_{ouw2} (from the CW source and ESG 2, respectively).

7. In Table 2-40, record the measured BER value in the column titled, "Negative Frequency Offset Interferers BER Value."

8. Compare the recorded BER value in the column titled, "Negative Frequency Offset Interferers BER Value" to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Subsection 3. Positive Frequency Offset Interferers IRR Measurements

Complete the following steps to make positive frequency offset measurements on your UE.

1. Introduce the positive frequency offset CW interferer (I_{ouw1}).

   I_{ouw1} is made available at the RF output of the CW source. In accordance with the 3GPP W-CDMA RF specification, the center frequency of I_{ouw1} is set 10 MHz above the center frequency of $\hat{I}_{or}$. The amplitude of I_{ouw1} is –46 dBm.

   On the CW source:

   Set the RF output frequency to 2150 MHz (or 10 MHz above the center frequency of $\hat{I}_{or}$).

   Set the RF output amplitude to –46 dBm.

   Activate the RF output.

2. Introduce the positive frequency offset modulated interferer (I_{ouw2}).

   I_{ouw2} is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of I_{ouw2} is set 20 MHz above the center frequency of $\hat{I}_{or}$. The amplitude of I_{ouw2} is –46 dBm.

   On ESG 2:

   a. Press **Frequency** > **2160** > **MHz** (or a frequency 20 MHz above the center frequency of $\hat{I}_{or}$) to set the carrier frequency of positive frequency offset modulated interferer (I_{ouw2}).

   b. Press **RF On/Off** until the RF ON annunciator is displayed on ESG 2 to activate the RF output.

3. Measure the BER of the data received by the UE on RMC 12.2 kbps (25.101 V3.3) in the presence of the positive frequency offset CW and modulated interferers (I_{ouw1} and I_{ouw2}).

   The controller (or BER test platform) is measuring the bit error ratio of the UE in the presence of all three RF output waveforms, $\hat{I}_{or}$ (from ESG 1) and the positive frequency offset interferers I_{ouw1} and I_{ouw2} (from the CW source and ESG 2, respectively).

4. In Table 2-41, record the measured BER value in the column titled, "Positive Frequency Offset Interferers BER Value."

5. Compare the recorded BER value in the column titled, "Positive Frequency Offset Interferers BER Value" to the allowable values in the column titled, "Specification Limitations" and record the status of the UE as PASS or FAIL in the column titled, "PASS/FAIL Status."

Example Test Record

Use the following tables to record the data from the IRR performance test.

Table 2-40 Negative Frequency Offset Interferers IRR Measurement Performance Test Record

Verification BER Value	Negative Frequency Offset Interferers BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Table 2-41 Positive Frequency Offset Interferers IRR Measurement Performance Test Record

Positive Frequency Offset Interferers BER Value	Specification Limitations	PASS/FAIL Status
	BER ≤ 0.001	

Spurious Emissions (3G TS 25.101.7.9)

This section contains a performance test summary and explains how to configure your test system in order to complete a spurious emissions performance test on your user equipment (UE).

NOTE   Spurious emissions measurements are only available within the specified input frequency limitations of the vector signal analyzer.

Specification Definition

Spurious emissions is a measure of the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.[1]

Performance Test Objective

The objective of this performance test is to determine the spurious emissions performance of your UE against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.101 V3.3).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring power level and occupied bandwidth of the spurious emissions generated by the UE.

Process

Using the VSA, measure the power level and occupied bandwidth of spurious emissions at the antenna port of the UE.

The recorded results are compared against the limits listed in the 3GPP W-CDMA RF specification and a PASS or FAIL status is assigned to the UE.

System Configuration

To configure the system to conduct the spurious emissions performance test:

1. Connect the equipment as shown in .

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio transmission and Reception (FDD) Technical Specification 3G TS 25.101 V3.3 (2000-06)*.

Figure 2-14 Spurious Emissions Equipment Setup
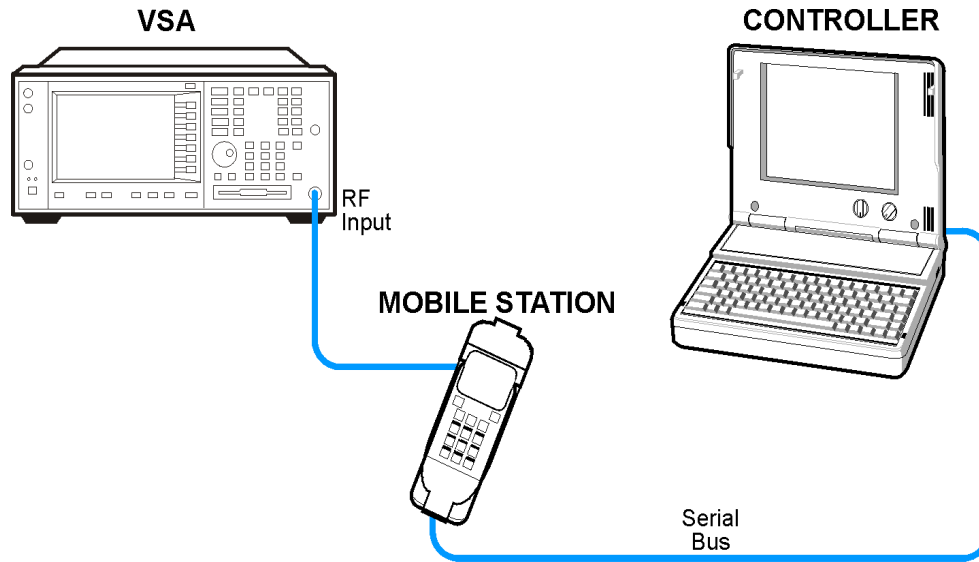
2. Configure the vector signal analyzer and complete the spurious emissions performance test.

   See the section titled, "Making the Spectrum Emission Mask Measurement" in "Chapter 3. Making W-CDMA (3GPP) Measurements" of the *Agilent Technologies E4406A VSA Series Transmitter Tester W-CDMA Measurement Guide* for VSA configurations and performance test procedure.

Uplink Measurement Setup

This section will guide you through setting up the ESG and measuring the output using the E4406A VSA Transmitter Tester.

This setup provides two 3GPP channels with real-time signal generation capability, which are used to test 3GPP base station (BS) receiver designs.

Required Equipment

- one ESG-D Series Signal Generator with Option 200
- one E4406A VSA Series Transmitter Tester with Option BAF
- BNC cables as needed (see the following figure)

Refer to Figure 2-15 and make the necessary connections between the ESG and the E4406A.

Figure 2-15 ESG Uplink Measurement Setup
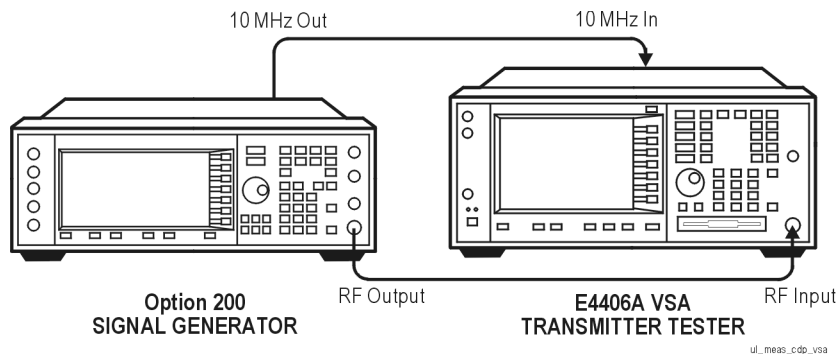
Configuring the ESG

NOTE   The following signal generator settings are used for example purposes. Change them as needed for your device under test (DUT).

---

1. Press **Preset**.

2. Press **Frequency** > **1.950** > **GHz** and then **Amplitude** > **–10** > **dBm**.

3. Press **Mode** > **Real Time I/Q BaseBand** > **CDMA** > **W-CDMA**.

4. Press **Link Down Up** until **Up** is highlighted.

5. Press **UE Setup**.

   This opens the user equipment (UE) setup editor. The highlight bar can be moved by rotating the front panel knob or pressing the arrow keys.

The following default values are displayed:

`Filter`	RNYQ (α = 0.220) EVM
`Chip Rate`	3.840000 Mcps
`Scrambling Code`	0

6. Press **Return** to reopen the W-CDMA menu.

7. Press the **Link Control** softkey.

   This opens the Link Control setup editor and a predefined configuration is enabled.

8. Press **Adjust Code Domain Power** > **Scale To 0dB**.

   Notice that the power levels have changed on each channel. This process has scaled the channel power levels to the proper amplitudes for transmission (the sum log value of the new power levels equals zero). The power ratios between the channels remain unchanged.

NOTE   Adjusting the code domain power applies to active channels only.

---

9. Toggle the **W-CDMA Off On** softkey to highlight **On**. Ensure that the `WCDMA` and `I/Q` annunciators are displayed.

10. Activate the RF output power by toggling the **RF On/Off** key until the `RF ON` annunciator is displayed on the ESG.

Configuring the E4406A VSA Series Transmitter Tester

This section explains how to configure the E4406A VSA, in order to measure the output signal from the ESG that was configured in the previous section.

Perform the following steps to view the code domain display:

1. Press **Preset**.

2. Set the VSA to use a 10 MHz external frequency reference.

Press: **System** > **Reference** > **Freq Ref Int Ext** > **10** > **MHz** > **Freq Ref Int Ext**

Ext is now underscored.

3. Choose the W-CDMA option.

   Press: **Mode** > **More (1 of 2)** > **W-CDMA (3GPP)**

4. Set the VSA to receive a mobile station signal.

   Press: **Mode Setup** > **Radio** (ensure that **MS** is underscored)

5. Set the center frequency to 1.950 GHz.

   Press: **FREQUENCY** > **1.950** > **GHz**

6. Select the code domain measurement.

   Press: **MEASURE** > **More (1 of 2)** > **Code Domain**

7. Activate the marker function and use the front panel knob to place marker #1 at the highest I or Q channel with the RPG knob.

8. In the upper right corner of the screen, ensure the marker readout data is shown as follows:

```
IMkr #1: C6 (16) 60 ksps
              -1.87 dB
```
   or
```
QMkr #2: C8 (0) 15 ksps
              -4.56 dB
```

NOTE   Be sure that the center frequency is set appropriately for your DUT.

The following figure shows the VSA code domain display.
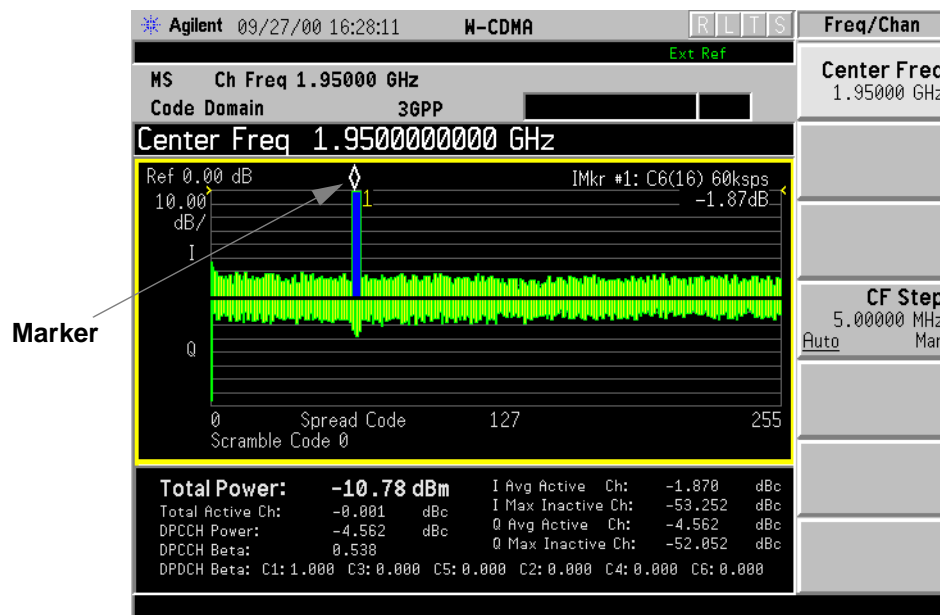
3GPP W-CDMA Base Station Performance Testing

This section includes signal generator configurations that will provide a stimulus for bit-error-ratio analysis of base station (BS) designs based on the requirements outlined in the 3GPP W-CDMA specification.[1]

This includes performance test summaries, test-specific signal generator settings, test system configurations, step-by-step instructions in the form of example test procedures, and example performance test records for testing the following performance specifications:

- "Reference Sensitivity Level (3G TS 25.141.7.2)" on page 2-81
- "Dynamic Range (3G TS 25.141.7.3)" on page 2-86
- "Adjacent Channel Selectivity (3G TS 25.141.7.4)" on page 2-91
- "Blocking Characteristics (3G TS 25.141.7.5)" on page 2-96
- "Intermodulation Response Rejection (3G TS 25.141.7.6)" on page 2-105
- "Spurious Emissions (3G TS 25.141.7.7)" on page 2-112

Required Equipment

- two ESG signal generators configured as a single ESG W-CDMA base station test solution
- one E4440A performance spectrum analyzer
- one signal source capable of providing CW at an amplitude range of −50 dBm to −15 dBm with an RF frequency range of 1.000 MHz to 12.750 GHz
- a system controller and software capable of providing control data to the base station under test
- software and/or hardware capable of measuring, calculating and storing the base station's bit error ratio (BER) while exposed to the test stimulus
- BNC cables, tee splitters, signal combiners, and adapters
- adapters and antennae as required by the BS

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1. *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12).*

ESG Physical Layer and Transport Layer Configuration

The physical layer and transport layer are configured separately. Physical layer configurations change as required by each individual performance test. The specified channel types and power levels are modified to provide the required stimulus for performing the individual performance specification tests.

The ESG provides a single-softkey solution for configuring factory-defined transport layer channelization. This predefined reference measurement channel is used as the transport layer configuration throughout the specification performance tests. For specific information regarding transport layer channelization based on this factory-defined setting, see the following section, "Understanding the Reference Measurement Channel" on page 4-18.

Performance Test Preparation

Prior to initiating the performance tests, ensure that:

- the base station's transmitter port(s) are terminated (to avoid the RF leakage power),

- the base station's TPC function is disabled, and

- the appropriate external attenuators are being used (for higher accuracy and less mismatch losses).

NOTE   All ESG signal parameters are specified at the front panel RF OUTPUT connector. Losses due to cabling and signal combining must be considered when performing the tests.

Reference Sensitivity Level (3G TS 25.141.7.2)

This section explains how to configure your test system, including signal generator settings and test system connections, in order to complete a reference sensitivity level performance test on your base station (BS). It includes an example performance test procedure and performance test record.

Specification Definition

Reference sensitivity level is a measure of the minimum receiver input power at the antenna connector at which the bit error ratio does not exceed a specific value.[1]

Performance Test Objective

The objective of this performance test is to determine the Reference Sensitivity Level (RSL) performance of your BS against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) at a specified minimum power level measured at the BS antenna port.

Process
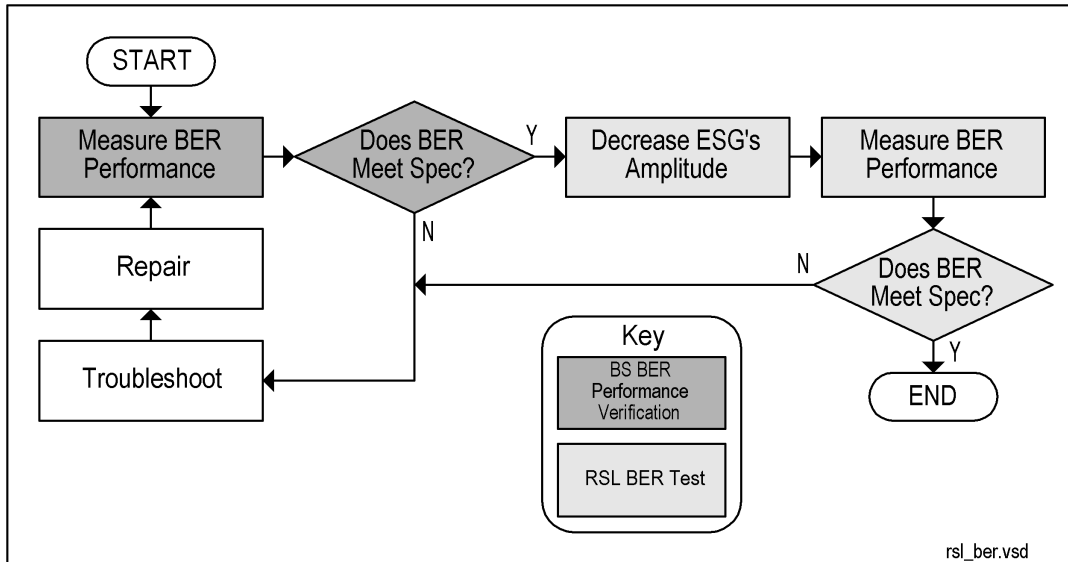
rsl_ber.vsd

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1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12).*

ESG Configuration

This test can be performed using the default uplink W-CDMA parameter settings with the exceptions of setting Frequency, Amplitude, Channel State, RF On/Off, and Mod On/Off. Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-42 and Table 2-43.

Table 2-42 RSL Physical Layer Configuration

Channel #	Parameter	Setting
Channel 1	Channel State	On
	PhyCH Type	DPCCH
	Power	−2.69 dB
	Beta	11
	TFCI Pattern	0000
	Slot Format	0
	Symbol Rate	15.0 ksps
	FBI Pattern	00000000
	Channel Code	0
	TPC Pattern	Up/Down
	TPC Pat Steps	1
Channel 2	Channel State	On
	PhyCH Type	DPDCH
	Power	0.00 dB
	Beta	15
	Data	Transport CH
	Symbol Rate	60.000 ksps
	Slot Format	2
	Channel Code	16

Table 2-43 RSL Transport Layer, Baseband, and RF Carrier Configuration

Transport Layer Parameter	Setting
Ref Measure Setup	12.2 kbps
Data	PN9
W-CDMA Baseband Signal Parameter	**Setting**
UE Setup	Filter: RNYQ (α=0.220)EVM Chip Rate: 3.840000 Mcps Scrambling Code: 0
BBG Data Clock	Int[1]
Phase Polarity	Normal
W-CDMA Off/On	On
W-CDMA RF Carrier Parameter	**Setting**
Frequency	1950 MHz
Amplitude	−111.00 dBm[2]
RF Off/On	On
Mod Off/On	On

[1] Set to external if using the optional base station chip clock output as the ESG's data clock source.

[2] The amplitude of the RF output is initially set to an arbitrary value (−111.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (−121.0 dBm) in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA reference sensitivity level test on your BS. Perform the procedures in the subsections sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your BS.

Figure 2-16 Reference Sensitivity Level Equipment Setup
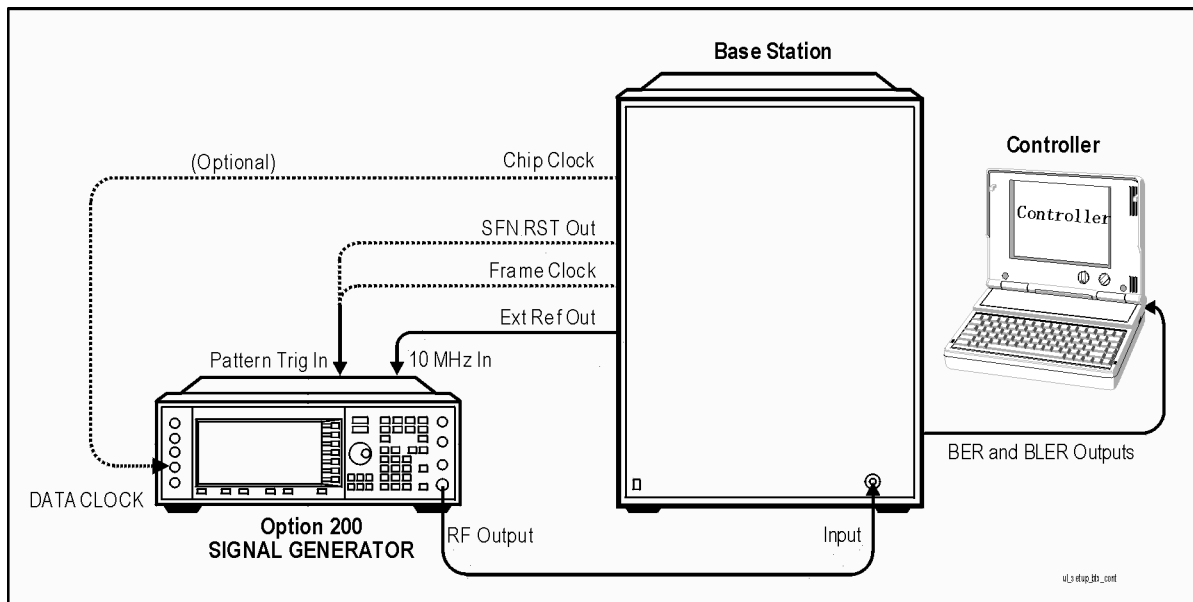
1. Connect the BS to the test system as shown in Figure 2-16.

    a. Using the appropriate cables, adapters, and antennae, connect the output of the ESG to the RF input of the BS.

    b. If the BS has multiple input ports, terminate the unused ports.

    c. Connect the system controller and the BER test platform to the BS.

2. Measure the Bit Error Ratio (BER) of the BS.

    The controller or BER test platform measures the bit error ratio of the BS exposed to the RF output power specified by TS 25.141.7.8 V3.4. This process verifies that the BER of the BS is within specification before decreasing the amplitude of the RF output power.

3. Record the first BER measurement result in the column titled, "Verification BER Value" in Table 2-44.

4. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

    • If the measured value is within the limits, continue to subsection 2.

- If the measured value is outside the limits, determine the cause of failure and repair the BS. After repair, return to Step 1 of this subsection.

Subsection 2. Reference Sensitivity Level Measurement

Complete the following steps to make a reference sensitivity level measurement on your BS.

1. Decrease the amplitude of the W-CDMA stimulus.

   In accordance with the 3GPP W-CDMA RF specification, decrease the amplitude of the RF output power to –121.00 dBm.

   On the ESG,

   Press **Amplitude** > **–121** > **dBm**.

2. Measure the BER of the BS at the decreased amplitude.

   The controller or BER test platform measures the bit error ratio of the BS with a W-CDMA stimulus amplitude of –121.00 dBm.

3. Record the BER result in the column titled, "Reference Sensitivity Level BER Value" in Table 2-44.

4. Compare the recorded value of the BER result with the allowable values and record the PASS/FAIL status for the BS.

Example Test Record

Use the following table to record the data from the RSL performance test.

Table 2-44 RSL Performance Test Record

Verification BER Value	Reference Sensitivity Level BER Value	Specification Limitation	PASS/FAIL Status
		BER ≤ 0.001	

Dynamic Range (3G TS 25.141.7.3)

This section explains how to configure your test system, including signal generator settings and test system connections, in order to complete a dynamic range performance test on your base station (BS). It includes an example performance test procedure and performance test record.

Specification Definition

Dynamic range is a measure of a receiver's ability to handle a rise of interference in the reception frequency channel. The receiver shall fulfill a specified BER requirement for a specified sensitivity degradation of the wanted signal in the presence of an interfering AWGN signal in the same reception frequency channel.[1]

Performance Test Objective

The objective of this performance test is to determine the dynamic range performance of your BS against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of a specified interfering AWGN signal occupying the same reception channel.

Process
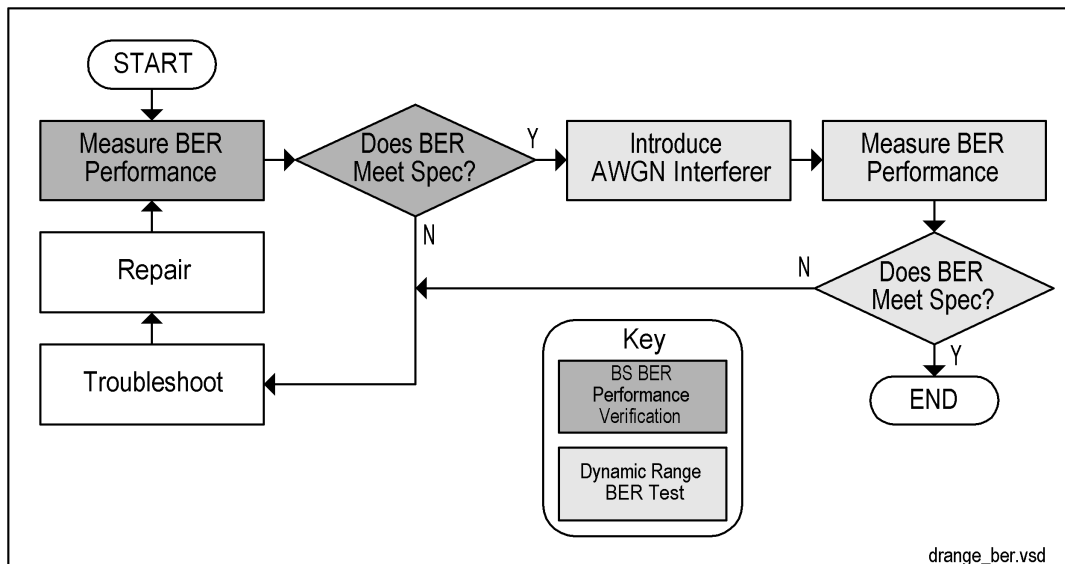
drange_ber.vsd

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1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12).*

ESG Configuration

This test can be performed using the default uplink W-CDMA parameter settings with the exceptions of setting Frequency, Amplitude, Channel State, RF On/Off, and Mod On/Off. Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-45 and Table 2-46.

Table 2-45 Dynamic Range Physical Layer Configuration

Channel #	Parameter	Setting
Channel 1	Channel State	On
	PhyCH Type	DPCCH
	Power	−2.69 dB
	Beta	11
	TFCI Pattern	0000
	Slot Format	0
	Symbol Rate	15.0 ksps
	FBI Pattern	00000000
	Channel Code	0
	TPC Pattern	Up/Down
	TPC Pat Steps	1
Channel 2	Channel State	On
	PhyCH Type	DPDCH
	Power	0.00 dB
	Beta	15
	Data	Transport CH
	Symbol Rate	60.000 ksps
	Slot Format	2
	Channel Code	16

Table 2-46 Dynamic Range Transport Layer, Baseband, and RF Carrier Configuration

Transport Layer Parameter	Setting
Ref Measure Setup	12.2 kbps
Data	PN9
W-CDMA Baseband Signal Parameter	**Setting**
UE Setup	Filter: RNYQ(α=0.220)EVM Chip Rate: 3.840000 Mcps Scrambling Code: 0
BBG Data Clock	Int[1]
Phase Polarity	Normal
W-CDMA Off/On	On
W-CDMA RF Carrier Parameter	**Setting**
Frequency	1950.0 MHz
Amplitude	–111.00 dBm[2]
RF Off/On	On
Mod Off/On	On

[1] Set to external if using the optional base station chip clock output as the ESG's data clock source.

[2] The amplitude of the RF output is initially set to an arbitrary value (–111.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–91.0 dBm) in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA dynamic range test on your BS. Perform the procedures in the subsections sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your BS.

Figure 2-17 Dynamic Range Equipment Setup
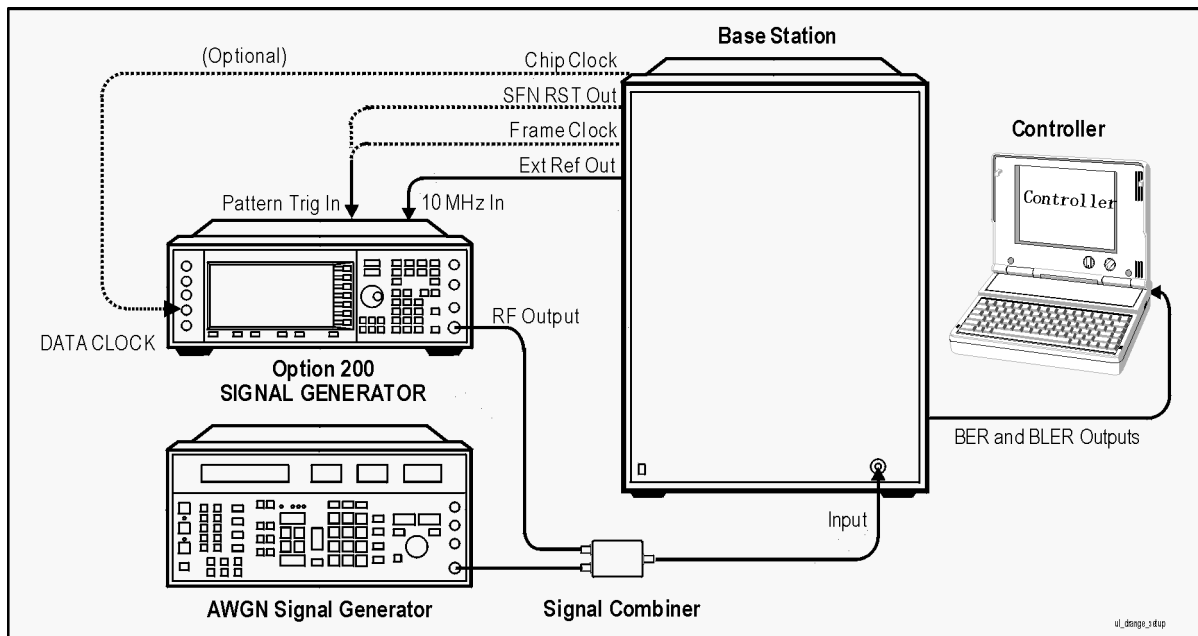
1. Connect the BS to the test system as shown in Figure 2-17.

   a. Using the appropriate cables, adapters, and antennae, connect the combined outputs of the ESG system and AWGN signal generator to the RF input of the BS.

   b. If the BS has multiple input ports, unused ports need to be terminated.

   c. Connect the system controller and the BER test platform to the BS.

2. Measure the Bit Error Ratio (BER) of the BS.

   The controller or BER test platform measures the bit error ratio of the BS exposed to the RF output power at a typical amplitude. This process verifies that the BER of the BS is within specification before introducing the AWGN interferer.

3. Record the first BER measurement result in the column titled, "Verification BER Value" in Table 2-47.

4. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

    • If the measured value is within the limits, continue to subsection 2.

    • If the measured value is outside the limits, determine the cause of failure and repair the BS. After repair, return to Step 1 of this subsection.

Subsection 2. Dynamic Range Measurement

Complete the following steps to make a dynamic range measurement on your BS.

1. Modify the amplitude level the W-CDMA stimulus.

    In accordance with the 3GPP W-CDMA RF specification, increase the amplitude of the RF output power to –91.00 dBm.

    On the ESG:

    Press **Amplitude** > **–91** > **dBm**.

2. Introduce the AWGN interferer. This signal acts as an interferer to degrade the BER of the BS.

    On the AWGN signal source:

    a. Set the RF output frequency to the same RF output frequency as the ESG.

    b. Set the amplitude to –73.00 dBm.

    c. Set the bandwidth to 3.840 MHz (3.84 Mcps data clock rate).

    d. Activate the modulation.

    e. Activate the RF output.

3. Measure the BER of the W-CDMA signal in the presence of the AWGN interferer.

    The controller or BER test platform measures the BER of the BS in the presence of the AWGN interferer.

4. Record the BER result in the column titled, "Dynamic Range BER Value" in Table 2-47.

5. Compare the recorded value of the BER result with the allowable values and record the PASS/FAIL status for the BS.

Example Test Record

Use the following table to record the data from the dynamic range performance test.

Table 2-47 Dynamic Range Performance Test Record

Verification BER Value	Dynamic Range BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤0.001	

Adjacent Channel Selectivity (3G TS 25.141.7.4)

This section explains how to configure your test system, including signal generator settings and test system connections, in order to complete an adjacent channel selectivity performance test on your base station (BS). It includes an example performance test procedure and performance test record.

Specification Definition

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a wanted signal at its assigned frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.[1]

Performance Test Objective

The objective of this performance test is to determine the ACS performance of your base station against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of a specified adjacent channel interferer.

Process
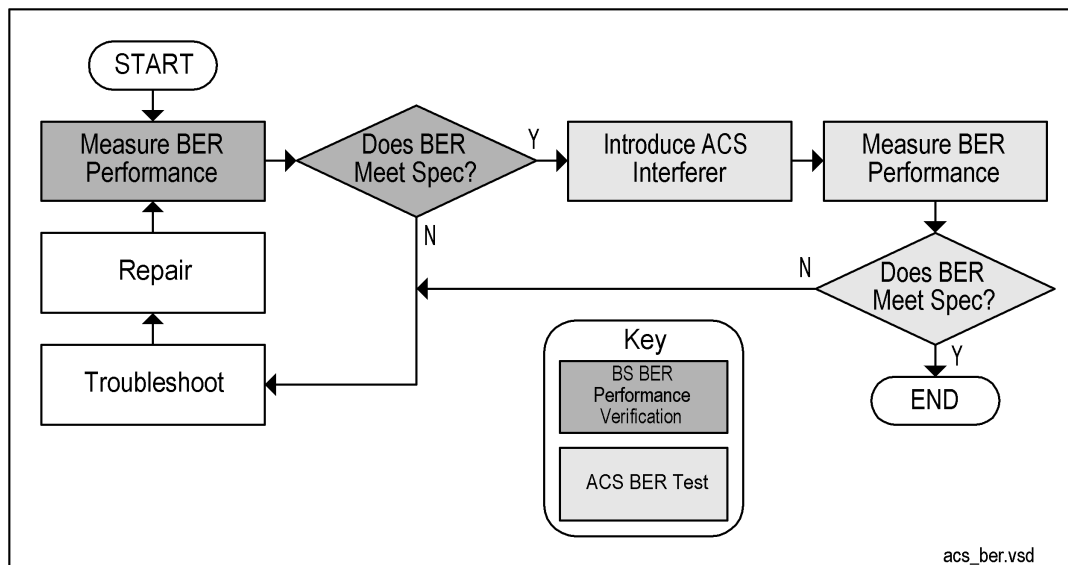
acs_ber.vsd

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12)*.

ESG Configuration

This test can be performed using the default uplink W-CDMA parameter settings with the exceptions of setting Frequency, Amplitude, Channel State, RF On/Off, and Mod On/Off. Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-48 and Table 2-49.

Unless otherwise noted, values are to be entered on both signal generators.

Table 2-48 ACS Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1 ESG 2 Channel 2	Channel State	On
	PhyCH Type	DPCCH
	Power	−2.69 dB
	Beta	11
	TFCI Pattern	0000
	Slot Format	0
	Symbol Rate	15.0 ksps
	FBI Pattern	00000000
	Channel Code	0
	TPC Pattern	Up/Down
	TPC Pat Steps	1
ESG 1 Channel 1 ESG 2 Channel 2	Channel State	On
	PhyCH Type	DPDCH
	Power	0.00 dB
	Beta	15
	Data	Transport CH
	Symbol Rate	60.000 ksps
	Slot Format	2

Table 2-49 ACS Transport Layer, Baseband, and RF Carrier Configuration

Transport Layer Parameter	Setting
Ref Measure Setup	12.2 kbps
Data	PN9
W-CDMA Baseband Signal Parameter	**Setting**
UE Setup	Filter: RNYQ(α=0.220)EVM Chip Rate: 3.840000 Mcps Scrambling Code: 0
BBG Data Clock	Int[1]
Phase Polarity	Normal
W-CDMA Off/On	On
W-CDMA RF Carrier Parameter	**Setting**
Frequency	1950 MHz (ESG 1) 1945 MHz or 1955 MHz (ESG 2)[2]
Amplitude	−111.00 dBm (ESG 1)[3] −52.00 dBm (ESG 2)
RF Off/On	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] Set to external if using the optional base station chip clock output as the ESG's data clock source.

[2] The frequency of the unwanted signal generated at the output of ESG 2 must be ±5 MHz from the fundamental waveform generated at the output of ESG 1.

[3] The amplitude of the W-CDMA stimulus is initially set to an arbitrary value (−111.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (−115.0 dBm) in accordance with the 3GPP specification for this performance test.

NOTE   For this performance test, ESG 2 must be provided with Option H99 Improved ACP performance for W-CDMA, CDMA, and TETRA systems.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA adjacent channel selectivity test on your BS. Perform the procedures in the subsections sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your BS.

Figure 2-18 Adjacent Channel Selectivity Equipment Setup
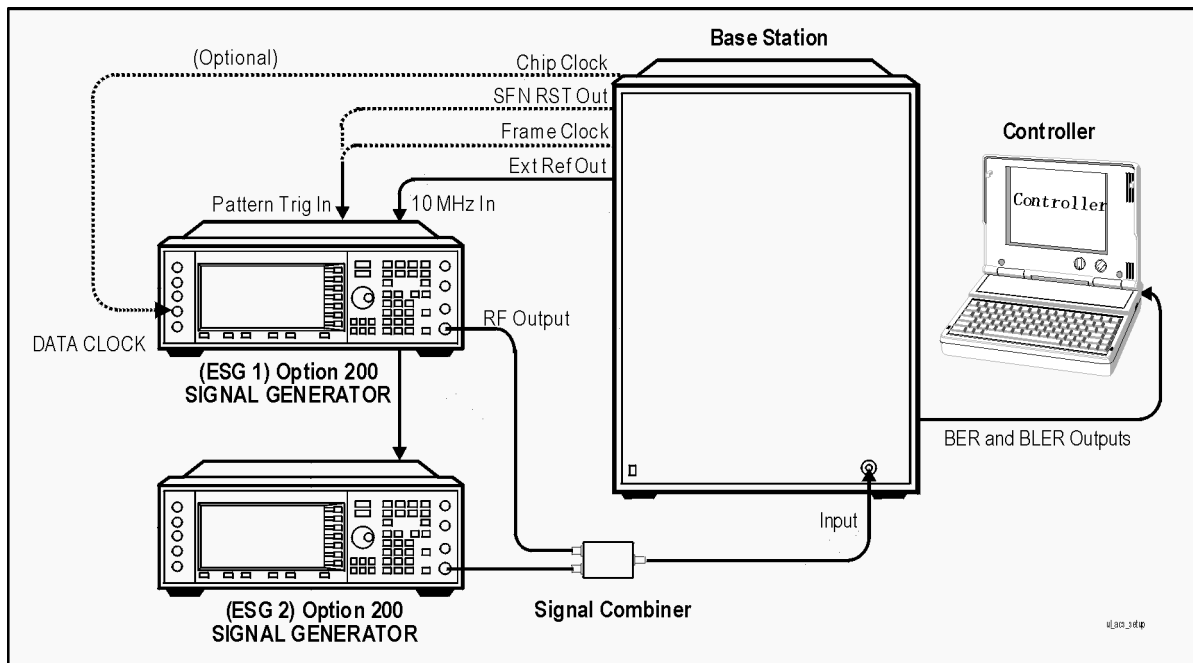
1. Connect the BS to the test system as shown in Figure 2-18.

   a. Using the appropriate cables, adapters, and antennae, connect the output of the two ESGs to the RF input ports of the signal combiner.

   b. Connect the RF output port of the signal combiner to the RF input of the BS.

   c. Connect the system controller and the BER test platform to the BS.

2. Measure the Bit Error Ratio (BER) of the BS.

   The controller or BER test platform is measuring the bit error ratio of the BS exposed to the RF output of ESG 1 only. This process verifies that the BER of the BS is within specification without the adjacent channel interferer.

3. Record the first BER measurement result in the column titled, "Verification BER Value" in Table 2-50.

4. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the BS. After repair, return to Step 1 of this subsection.

Subsection 2. ACS Measurement

Complete the following steps to make an ACS measurement on your BS.

1. Modify the amplitude of the W-CDMA stimulus to –115.00 dBm.

   On ESG 1:

   Press **Amplitude** > **–115** > **dBm**.

2. Introduce the adjacent channel interferer.

   The adjacent channel stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this adjacent channel interferer can be offset ±5 MHz from the center frequency of fundamental waveform. The amplitude of the adjacent interferer is –52.00 dBm.

   On ESG 2:

   Press **RF On/Off** (or executing the appropriate SCPI command) until the RF ON annunciator is displayed on ESG 2.

3. Measure the BER of the BS in the presence of the adjacent channel stimulus.

   The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the W-CDMA stimulus from ESG 1 and the adjacent channel interferer from ESG 2.

4. Record the BER measurement result in the column titled, "Adjacent Channel BER Value" in Table 2-50.

5. Compare the recorded value of the BER measurement with the allowable values and record the PASS/FAIL status for the BS.

Example Test Record

Use the following table to record the data from the ACS performance test.

Table 2-50 ACS Performance Test Record

Verification BER Value	Adjacent Channel BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤0.001	

Blocking Characteristics (3G TS 25.141.7.5)

This section explains how to configure your test system, including signal generator settings and test system connections, in order to complete a blocking characteristics performance test on your base station (BS). It includes an example performance test procedure and performance test record.

NOTE   An external source capable of providing CW at an amplitude of –15 dBm across a frequency range of 4 to 12.750 GHz is required for testing above 4 GHz (or the maximum RF output frequency of your ESG).

Specification Definition

Blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels.[1]

Performance Test Objective

The objective of this performance test is to determine the in-band and out-of-band blocking characteristics performance of your BS against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of specified interferers at in-band and out-of-band frequencies (other than adjacent channel frequencies).

---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12)*.

Process

In-Band Tests

block_in_ber.vsd

Out-of-Band Tests

block_out_ber.vsd
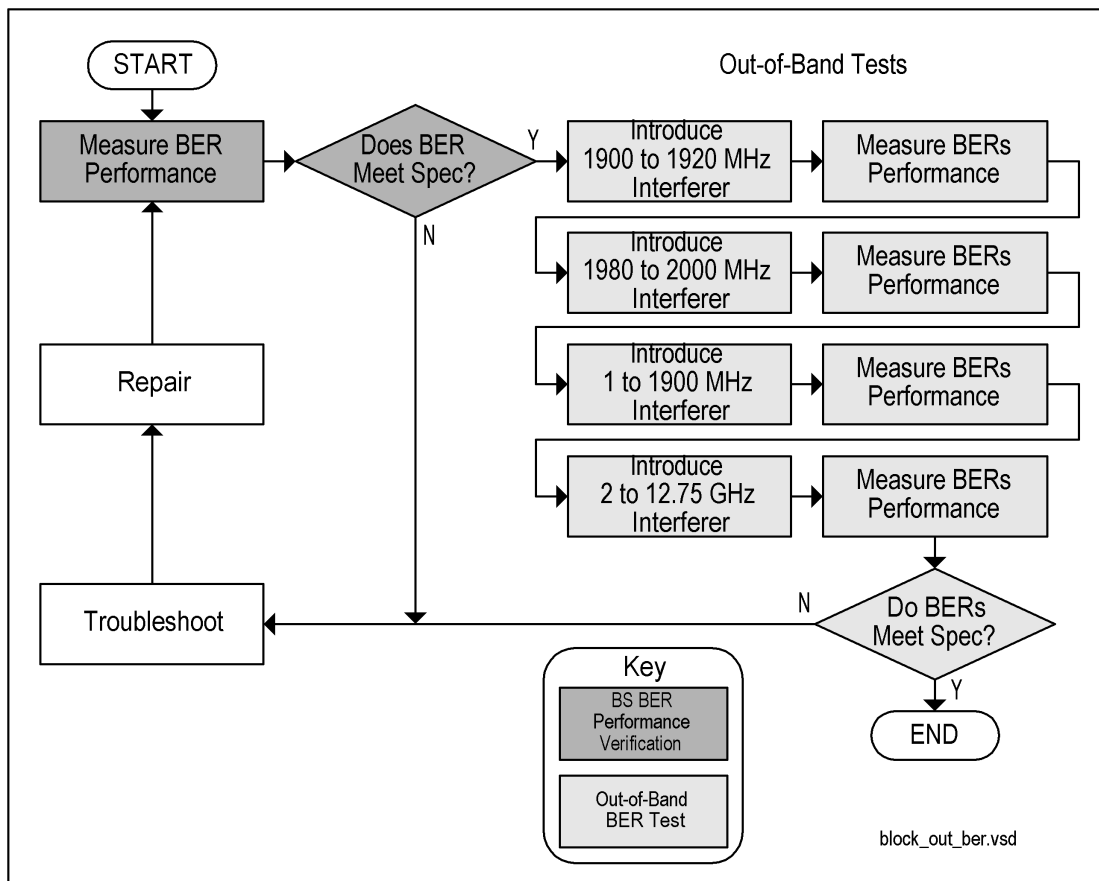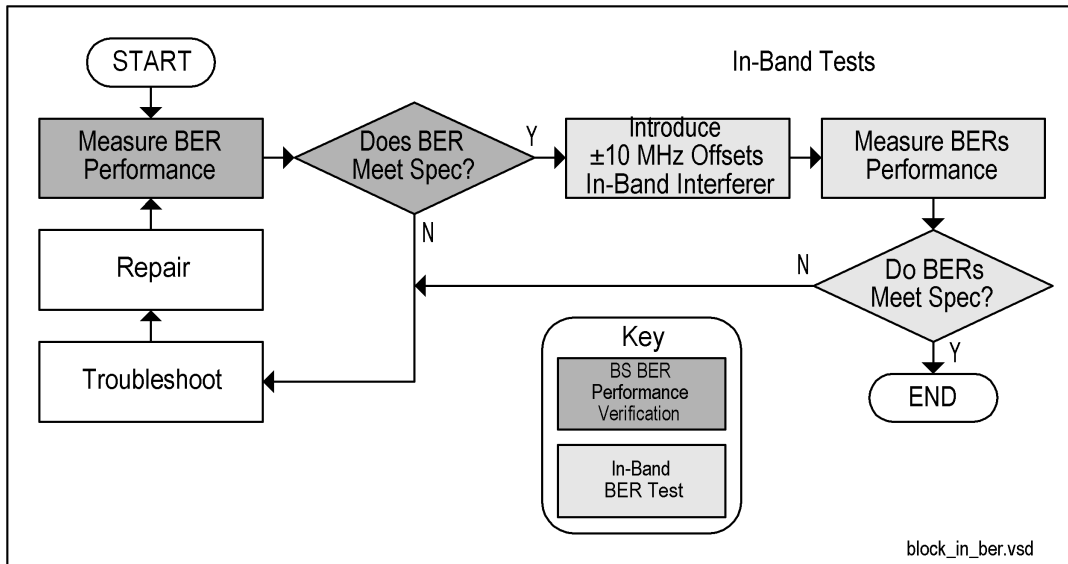
ESG Configuration

Performance tests can be done with the default settings with the exceptions of setting Frequency, Amplitude, Channel State, RF On/Off, and Mod On/Off. Configure the signal generators by using the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-51 and Table 2-52.

Unless otherwise noted, values are to be entered on both signal generators.

Table 2-51 Blocking Characteristics Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1 ESG 2 Channel 1	Channel State	On
	PhyCH Type	DPCCH
	Power	−2.69 dB
	Beta	11
	TFCI Pattern	0000
	Slot Format	0
	Symbol Rate	15.0 ksps
	FBI Pattern	00000000
	Channel Code	0
	TPC Pattern	Up/Down
	TPC Pat Steps	1
ESG 1 Channel 2 ESG 2 Channel 2	Channel State	Off

Table 2-52 Blocking Characteristics Transport Layer, Baseband, and RF Carrier Configuration

Transport Layer Parameter	Setting
Ref Measure Setup	12.2 kbps
Data	PN9
W-CDMA Baseband Signal Parameter	**Setting**
UE Setup	Filter: RNYQ(α=0.220)EVM Chip Rate: 3.840000 Mcps Scrambling Code: 0
BBG Data Clock	Int[1]
Phase Polarity	Normal
W-CDMA Off/On	On
W-CDMA RF Carrier Parameter	**Setting**
Frequency	1950 MHz (ESG 1) 1940 MHz or 1960 MHz (ESG 2)[2]
Amplitude	−111.00 dBm (ESG 1)[3] −40.00 dBm (ESG 2)
RF Off/On	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] Set to external if using the optional base station chip clock output as the ESG's data clock source.

[2] The frequency of the unwanted signal generated at the output of ESG 2 must be ±10 MHz from the fundamental W-CDMA signal generated at the output of ESG 1.

[3] The amplitude of the W-CDMA stimulus is initially set to an arbitrary value (−111.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (−115.0 dBm) in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA blocking characteristics test on your BS. Perform the subsections in this procedure sequentially, in the order in which they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your BS.

Figure 2-19 Blocking Characteristics Equipment Setup
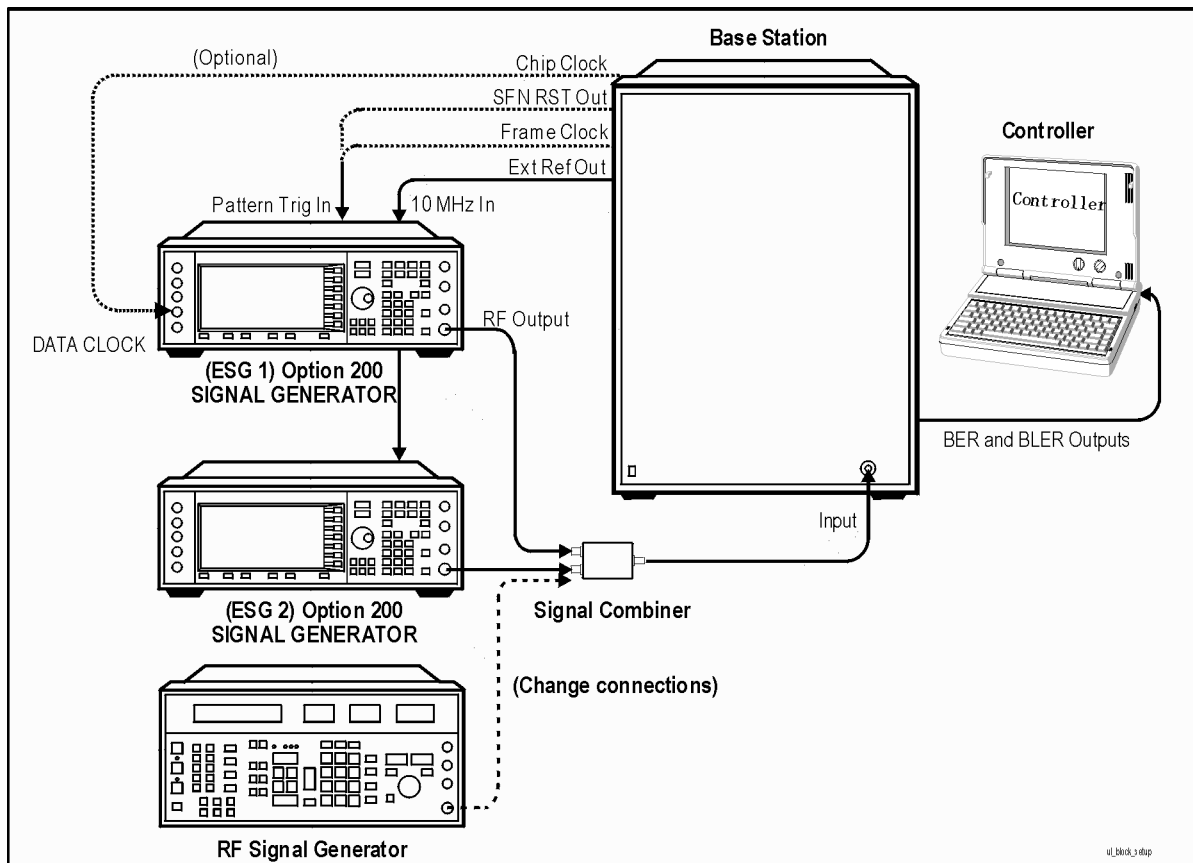
1. Connect the BS to the test system as shown in Figure 2-19.

   a. Using the appropriate cables, adapters, and antennae, connect the outputs of the two ESGs, or of one ESG and RF signal generator, to the RF input ports of the signal combiner.

   b. Connect the RF output port of the signal combiner to the RF input of the BS.

   c. Connect the system controller and the BER test platform to the BS.

2. Measure the Bit Error Ratio (BER) of the BS.

    The controller or BER test platform is measuring the bit error ratio of the BS exposed to the RF output of ESG 1 only. This process verifies that the BER of the BS is within specification without the presence of the interfering signal.

3. Record the first BER measurement result in the column titled, "Verification BER Value" in Table 2-53.

4. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

    • If the measured value is within the limits, continue to subsection 2.

    • If the measured value is outside the limits, determine the cause of failure and repair the BS. After repair, return to Step 1 of this subsection.

Subsection 2. In-Band Measurements

Complete the following steps to make an in-band blocking characteristics measurement on your BS.

1. Adjust the amplitude of the fundamental W-CDMA signal to the required value.

    Modify the amplitude of the W-CDMA stimulus to −115.0 dBm.

    On ESG 1:

    Press **Amplitude** > **−115** > **dBm**.

2. Introduce the in-band 10 MHz offset interferer.

    The first in-band interfering stimulus is made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this interferer must be offset ±10 MHz from the center frequency of fundamental W-CDMA signal. The amplitude of this interfering signal is −40.00 dBm.

    On ESG 2:

    Activate the RF output by pressing **RF On/Off** (or executing the appropriate SCPI command) until the RF ON annunciator is displayed.

3. Measure the BER of the BS in the presence of the 10 MHz offset in-band interferer.

    The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the RF output waveform from ESG 1 and the 10 MHz offset in-band interferer from ESG 2.

4. Record the BER measurement result for the 10 MHz offset in-band interferer in the column titled, "10 MHz Offset Interferer BER Value" in Table 2-53.

Subsection 3. Out-of-Band Measurements

Complete the following steps to make out-of-band blocking characteristics measurements on your BS.

Perform the following parts of this subsection sequentially, in the order they appear in this document.

Part A. Modulated Interferer Measurements

1. Introduce the modulated negative frequency offset out-of-band interferer.

   The out-of-band interfering stimulus is also made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this interferer must be offset a minimum of 10 MHz below the center frequency of fundamental W-CDMA signal. The amplitude of this interferer is –40.00 dBm.

   On ESG 2:

   Press **Frequency** and enter a value between 1900 MHz and 1920 MHz. This value must be at least 10 MHz below the center frequency of the fundamental W-CDMA signal.

2. Measure the BER of the BS in the presence of the modulated negative frequency offset out-of-band interferer.

   The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the fundamental W-CDMA signal from ESG 1 and the modulated negative frequency offset out-of-band interferer from ESG 2.

3. Record the BER measurement results for the modulated negative frequency offset out-of-band interferer in the column titled, "Negative Frequency Offset Interferer BER Value" in Table 2-54.

4. Introduce the modulated positive frequency offset out-of-band interferer.

   The out-of-band interfering stimulus is also made available at the RF output of ESG 2. In accordance with the 3GPP W-CDMA RF specification, the center frequency of this interferer must be offset a minimum of 10 MHz above the center frequency of fundamental W-CDMA signal. The amplitude of this interferer is –40.00 dBm.

   On ESG 2:

   Press **Frequency** and enter a value between 1980 MHz and 2000 MHz. This value must be at least 10 MHz above the center frequency of the fundamental W-CDMA signal.

5. Measure the BER of the BS in the presence of the modulated positive frequency offset out-of-band interferer.

   The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the fundamental W-CDMA signal from ESG 1 and the modulated positive frequency offset out-of-band interferer from ESG 2.

6. Record the BER measurement results for the modulated positive frequency offset out-of-band interferer in the column titled, "Positive Frequency Offset Interferer BER Value" in Table 2-54.

Part B. CW Interferer Measurements

NOTE	An external signal source capable of providing CW at an amplitude of –15 dBm across a frequency range of 1.000 MHz to 12.750 GHz is required for out-of-band performance testing.

1. Introduce the negative offset CW out-of-band interferer.

    The negative offset CW out-of-band interferer is made available at the RF output of the external signal source. The amplitude of this interferer is –15.00 dBm.

    On the external signal source:

    a. Set the waveform type to CW.

    b. Set the RF output frequency to a value between 1 MHz and 1900 MHz.

    c. Set the RF output amplitude to –15 dBm.

    d. Activate the RF output.

2. Measure the BER of the BS in the presence of the negative offset CW out-of-band interferer.

    The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the RF output waveform from ESG 1 and the negative offset CW out-of-band interferer from the external signal source.

3. Record the BER measurement results for the negative offset CW out-of-band interferer in the column titled, "Negative Frequency Offset Interferer BER Value" in Table 2-55.

4. Introduce the positive offset CW out-of-band interferer.

    The positive offset CW out-of-band interferer is made available at the RF output of the external signal source. The amplitude of this interferer is –15.00 dBm.

    On the external signal source:

    a. Set the waveform type to CW.

    b. Set the RF output frequency to a value between 2000 MHz and 12750 MHz.

    c. Set the RF output amplitude to –15 dBm.

    d. Activate the RF output.

5. Measure the BER of the BS in the presence of the positive offset CW out-of-band interferer.

    The controller or BER test platform is measuring the bit error ratio of the BS in the presence of both the RF output waveform from ESG 1 and the positive offset CW out-of-band interferer from the external signal source.

6. Record the BER measurement results for the positive offset CW out-of-band interferer in the column titled, "Positive Frequency Offset Interferer BER Value" in Table 2-55.

7. Compare all of the values with the specification limitations and assign a PASS/FAIL status to the BS.

Example Test Record

Use the following tables to record the data from the blocking characteristics performance tests.

Table 2-53 In-Band Measurement Blocking Characteristics Performance Test Record

Verification BER Value	10 MHz Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Table 2-54 Out-of-Band Modulated Interferer Measurements Blocking Characteristics Performance Test Record

Negative Frequency Offset Interferer BER Value	Positive Frequency Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Table 2-55 Out-of-Band CW Interferer Measurements Blocking Characteristics Performance Test Record

Negative Frequency Offset Interferer BER Value	Positive Frequency Offset Interferer BER Value	Specification Limitations	PASS/FAIL Status
		BER ≤ 0.001	

Intermodulation Response Rejection (3G TS 25.141.7.6)

This section explains how to configure your test system, including signal generator settings and test system connections, in order to complete an intermodulation response rejection performance test on your base station (BS). It includes an example performance test procedure and performance test record.

NOTE   An external source capable of providing CW at an amplitude of –48 dBm across a frequency range of 1920.0 to 1980.0 MHz is required for IRR performance testing.

Specification Definition

Intermodulation response rejection is a measure of the capability of a receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.[1]

Performance Test Objective

The objective of this performance test is to determine the Intermodulation Response Rejection (IRR) performance of your BS against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring Bit Error Ratio (BER) in the presence of two specified, frequency-related interferers.

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1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12).*

Process
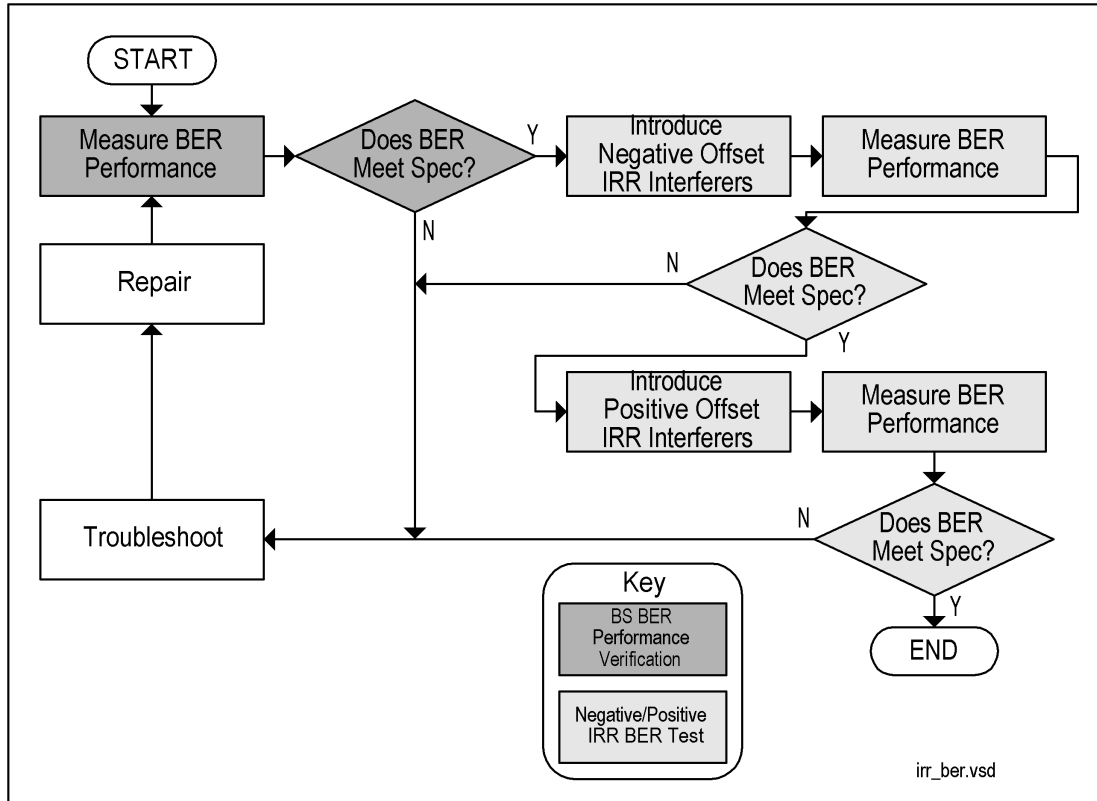
ESG Configuration

This test can be performed using the default uplink W-CDMA parameter settings with the exceptions of setting Frequency, Amplitude, Channel State, RF On/Off, and Mod On/Off. To configure the signal generators, use the front panel hardkeys and softkeys (or the appropriate SCPI commands) to enter the values listed in Table 2-56 and Table 2-57.

Unless otherwise noted, values are to be entered on both ESGs.

Table 2-56 IRR Physical Layer Configuration

ESG # Channel #	Parameter	Setting
ESG 1 Channel 1 ESG 2 Channel 1	Channel State	On
	PhyCH Type	DPCCH
	Power	−2.69 dB
	Beta	11
	TFCI Pattern	0000
	Slot Format	0
	Symbol Rate	15.0 ksps
	FBI Pattern	00000000
	Channel Code	0
	TPC Pattern	Up/Down
	TPC Pat Steps	1
ESG 1 Channel 2 ESG 2 Channel 2	Channel State	Off

Table 2-57 IRR Transport Layer, Baseband, and RF Carrier Configuration

Transport Layer Parameter	Setting
Ref Measure Setup	12.2 kbps
Data	PN9
W-CDMA Signal Parameter	**Setting**
UE Setup	Filter: RNYQ(α=0.220)EVM Chip Rate: 3.840000 Mcps Scrambling Code: 0
BBG Data Clock	Int[1]
Phase Polarity	Normal
W-CDMA Off/On	On
W-CDMA RF Carrier Parameter	**Setting**
Frequency	1950 MHz (ESG 1) 1930 MHz (ESG 2)[2]
Amplitude	–111.00 dBm (ESG 1)[3] –48.0 dBm (ESG 2)
RF Off/On	On (ESG 1) Off (ESG 2)
Mod Off/On	On

[1] Set to external if using the optional base station chip clock output as the ESG's data clock source.

[2] The frequency of the modulated interferer generated at the output of ESG 2 must be ±20 MHz from the fundamental W-CDMA signal generated at the output of ESG 1.

[3] The amplitude of the W-CDMA stimulus is initially set to an arbitrary value (–111.0 dBm), in order to perform a BER verification measurement. After BER verification, the amplitude will be modified to the required value (–115.0 dBm) in accordance with the 3GPP specification for this performance test.

Example Test Procedure

Follow this example procedure to perform a 3GPP W-CDMA intermodulation response rejection test on your BS. Perform the subsections in this procedure sequentially, in the order they appear in this document.

Subsection 1. Equipment Setup and Preliminary BER Verification

Complete the following steps to connect the equipment and perform a BER verification test on your BS.

Figure 2-20 Intermodulation Response Rejection Equipment Setup
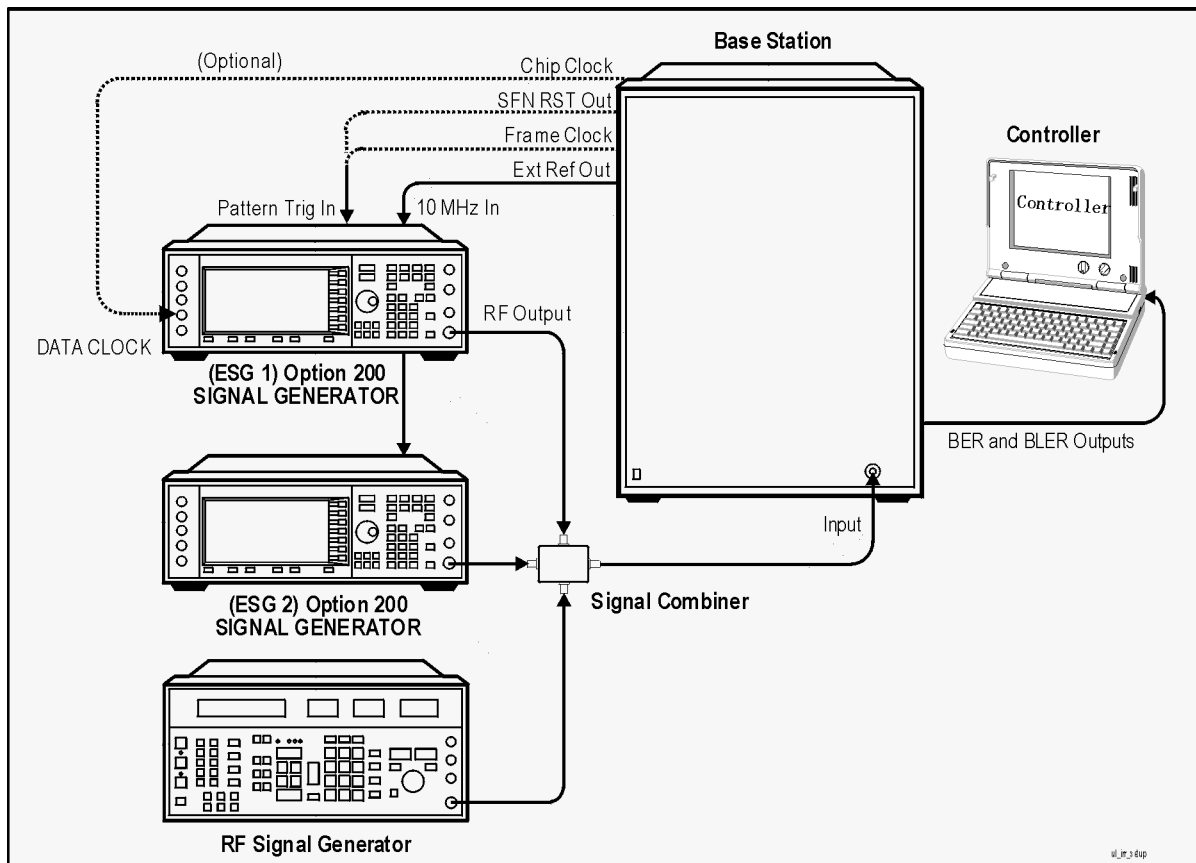
1. Connect the BS to the test system as shown in Figure 2-20.

   a. Using the appropriate cables, adapters, and antennae, connect the outputs of the two ESGs and one RF signal generator to the RF input ports of the signal combiner.

   b. Connect the RF output port of the signal combiner to the RF input of the BS.

   c. Connect the system controller and the BER test platform to the BS.

2. Measure the Bit Error Ratio (BER) of the BS.

   The controller or BER test platform is measuring the bit error ratio of the BS exposed to the RF output of ESG 1 only. This process verifies that the BER of the BS is within specification without the intermodulation products generated by the CW and modulated interferers.

3. Record the first BER measurement result in the column titled, "Verification BER Value" in Table 2-58.

4. Compare the measured BER value in the column titled, "Verification BER Value" with the limits from the column titled, "Specification Limitations."

   • If the measured value is within the limits, continue to subsection 2.

   • If the measured value is outside the limits, determine the cause of failure and repair the BS. After repair, return to Step 1 of this subsection.

Subsection 2. Negative Frequency Offset Interferers Measurement

Complete the following steps to make negative frequency offset interferer IRR measurements on your BS.

1. Adjust the amplitude of the fundamental W-CDMA signal to the required value.

   Modify the amplitude of the W-CDMA stimulus to –115.0 dBm.

   On ESG 1:

   Press **Amplitude** > **–115** > **dBm**.

2. Introduce the negative 10 MHz offset interferer from the RF signal generator and negative 20 MHz offset interferer from the ESG 2 (relative to the center frequency of the W-CDMA signal) in the frequency range 1920.0 to 1980.0 MHz. The amplitudes of these interferers are –48 dBm.

   On ESG 2:

   Activate the RF output by pressing **RF On/Off** (or executing the appropriate SCPI command) until the RF ON annunciator is displayed.

   On the external signal source:

   a. Set the waveform type to CW.

   b. Set the RF output frequency to 1940 MHz.

   c. Set the RF amplitude to –48 dBm.

   d. Activate the RF output.

3. Measure the BER of the BS.

   The controller or BER test platform is measuring the bit error ratio of the BS in the presence of the negative frequency offset interferers.

4. Record the BER measurement results for the negative frequency offset interferers measurement in the column titled, "Negative Frequency Offset Interferers BER Value" in Table 2-58.

Subsection 3. Positive Frequency Offset Interferers Measurements

Complete the following steps to make positive frequency offset interferer IRR measurements on your BS.

1. Introduce the positive 10 MHz offset interferer from the RF signal generator and positive 20 MHz offset interferer from the ESG 2 (relative to the center frequency of the W-CDMA signal) in the frequency range 1920.0 to 1980.0 MHz. The amplitudes of these interferers are –48 dBm.

   On ESG 2:

   Press **Frequency** > **1970** > **MHz**.

   On the external signal source:

   Set the RF output frequency to 1960 MHz.

2. Measure the BER of the BS.

   The controller or BER test platform is measuring the bit error ratio of the BS in the presence of the positive frequency offset interferers.

3. Record the BER measurement results for the positive frequency offset interferers measurement in the column titled, "Positive Frequency Offset Interferers BER Value" in Table 2-58.

4. Compare all of the values with the specification limitations and assign a PASS/FAIL status to the BS.

Example Test Record

Use the following table to record the data from the IRR performance test.

Table 2-58 IRR Performance Test Record

Verification BER Value	Negative Frequency Offset Interferers BER Value	Positive Frequency Offset Interferers BER Value	Specification Limitations	PASS/FAIL Status
			BER ≤ 0.001	

Spurious Emissions (3G TS 25.141.7.7)

This section contains a performance test summary and explains how to configure your test system in order to complete an spurious emissions performance test on your base station (BS).

NOTE   Spurious emissions measurements are only available within the specified input frequency limitations of the microwave spectrum analyzer.

Specification Definition

Spurious emissions is a measure of the power of emissions generated or amplified in a receiver that appear at the BS antenna connector.[1]

Performance Test Objective

The objective of this performance test is to determine the spurious emissions performance of your BS against limitations described in the 3GPP W-CDMA RF specification (3G TS 25.141 V3.4).

Defining Measurement

The PASS/FAIL status of the DUT is determined by measuring the power level and occupied bandwidth of the spurious emissions generated by the BS.

Process
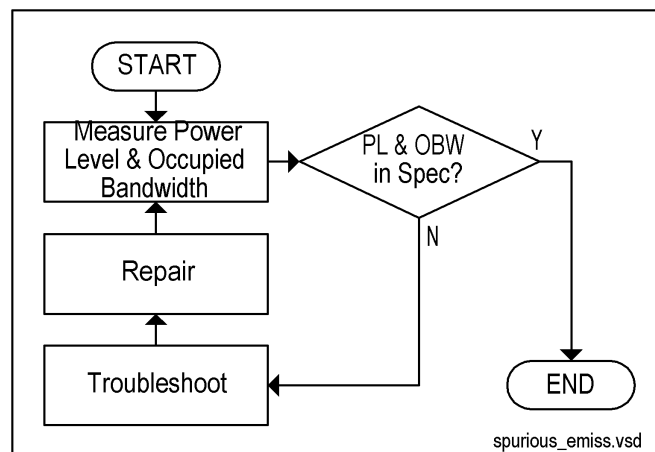
---

1. From *3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) Technical Specification 3G TS 25.141 V3.4 (2000-12)*.

Example Test Procedure

Follow this example procedure to perform 3GPP W-CDMA spurious emissions performance test on your BS.

Figure 2-21. Spurious Emissions Equipment Setup
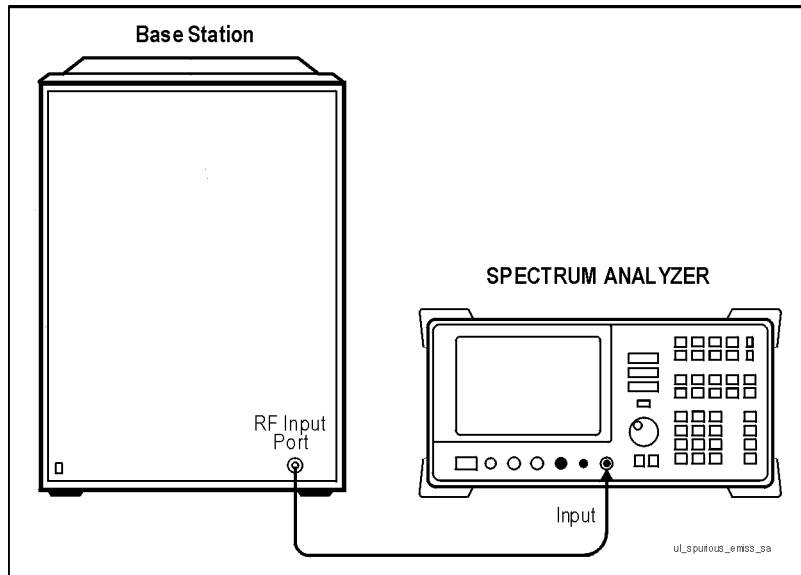
1. Connect the equipment as shown in Figure 2-21.

2. Configure the E4440A performance spectrum analyzer. (For additional information, refer to the E4440A performance spectrum analyzer measurement guide.)

3. Terminate the transmitter (TX) port(s) of the BS appropriately.

4. Set the frequency span of the spectrum analyzer from 1920 MHz to 1980 MHz. Measure the power levels and occupied bandwidths of the spurious emissions from the BS. Record the results in the column titled, "Measurement Value" in Table 2-59.

5. Set the frequency span of the spectrum analyzer from 9 kHz to 1 GHz. Measure the power levels and occupied bandwidths of the spurious emissions from the BS. Record the results in the column titled, "Measurement Value" in Table 2-59.

6. Set the frequency span of the spectrum analyzer from 1 GHz to 12.75 GHz. Measure the power levels and occupied bandwidths of the spurious emissions from the BS. Record the results in the column titled, "Measurement Value" in Table 2-59.

7. Compare the values with the specification limitations and assign a PASS/FAIL status to the BS.

Example Test Record

Use the following table to record the data from the spurious emissions performance test.

Table 2-59 Spurious Emissions Performance Test Record

Frequency Range	Measurement Value	Specification Limitations	PASS/FAIL Status
1920 to 1980 MHz		−78 dBm/3.840 MHz	
9 kHz to 1 GHz		−57 dBm/100 kHz	
1 GHz to 12.75 GHz[1]		−47 dBm/1 MHz	

[1]With the exception of frequencies lower than 12.5 MHz from the first carrier frequency used, or higher than 12.5 MHz from the last carrier frequency used.

Troubleshooting

Use the following checklists to help troubleshoot problems with Option 200.

NOTE   In some cases, the ESG may allow invalid channel coding settings without reporting an error. If you experience problems, ensure that the setting of the ESG(s) conform to the 3GPP Technical Specification.

Tips and Tricks

There is a Tips and Tricks section located on the Agilent Technologies ESG support web site that may provide you assistance in the operation of the Option 200 firmware. Perform the following steps to reach the appropriate web site:

1. Enter and go to www.agilent.com/find/esg.

2. Select your model of ESG under the Products list.

3. Select Software Patches and Drivers, in the next window, under the Additional Information list.

4. Select the firmware version currently loaded on your ESG, shown under the Software Updates section.

   The firmware version is displayed when the ESG is powered on or it can be viewed by pressing the following keys and viewing the listed field:

   Utility > **Instrument Info/Help Mode** > **Diagnostic Info** > Firmware Revision

5. Locate the Tips and Tricks section and follow any instructions that may be appropriate to your situation.

Can't Turn on W-CDMA

❏ At least one W-CDMA channel must be on.

Can't See Channels Displayed on Transmitter Tester

Ensure that the following are true:

❏ W-CDMA channels are on.

❏ W-CDMA is on (W-CDMA and I/Q annunciators are displayed). I/Q must be toggled on to modulate the RF output.

❏ ESG RF output is on (RF ON annunciator is displayed).

❏ ESG RF is modulated (MOD ON annunciator is displayed).

❏ Scrambling Code (BS Setup) of ESG matches primary scramble code of VSA.

❏ For two-ESG system configurations, the I/Q Source is set to Ext I/Q and BBG Data Clock set to Ext.

❑ ESG RF power may need to be increased (for example, −30 dBm).

❑ Power of other coded channels may need to be decreased.

❑ ESG carrier signal power is higher than the receiver's noise floor. (Increase the ESG carrier signal power level if the signal cannot be seen on the transmitter tester.)

❑ ESG OCNS channel power level is sufficient to increase the code domain power to the appropriate level without interfering with the other channels. (OCNS channel power may need to be reduced.)

When Programming Two ESGs, Both Signal Generators Display the Same Values

❑ Each ESG must have a unique GPIB address:
Utility > **GPIB/RS2-32** > **GPIB Address**

3 Softkey Reference

This chapter lists, in alphanumeric order, the softkeys and associated data fields available with Option 200.

Navigate among the data field entries using the front panel knob or the arrow keys.

For the SCPI commands that duplicate some of these softkeys remotely, see Chapter 5 , "Remote Programming and Examples."

To access the Option 200 softkeys use the front panel **Mode** key.

If your signal generator has multiple options, the softkeys in the first menu enable you to access the various options. Press **Real Time I/Q Baseband** to display the **CDMA** softkey.

pk725a
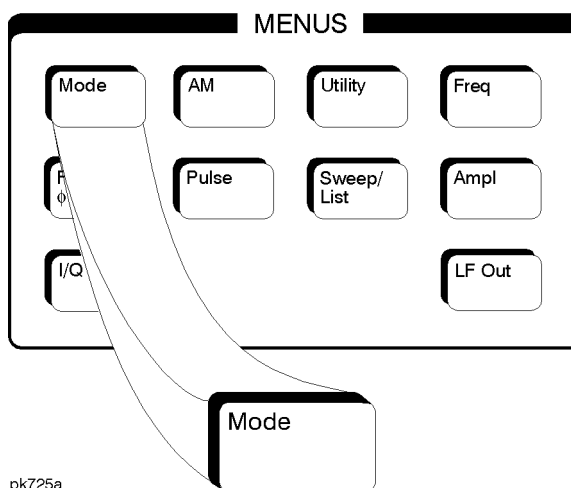
NOTE

- The key paths provided in this chapter do *not* include the **Real Time I/Q Baseband** softkey.

- If you do not see a softkey in the indicated menu, it may be on the next page of that menu; to display the next page, press the **More** softkey. Hardkeys and softkeys are denoted by **Bold** text; data fields by Courier font.
  For example:

  Hardkey   Softkeys   Data Field

  Location: **Mode** > **CDMA** > **BS Setup** > Filter

- All softkey and Data Field Location pathways assume a factory preset condition.

Symbols

of Blocks

This field sets the number of blocks transmitted by the active transport (DCH) channel.

Range: 1 to 8

Default: 1

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > (select any reference measurement channel type) > **Config Transport** > # of Blocks

% Power Other ESG

After setting the channel powers of both ESGs, edit this field by entering the percent power value of the ESG that is paired with this one. Once the value has been entered, **Scale to 0 dB** will scale the channel powers so that the sum of the powers is 0 dB taking into account the total power of both ESGs. See "Adjust the Relative Power Mapping" on page 2-14.

NOTE   For the single-ESG setup, set this field to 0.0 percent.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup** > % Power Other ESG

% Power This ESG

This field displays the percentage of total power that this ESG is contributing. Enter a value in the % Power Other ESG data field of the ESG that is paired with this one. See "Adjust the Relative Power Mapping" on page 2-14.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup** > % Power This ESG

Numerics

1/2 Conv

This key sets a one-half rate convolutional encoder, used for coding each transport channel selected for uplink physical channel #2.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Coding > **Edit Item** > **1/2 Conv**

1/3 Conv

This key sets a one-third rate convolutional encoder, used for coding each transport channel selected for uplink physical channel #2.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Coding > **Edit Item** > **1/3 Conv**

2 Box Setup

This key accesses a table editor from which you can select and modify the parameters of the IQ voltage scale and scale the code domain power to 0 dB for the two-ESG configuration. See "I/Q Voltage Scale" on page 3-39. This is valid for the two-ESG configuration in downlink only.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup**

10 msec

This key sets the frame clock interval to 10 milliseconds for the uplink synchronization signal setup.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Interval** > **10 msec**

12.2 kbps (25.101 v3.5)

This key sets the downlink DPCH channel to 12.2 kbps for the reference measurement test setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **12.2 kbps (25.101 v3.5)**

20 msec

This key sets the frame clock interval to 20 milliseconds for the uplink synchronization signal setup.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Interval** > **20 msec**

40 msec

This key sets the frame clock interval to 40 milliseconds for the uplink synchronization signal setup.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Interval** > **40 msec**

64 kbps (25.101 v3.5)

This key sets the downlink DPCH channel to 64 kbps for the reference measurement test setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **64 kbps (25.101 v3.5)**

80 msec

This key sets the frame clock interval to 80 milliseconds for the uplink synchronization signal setup.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Interval** > **80 msec**

144 kbps (25.101 v3.5)

This key sets the downlink DPCH channel to 144 kbps for the reference measurement test setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **144 kbps (25.101 v3.5)**

384 kbps (25.101 v3.5)

This key sets the downlink DPCH channel to 384 kbps for the reference measurement test setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **384 kbps (25.101 v3.5)**

A

Abort Channel Setup

This key immediately stops the channel-coding generation process that was initiated after pressing the **Apply Channel Setup** softkey. This key is valid for uplink only.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** or **2** > **PhyCH Setup** > **Apply Channel Setup** > **Abort Channel Setup**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > **Apply Channel Setup** > **Abort Channel Setup**

Actual BER

This field displays the actual bit error rate (BER) value being generated. This value may be different from the desired BER value as set in the BER field. It is calculated after the **Apply Channel Setup** key is pressed and the error bits are inserted into the data of the transport channel. To insert the error bits, the Err Insert field must be set to BER. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Actual BER

Actual BLER

This field displays the actual block error rate (BLER) value being generated. This value may be different from the desired BLER value as set in the BLER field. It is calculated after the **Apply Channel Setup** key is pressed and the error blocks are inserted into the data of the transport channel. To insert the error blocks, the Err Insert field must be set to BLER. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Actual BLER

Adjust Code Domain Power

This key accesses a menu in which you can adjust the code domain power. Select the **Equal Powers** or **Scale to 0 dB** softkey from the list displayed to set the code domain power level. This key is valid only for a one-box configuration.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Adjust Code Domain Power**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **Adjust Code Domain Power**

All Down

This key sets the transport power control (TPC) pattern to send consecutive down commands. The power will decrease by 1 dB on a slot-by-slot basis.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **All Down**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Select Pattern** > **All Down**

All Up

This key sets the transport power control (TPC) pattern to send consecutive up commands. The power will increase by 1 dB on a slot-by-slot basis.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **All Up**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Select Pattern** > **All Up**

AMR 12.2 (25.944 v3.3)

This key selects the adaptive multirate (AMR) 12.2 kbps reference measurement test setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **AMR 12.2 (25.944 v3.3)**

AMR 12.2 kbps

This key selects the adaptive multirate (AMR) 12.2 kbps reference measurement test setup.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **AMR 12.2 kbps**

APCO 25 C4FM

This key selects an Association of Public-safety Communications Officials (APCO) 25 specified C4FM filter in the **Select** (filter) menu. This is a Nyquist filter with an alpha of 0.2 that is combined with a shaping filter.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Select** > **APCO 25 C4FM**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **APCO 25 C4FM**

Apply Bit Errors

This key appears in two places.

Create File/Edit File Menu

This key displays a menu in which you can enter bit errors and a percentage of bit errors in the file displayed in the Bit File Editor.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** or **PICH** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > TPC Pattern > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors**

Bit Errors Menu

This key applies the adjusted values of bit errors to the current file. From this menu you can enter bit errors as a numeric value or as a percentage or the total bit count and apply these to the selected file.

Range: 0 to 511

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** or **PICH** >**PhyCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Apply Bit Errors**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > TFCI Pattern, TPC Pattern, or FBI Pattern > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Apply Bit Errors**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Apply Bit Errors**

Apply Channel Setup

This key initiates the data coding process for the physical and transport channel's user-defined parameters. Upon pressing this key, the required calculations are made and data is generated. The time taken is dependent on the physical and transport channel configurations. This key appears in several locations.

PhyCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > (type) > **PhyCH Setup** > **Apply Channel Setup**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > **Apply Channel Setup**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > **Apply Channel Setup**

TrCH Setup Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > **Apply Channel Setup**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > **Apply Channel Setup**

B

BBG Data Clock Setup

This key displays a menu from which you can select the baseband generator (BBG) data clock source and a multiplier for the external clock.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BBG Data Clock Setup**

BBG Data Clock Ext Int

This key selects the baseband generator (BBG) data clock source. The choices are external (Ext) or internal (Int). In external mode, the baseband generator uses the signal applied to the external data clock input as the data clock. When internal is selected, it uses the internal data clock.

Default: Internal

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BBG Data Clock Ext Int**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BBG Data Clock Setup** > **BBG Data Clock Ext Int**

BCH Data

This field displays the data type used for the broadcast channel (BCH). The data type can be PN9, PN15, FIX4 or a user file. The BCH is carried on the P-CCPCH channel.

Default: 0000

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **3** > **PhyCH Type** > BCH Data

BER

This key sets the insertion mode to Bit Error Rate (BER) for each transport channel. An incorrect bit sequence is inserted in the data.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Err Insert > **Edit Item** > **BER**

BER

> This field displays the bit error rate (BER) to be inserted into the
> selected transport channel data. The value entered into this field is
> valid only when the `Err Insert` field is set to `BER`. The errors are
> applied to transport channel data when the **Apply Channel Setup** softkey
> is pressed. The actual numbers of the `Error Bit`, the `Total Bit`, and
> the `Actual BER` are displayed below this field after the errors are
> applied to the transport channel data. This data field is on the second
> page of the table editor.
>
> Range: 0.0000 to 1.0000
>
> Default: 0.0000
>
> Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
> **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** >
> **TrCH Setup** > BER

Beta

> This key is activated automatically when you select the Kaiser
> windowing function. The default Beta factor provides a good
> compromise for optimizing out-of-band performance (ACP) without
> seriously compromising passband performance (EVM).
>
> Changing the Beta factor adjusts the trade-off between ACP and EVM:
>
> - decreasing the value improves EVM
>
> - increasing the value improves ACP
>
> Range: 1.000 to 10.000
>
> Default: 4.000
>
> Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** >
> **BS Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** >
> **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Kaiser** > **Beta**
>
> Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
> **UE Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** >
> **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Kaiser** > **Beta**

```
Beta
```

This field displays the signaling value for the amplitude ratio. The value of the `Power` field is re-calculated when the value is set in this field. If the value of the `Power` field is directly set, the value of this field becomes invalid and "-" is displayed.

Range: 0 to 15

Default: 15

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** or **2** > **PhyCH Setup** > Beta

Bit Errors (numeric value)

This key allows you to enter bit errors into a selected file. The number of bit errors is displayed in the active entry area of the `Bit File Editor` display. These errors are applied to the selected file when the **Apply Bit Errors** softkey is pressed. The **Bit Errors** percent softkey will update automatically to reflect the number of bit errors selected. This key appears in several locations.

PhyCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** or **PICH** > **PhyCH Setup** > Data > **Edit Item** > **User File** > or **Edit File** > **Apply Bit Errors** > **Bit Errors <numeric value>**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > TPC Pattern > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <numeric value>**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <numeric value>**

TrCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1, 2, 3,** or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <numeric value>**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > Data > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <numeric value>**

Bit Errors (percent value)

This key allows you to enter bit errors into the selected file as a percentage of the total bit count. The percentage of bit errors is displayed in the active entry area of the `Bit File Editor` display. These errors are applied to the selected file when the **Apply Bit Errors** softkey is pressed. When the percent value changes, the bit error numeric value is automatically adjusted to reflect the number of bit errors. This key appears in several locations.

PhyCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** or **PICH** > **PhyCH Setup** > `Data` > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <% value>**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `TPC Pattern` >**Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <% value>**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <% value>**

TrCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or   > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > `Data` > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <% value>**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Data` > **Edit Item** > **User File** > **Create File** or **Edit File** > **Apply Bit Errors** > **Bit Errors <% value>**

Bits/Frame

This field is not user-defined. The value cannot be changed and the field is grayed-out. The field displays the bits per frame for the fully coded transport channel and is automatically updated from calculated transport channel parameters and the Ref Measurement Setup test rate selection.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > Bits/Frame

Default (Uplink): 490 for transport channel #1, 110 for transport channel #2, 60 for transport channels #3, #4, #5, and #6

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Bits/Frame

Bits Rate

This field is not user-defined. The value cannot be changed and the field is grayed-out. The bits rate value is automatically updated from calculated transport channel parameters and the Ref Measurement Setup test rate selection.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > Bits Rate

Default (Uplink): 12.2 kbps for transport channel #1, 2.40 kbps for transport channel #2, 2.00 kbps for transport channels #3, #4, #5, and #6

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Bits Rate

BLER

This key sets the insertion mode to Block Error Rate (BLER) for each transport channel. An incorrect CRC bit sequence is inserted in the data.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Err Insert > **Edit Item** > **BLER**

```
BLER
```

This field displays the block error rate (BLER) in bits, selected for the transport channel data. The value entered into this field is valid only when the `Err Insert` field is set to `BLER`. The errors are applied to the transport channel data when the **Apply Channel Setup** softkey is pressed. The numbers of the `Error Block`, the `Total Block`, and the `Actual BLER` fields are displayed below this field after the errors are applied to the transport channel data. This data field is on the second page of the table editor. See "Num of Blk" on page 3-46 for more information.

Range: 0.000 to 1.000

Default: 0.000 for all Transport Channels

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `BLER`

```
Blk Size
```

This field displays the coding block size of the selected transport channel. The total input data in one transport channel is the block size multiplied by the number of blocks.

Range: 0 to 5000

Default (Downlink): 20 for all the transport channels

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Blk Size`

Default (Uplink): 244 for transport channel #1, 96 for transport channel #2, 20 for transport channels #3, #4, #5, and #6.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > `Blk Size`

BS Setup

This key accesses a table editor from which you can select and modify the parameters for the base station (BS). Highlight the data field you want to change and press the **Edit Item** softkey. Press a softkey, use the numeric keypad or front panel knob to change values contained in the table and press the appropriate softkey to terminate the entry.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup**

C

Channel Code

This field displays the value of the channel code. This code is an orthogonal variable spreading factor code (OVSF). The range of code numbers is dependent on and coupled to the slot format and symbol rate.

Range (Downlink): 0 to 511

Default (Downlink): 6 for channel 1, 7 for channel 2, 8 for channel 3, and 9 for channel 4

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** or **OCNS** > Channel Code

Slot Format	0-1	2-7	8-11	12	13	14	15	16
Symbol Rate	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	511	255	127	63	31	15	7	3

Range (DPCCH of Uplink): Always 0 to 255, not depending on the slot format and symbol rate

Range (DPDCH of Uplink): 0 to 255

Default (Uplink): 0 for DPCCH, 16 for DPDCH

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > Channel Code

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > Channel Code

Slot Format	0	1	2	3	4	5	6
Symbol Rate	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	255	127	63	31	15	7	3

Channel State Off On

This key turns the selected physical channel on or off.

Default: On

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** >
1, **2**, **3**, or **4** > **Channel State Off On**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
Link Control > **1** or **2** > **Channel State Off On**

Chip Rate

This field displays the chip rate set in the BS Setup or UE Setup table editor. Press the **Edit Item** key to set the chip rate. The default value is 3.84 Mcps and is in accordance with the 3GPP W-CDMA specification.

Range: 1000 cps to 4.250 Mcps.

Default: 3.840000 Mcps

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** >
Chip Rate

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
UE Setup > Chip Rate

Coding

This field displays the encoder type used for the transport/physical channel selected. For uplink, this key is active only with physical channel #2. Choices for the encoder type include 1/2 Conv, 1/3 Conv, Turbo, and None.

Default: 1/3 Conv for transport channels #1 and #2, 1/2 Conv for all other transport channels

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** >
Link Control > **1**, **2**, **3**, or **4** > **Config Transport** >
Transport Channel # 1 to **6** > **TrCH Setup** > Coding

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
Link Control >**2** > **Config Transport** > **Transport Channel # 1** to **6** >
TrCH Setup > Coding

Config Transport

This key accesses a menu from which a transport channel can be selected and transport channel data entered. For uplink, this key is active only for physical channel #2. For downlink, this key is active only with physical channel type DPCH and after selection of a reference measurement setup rate or data type TrCH. For downlink, press the following sequence of keys to activate the **Config Transport** softkey:

Mode > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measurement Setup** > (rate) > **Config Transport**

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Config Transport**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport**

Copy File

This key copies the current file. You can then edit and rename the file.

Copy File is located in table editor menus and in catalogs of files.

CPICH

This key selects the common pilot channel (CPICH) as the physical channel type. CPICH is a fixed rate (30 kbps, SF=256) downlink channel.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **4** > **PhyCH Type** > **CPICH**

CRC Size

This field displays the number of cyclic redundancy code (CRC) bits to be added to the transport channel data. For downlink, this field is displayed after the **Config Transport** softkey is active. For uplink, this field is displayed only with physical channel #2. The CRC choices are 0, 8, 12, 16, and 24.

Default (Downlink): 16 for transport channel 1, 12 for transport channel 2 and for other transport channels the default is 8.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > CRC Size

Default (Uplink): 16 for transport channels 1 and 2 and for other transport channels the default is 8.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > CRC Size

Create File

This key creates a new user file. The file, named Untitled, can be opened for editing in the Bit File Editor.

Create File is located in table editor menus and in catalogs of files.

D

Data

This field displays the data type for a transport and/or physical channel. Press the **Edit Item** key to choose from a list of data types. Data types available include PN sequences, fixed data, transport channel data, or user-defined data files. This field appears in several locations.

PhyCH Setup menu

Default (Downlink): PN9

Default (Uplink): Transport CH

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > Data

TrCH Setup menu

Default: PN9

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH setup** > Data

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > Data

Define User FIR

This key accesses the FIR Values table editor. You can add or modify coefficients for a finite impulse response (FIR) filter. The FIR Values table editor allows a maximum of 1024 coefficients in a file, however, the signal generator hardware is limited to 256 coefficients, 32 symbols, and an oversample ratio between 4 and 16.

NOTE   If you enter more than 32 symbols, the instrument cannot use the filter.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Define User FIR**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Define User FIR**

Delete

This key displays the Bit File Editor and a menu from which you can select different ways of removing bits from a file.

Delete is located in table editor menus and in catalogs of files.

Delete All Rows

This key deletes all rows in the file displayed in the Bit File Editor. You are asked to confirm the deletion.

Delete All Rows is located in table editor menus and in catalogs of files.

Delete Bits

This key deletes the specified number of bits from the selected file.

Delete Bits is located in table editor menus and in catalogs of files.

Delete File

This key deletes the highlighted file from the Catalog of FIR files. You are prompted for confirmation.

Delete File is located in table editor menus and in catalogs of files.

Delete To Beginning

This key deletes all bits from the highlighted bit to the beginning bit of the file displayed in the Bit File Editor.

Delete To Beginning is located in table editor menus and in catalogs of files.

Delete To End

This key deletes all bits from the highlighted bit to the end of the file displayed in the Bit File Editor. The key appears in several locations.

Delete To End is located in table editor menus and in catalogs of files.

Delete Row

This key deletes the highlighted row of the file displayed in the FIR Values table editor.

Delete Row is located in table editor menus and in catalogs of files.

Display FFT

This key displays a graphical representation of the filter frequency response for a filter loaded into the FIR values table editor (calculated using a fast Fourier Transform function). The following is an example of the frequency response for a root Nyquist filter with an oversample ratio of 4.

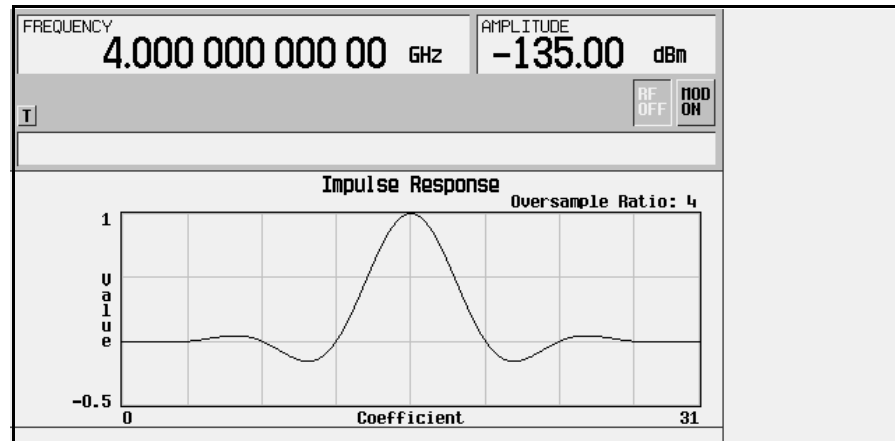To return to the FIR table editor and menu keys, press **Return**.
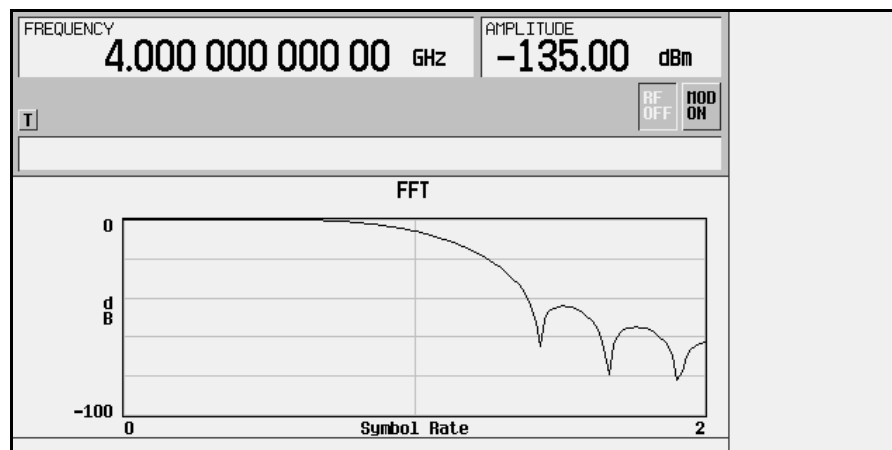
Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Display FFT**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Display FFT**

Display Impulse Response

This key displays a graphical representation of the finite impulse response (FIR) over time for the filter loaded into the FIR Values table editor. The following is an example of the impulse response of a root Nyquist filter with an oversample ratio of 4.

To return to the FIR table editor and menu keys, press **Return**.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Display Impulse Response**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Display Impulse Response**

Down/Up

This key sets the transport power control (TPC) pattern to repeatedly send down followed by *n* up commands. The number of *n* down and up commands is defined in the `TPC Pat Steps` field of the **PhyCH Setup** menu.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Down/Up**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Select Pattern** > **Down/Up**

DPCCH

This key selects the dedicated physical control channel (DPCCH) for uplink physical channel #1. The uplink DPCCH is used to carry control information. For example, TFCI and TPC bits.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH**

DPCH

This key selects the dedicated downlink physical channel (DPCH). This softkey is available for all four physical downlink channels.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH**

DPDCH

This key selects the dedicated physical data channel (DPDCH) for uplink physical channel #2. The uplink DPDCH is used to carry the DCH transport channel.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Type** > **DPDCH**

E

Edit File

This key allows editing of the file selected from the `Catalog of Binary/Bit Files`. When necessary, you are asked to confirm converting binary files to bit files for editing. This key appears in several locations.

NOTE   There is no undo capability; bit files are saved after each modification.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **User File** > **Edit File**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `FBI Pattern`, `TFCI Pattern`, or `TPC Pattern` > **Edit Item** > **User File** > **Edit File**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **User File** > **Edit File**

Edit Item

This key selects the highlighted field in the displayed table for editing.

Edit Item is located in table editor menus and in catalogs of files.

Equal Powers

This key adjusts all channel powers to equal power levels. The sum of all channel powers is 0 dB.

NOTE   This softkey is valid only for a single-ESG configuration.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Adjust Code Domain Power** > **Equal Powers**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** or **2** > **Adjust Code Domain Power** > **Equal Powers**

Err Insert

This field allows you to select an error insertion mode to be applied to the data for the transport channel. This field is on the second page of the table editor. The selections are BLER (block error rate), BER (bit error rate), and NONE.

Default: NONE

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Err Insert

Error Bits

This field displays the number of actual bit errors being generated. It is calculated from the desired BER value as set in the BER field after the **Apply Channel Setup** key is pressed and the error bits are inserted into the data for the transport channel. To insert the error bits, the Err Insert field must be set to BER. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Error Bit

Error Blocks

This field displays the number of the actual error blocks being generated. It is calculated from the desired BLER value as set in the BLER field after the **Apply Channel Setup** key is pressed and the error blocks are inserted into the data of the transport channel. To insert the error blocks, the Err Insert field must be set to BLER. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Error Block

Ext Clock Polarity Neg Pos

This key selects the external clock polarity to either the positive (**Pos**) edge or negative (**Neg**) edge. This is valid only when **BBG Data Clock** is set to **Ext**.

Default: Positive

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BBG Data Clock Setup** > **Ext Clock Polarity Neg Pos**

Ext Clock Rate X1 X2 X4

This key selects the external clock rate. The key is valid for uplink and only when **BBG Data Clock** is set to **Ext**.

X1   3.84 MHz external clock

X2   7.68 MHz external clock

X4   15.36 MHz external clock

Default: X1

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BBG Data Clock Setup** > **Ext Clock Rate X1 X2 X4**

F

FBI Pattern

This field displays the 30-bit data pattern of the feedback information
(FBI) bits set in the **PhyCH Setup** menu for uplink physical channel #1.
Press the **Edit Item** key to specify the desired pattern and terminate
with the **Return** key.

Range: 0 to 3FFFFFFF

Default: 00000000

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
Link Control > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > FBI Pattern

FBI State

This field indicates whether or not the feedback information (FBI) bits
are included in the uplink dedicated physical control channel
(DPCCH) #1. The FBI state is dependent on the slot format number.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
Link Control > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > FBI State

Filter

This field displays the selected filter type. Press the **Edit Item** softkey to
display a menu from which you can select a filter type or user FIR,
change a filter alpha, optimize FIR for EVM or ACP, or restore the
default filter.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** >
Filter

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
UE Setup > Filter

Filter Alpha

This key allows you to enter a filter alpha value for a Nyquist filter or root Nyquist filter. The entered value appears in the active entry area of the display. This key appears in several locations.

NOTE

The **Filter Alpha** softkey appears only after you choose a root Nyquist or Nyquist filter. If a Gaussian filter is used, you will see **Filter BbT**. If any other filter is selected, you will see a **Filter Factor N/A** softkey (grayed-out).

The filter alpha value is set to 0.220 at the factory. This value can be user-defined. The value is not affected by an instrument preset or by a power cycle.

Range: 0.000 to 1.000

Select Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **Nyquist** or **Root Nyquist** > **Filter Alpha**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **Root Nyquist** or **Nyquist** > **Filter Alpha**

Load Default FIR Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Nyquist** or **Root Nyquist** > **Filter Alpha**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist** or **Nyquist** > **Filter Alpha**

Filter BbT

This key allows you to change the bandwidth-multiplied-by-bit-time product value. The entered BbT filter value for the Gaussian filter appears in the active entry area of the display. The **Filter BbT** key appears in several locations.

The BbT value is set to 0.300 at the factory. This value can be user-defined. The value is not affected by an instrument preset or power cycle.

Range: 0.000 to 1.000

NOTE

The **Filter BbT** softkey appears only after you choose a Gaussian filter. If a root Nyquist or Nyquist filter is in use, you will see **Filter Alpha**. If any other filter is selected, you will see a **Filter Factor N/A** softkey (grayed-out).

Select Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **Gaussian** > **Filter BbT**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **Gaussian** > **Filter BbT**

Load Default FIR Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Gaussian** > **Filter BbT**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Gaussian** > **Filter BbT**

Filter Symbols

This key enables you to select the number of filter symbols for the filter displayed in the `FIR Values` table editor. The entered value appears in the active entry area of the display. Although the FIR table editor allows a maximum of 32 symbols, with a maximum oversample ratio of 32, the selected FIR filter cannot have more than 256 coefficients. Select the number of symbols and the oversample ratio accordingly. A FIR filter with more than 16 symbols will cause the symbol rate to be halved.

The filter symbol number is set to 8 at the factory. This value can be user-defined. The filter symbol number is not affected by an instrument preset or by a power cycle.

Range: 1 to 32 symbols

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Filter Symbols**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Filter Symbols**

FIX

This key allows you to enter in a fixed data pattern for uplink physical channel #1. The key appears in several locations. For the TFCI Pattern, a fixed hexadecimal data pattern can be selected and encoded into the transport format combination indicator (TFCI). For the FBI Pattern, a fixed hexadecimal data pattern can be selected for the feedback information (FBI) bits.

Range (`TFCI Patt`): 0000 to 03FF

Default (`TFCI Patt`): 0000

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TFCI Pattern` > **Edit Item** > **FIX**

Range (`FBI Patt`): 00000000 to 3FFFFFFF

Default (`FBI Patt`): 00000000

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `FBI Pattern` > **Edit Item** > **FIX**

FIX4

This key allows you to enter in a downlink or uplink fixed 4-bit data pattern. The entered value appears in the active display area. The FIX4 pattern will be repeated as necessary to fill the data slot for the downlink physical channel (DPCH) or uplink physical channel #1 or #2. The front panel arrow keys, keypad, or front panel knob can be used to set the 4-bit data pattern. This key appears in several locations.

Range: 0000 to 1111

Default: 0000

PhyCH Setup

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** or **PICH** > **PhyCH Setup** > `Data` > **Edit Item** > **FIX4**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **FIX4**

TrCH Setup

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Data`> **Edit Item** > **FIX4**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Data` > **Edit Item** > **FIX4**

Frame Clock Interval

This key displays a menu from which you can select a frame clock interval for the uplink synchronization signal. Choices are 10, 20, 40, and 80 msec.

Default: 80 msec

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Interval**

Frame Clock Polarity Neg Pos

This key sets the polarity of the frame clock signal to either positive (**Pos**) or negative (**Neg**).

Default: Positive

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Frame Clock Polarity Neg Pos**

G

Gaussian

This key selects a Gaussian filter for use in the filter setup. Use the **Filter BbT** softkey to change the filter bandwidth-multiplied-by-bit-time product value. The **Gaussian** softkey appears in several locations.

Pressing the **Gaussian** softkey followed by **Generate** loads the FIR Values table editor with the coefficient values for the Gaussian filter. The filter BbT and number of filter symbols are defined with the softkeys in this menu. If you change either parameter after loading the filter coefficients, press the **Generate** softkey again.

The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter response as it is defined in the FIR Values table editor.

Select Menu

Softkey Location (Downlink): **Mode** > **CDMA** >**W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Select** > **Gaussian**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **Gaussian**

Load Default FIR Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Gaussian**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Gaussian**

Generate

This key creates coefficients for a filter using the filter alpha value or filter BbT value and the filter symbols.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Generate**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Generate**

Goto Bottom Row

This key moves the highlighted selection to the bottom row of the file displayed by the Bit File Editor or current list of items.

Goto Bottom Row is located in table editor menus and in catalogs of files.

Goto Middle Row

This key moves the highlighted selection to the middle row of the file displayed by the Bit File Editor or current list of items.

Goto Middle Row is located in table editor menus and in catalogs of files.

Goto Row

This key displays a menu from which you can select a row or page in a table editor or current list of items to edit.

Goto Row is located in table editor menus and in catalogs of files.

Goto Top Row

This key moves the highlighted selection to the top row of the file displayed by the Bit File Editor or current list of items.

Goto Top Row is located in table editor menus and in catalogs of files.

H

Hamming

This key applies the Hamming windowing function to the selected filter. Windowing improves out-of-band performance (ACP) by smoothing the filter's transition to zero, but simultaneously degrades passband performance (EVM).

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Hamming**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Hamming**

Hann

This key applies the Hann windowing function to the selected filter. Windowing improves out-of-band performance (ACP) by smoothing the filter's transition to zero, but simultaneously degrades passband performance (EVM).

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Hann**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Hann**

I

Insert

This key displays a menu from which you can select different ways of inserting bits into a user file. This key appears in several locations.

Insert is located in table editor menus and in catalogs of files.

Insert 0's

This key inserts the desired number of 0's at the current position in the user file. This key appears in several locations.

Insert 0's is located in table editor menus.

Insert 1's

This key inserts the desired number of 1's at the current position in the user file. This key appears in several locations.

Insert 1's is located in table editor menus.

Insert PN9

This key accesses a menu from which a PN9 seed value can be entered. The generated 9-bit pseudo-random bit sequence can then be inserted into the user file. This key appears in several locations.

Range: 001 to 1FF

Default: 1FF

Insert PN9 is located in table editor menus under the **Edit File** or **Create File** softkeys. An example of this key's location is given as follows:

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Edit File** or **Create File** > **Insert** > **Insert PN9** > **Insert PN9**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > FBI Pattern > **Edit Item** > **User File** > **Edit File** or **Create File** > **Insert** > **Insert PN9** > **Insert PN9**

Insert PN15

This key accesses a menu from which a PN15 seed value can be entered. The generated 15-bit pseudo-random bit sequence can then be inserted into the user file. This key appears in several locations.

Range: 0000 to 7FFE

Default: 0000

Insert PN15 is located in table editor menus under the **Edit File** or **Create File** softkeys. An example of this key's location is given as follows:

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **User File** > **Edit File** or **Create File** > **Insert** > **Insert PN15** > **Insert PN15**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > FBI Pattern > **Edit Item** > **User File** > **Edit File** or **Create File** > **Insert** > **Insert PN15** > **Insert PN15**

Insert Row

This key inserts a row into the file displayed in the table editor.

Insert Row is located in table editor menus.

Interleaver

The field displays the interleaving operating state. This field is not user-defined. The value cannot be changed and the field is grayed-out.

Default: On

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1, 2, 3,** or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > Interleaver

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Interleaver

I/Q Voltage Scale

This field displays the power output value at the IQ ports. Press the **Edit Item** key to select the power level at the IQ ports. Since changing this value affects the total power, you will also see individual channel power adjustments. This value is assigned by performing the relative power mapping procedure. See "Adjust the Relative Power Mapping" on page 2-14. This field is not valid for uplink configuration.

NOTE   IQ Voltage Scale is used in the two-ESG configuration to adjust the relative power values of the channels between the two signal generators. See "Voltage Other ESG" on page 3-74.

Range: –40.00 dB to 0.00 dB

Default: 0.00 dB

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup** > IQ Voltage Scale

IS-95

This key selects a standard IS-95 filter.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **BS Setup** > Filter > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95**

IS-95 and IS-2000

This key accesses a menu of filter types for IS-95 and IS-2000 filters. The choices are IS-95, IS-95 w/EQ, IS-95 Mod, and IS-95 Mod w/EQ.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Select** > **IS-95 and IS-2000**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **IS-95 and IS-2000**

IS-95 Mod

This key selects a modified version of the standard IS-95 filter. This filter has improved adjacent channel power performance. The modification meets the IS-95 error function criterion.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 Mod**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 Mod**

IS-95 Mod w/EQ

This key selects a modified version of the standard IS-95 filter. This filter has improved adjacent channel power performance, and includes equalization for phase compensation required by a base station. The filter modification meets the IS-95 error function criterion.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 w/EQ Mod**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 w/EQ Mod**

IS-95 w/EQ

This key selects a standard IS-95 filter with equalization for phase compensation required by a base station.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 w/EQ**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **IS-95 and IS-2000** > **IS-95 w/EQ**

K

Kaiser

This key applies the Kaiser windowing function to the selected filter. Windowing improves out of band performance (ACP) by smoothing the filter's transition to zero, but simultaneously degrades passband performance (EVM).

Selecting the **Kaiser** softkey activates the Beta factor that can be adjusted for trade-off between optimized ACP and EVM. Decreasing the Beta factor value improves EVM; increasing the value improves ACP.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Kaiser**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **Kaiser**

L

Link Control

This key displays a menu from which you can select a physical channel, modify parameters and/or configure selected transport channels.

Softkey Location: **Mode** > **CDMA** > **W-CDMA** > **Link Control**

Link Down Up

This key toggles the link down/up selection. **Down** sets the downlink base station (BS) setup parameters while **Up** sets the uplink user equipment (UE) setup parameters.

Default: Down

Softkey Location: **Mode** > **CDMA** > **W-CDMA** > **Link Down Up**

Load Default FIR

This key presents a selection of default filter types with standard filter parameters. The choices are Root Nyquist, Nyquist, Gaussian, and Rectangle. A selection will automatically fill the FIR Values table editor with the pre-defined filter coefficients. Depending on the filter selected, a menu will be presented listing filter alpha, filter BbT, filter symbols and windowing. These can be edited where appropriate. If any default parameters, for example, filter alpha, filter BbT, or filter symbols are changed then press the **Generate** softkey to create the filter.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR**

Load From Selected File

This key replaces the current filter information displayed in the `Catalog of FIR Files` with the information stored in the highlighted file.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load/Store** > **Load From Selected File**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load/Store** > **Load From Selected File**

Load/Store

This key accesses a file management menu from which you can load the table editor with filter values from files stored in the signal generator's memory. The file management menu also allows you to store data to a file, or delete a file.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load/Store**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load/Store**

M

`Max Puncture`

This field is not used in the current version of the firmware.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > `Max Puncture`

Mirror Table

Pressing this key generates a mirrored copy of FIR table entries. The mirror function takes the values in the FIR table and duplicates them. The duplicate values occupy the bottom half of the table and are in reverse order.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Mirror Table**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Mirror Table**

N

NONE

This key sets the insertion mode to NONE for each transport channel. No error bit is inserted in the data.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > `Err Insert` > **Edit Item** > **NONE**

None

This key selects no coding in the **TrCH Setup** menu or no windowing function in the **Window** menu.

TrCH Menu

No encoder is used for coding transport channels.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Coding` > **Edit Item** > **None**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **1** to **6** > **TrCH Setup** > `Coding` > **Edit Item** > **None**

Window Menu

No windowing function is used for the selected filter. The filter is optimized for maximum passband performance (EVM).

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **None**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window** > **None**

Number of Bits

This key allows deletion of bits from the user file displayed in the `Bit File Editor`. The number of bits to delete is displayed in the active entry field of the display.

Number of Bits is located in table editor menus under the **Edit File** or **Create File** softkeys. An example of this key's location is given as follows:

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type**> **DPCCH** > **PhyCH Setup** > `FBI Pattern`, `TFCI Pattern`, or `TPC Pattern` > **Edit Item** > **User File** > **Edit File** or **Create File** > **Delete** > **Number of Bits**

Num of Blk

This field displays the number of coded blocks set for each transport channel selected for uplink physical channel #2. The total input data in one transport channel is the number of blocks multiplied by the block size.

Range: 0 to 4095

Default: 1 for all transport channels

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Num of Blk`

Nyquist

This key selects a Nyquist (raised cosine) filter in either the Select menu or the Load Default FIR menu.

Select Menu

This key selects a **Nyquist** filter and returns to the Select (Filter) menu.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Select** > **Nyquist**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **Nyquist**

Load Default FIR Menu

This key followed by **Generate** loads the FIR table editor with the coefficient values for a Nyquist filter. The filter alpha and number of filter symbols are defined with the softkeys in this menu. If you change either parameter after loading the filter coefficients, press the **Generate** softkey again. The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter responses as it is currently defined in the FIR table editor.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Nyquist**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Nyquist**

O

`Offset`

This field displays the timing offset for the DPCH channel. Press the **Edit Item** key to select a timing offset for the DPCH channel. The offset is in chips.

Range: 0 to 149

Default: 0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Offset`

Optimize FIR For EVM ACP

This key selects either error vector magnitude (EVM), for best passband filter response, or adjacent channel power (ACP), for best stopband filter rejection.

Default: EVM

NOTE   This key is grayed-out if a filter other than a root Nyquist or Nyquist filter is selected.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **Root Nyquist** or **Nyquist** > **Optimize FIR For EVM ACP**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **Root Nyquist** or **Nyquist** > **Optimize FIR For EVM ACP**

Oversample Ratio

This key sets the oversampling ratio to be applied to the FIR filter design in the **Define User FIR** menu. Although the FIR Values table editor allows a maximum of 32 symbols, with a maximum oversample ratio of 32, the selected FIR filter cannot have more than 256 coefficients. Select the number of symbols and the oversample ratio accordingly.

The oversample ratio value is set at the factory. This value can be user-defined. The value is not affected by an instrument preset or by a power cycle.

Range: 1 to 32

Default: 1

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Define User FIR** > **Oversample Ratio**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Define User FIR** > **Oversample Ratio**

P

Page Down

This key displays the next page of entries in the table editor menu and in catalogs of files.

Page Down is located in table editor menus and in catalogs of files.

Page Up

This key displays the previous page of entries in the table editor menu and in catalogs of files.

Page Up is located in table editor menus and in catalog of files.

P-CCPCH

This key selects the primary common control physical channel (P-CCPCH) as the physical channel type. The P-CCPCH is a fixed rate (30 kbps, Spread Factor=256) common downlink physical channel.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **3** > **PhyCH Type** > **P-CCPCH**

Paging Indicator

This filed displays the number of paging indicators per frame. This field is not user-defined. The value cannot be changed and the field is grayed-out.

Default: 144

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **3** > **PhyCH Type** > **PICH** > Paging Indicator

Phase Polarity Normal Invert

This key selects either normal or inverted phase polarity. The inverted mode shifts the internal Q signal 90 degrees so that it lags the in-phase I signal. This is useful for lower sideband mixing applications and is required by some radio standards.

Default: Normal

Softkey Location: **Mode** > **CDMA** > **W-CDMA** > **Phase Polarity Normal Invert**

Physical Channel

This key is always active unless the **Frequency** or **Amplitude** key is activated. For downlink, press the up/down arrow keys or rotate the front panel knob to select physical channel #1, #2, #3, or #4. For uplink, press the up/down arrow keys or rotate the front panel knob to select physical channel #1 or #2.

Default: Physical channel #1

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Physical Channel #**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **Physical Channel #**

PhyCH Setup

This key displays a menu in which you can edit parameter fields and apply those parameters to the physical channel selected. The fields shown depend on the **PhyCH Type** selected.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Setup**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **PhyCH Setup**

PhyCH Type

This key accesses a menu from which you can select a physical channel type. The default and available channels are different for downlink and uplink configurations.

Default (Downlink):

        PSCH for Physical Channel # 1

        SSCH for Physical Channel # 2

        P-CCPCH for Physical Channel # 3

        CPICH for Physical Channel # 4

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type**

Default (Uplink):

        DPCCH for Physical Channel # 1

        DPDCH for Physical Channel # 2

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** or **2** > **PhyCH Type**

`PI Bits`

This field displays the number of bits in the paging indicator. The field is grayed-out and you cannot change the value.

Default: 288

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **3** > **PhyCH Type** > **PICH** > `PI Bits`

PICH

This key selects the paging indicator channel. The paging indicator channel (PICH) is a fixed rate (Spread Factor=256) physical channel used to carry the paging indicators. Selecting the PICH for channel #3 will disable channel #4.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **3** > **PhyCH Type** > **PICH**

PN9

This key selects an internally generated 9-bit pseudo-random sequence pattern as output data. The PN9 code can be applied to physical and /or transport channels. This key appears in several locations.

PhyCH Setup menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Physical Channel** > **PhyCH Type** > **DPCH**, **PICH** or **OCNS** > **PhyCH Setup** > `Data` > **Edit Item** > **PN Sequence** > **PN9**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **PN Sequence** > **PN9**

TrCH Setup Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Data` > **Edit Item** > **PN9**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Data` > **Edit Item** > **PN9**

FBI, TFCI, or TPC Pattern Selection

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `FBI`, `TFCI`, or `TPC Pattern` > **Edit Item** > **PN Sequence** > **PN9**

PN15

This key selects an internally generated 15-bit pseudo-random sequence pattern as output data. For uplink, physical channel #1 can use PN15 in the following formats: `FBI Pattern`, `TFCI Patt` or `TPC Pattern`. For downlink, PN15 is available for the following physical channels types: DPCH, OCNS and PICH. The downlink and uplink transport channels do not support PN15.

Softkey location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH**, **PICH**, or **OCNS** > **PhyCH Setup** > `Data` > **Edit Item** > **PN Sequence** > **PN15**

Softkey location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `FBI`, `TFCI`, or `TPC Pattern` > **Edit Item** > **PN Sequence** > **PN15**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **PN Sequence** > **PN15**

Power

This field displays the power level for the selected physical channel. Press the **PhyCH Setup** softkey to edit the power field.

Range (Downlink): −40.00 dB to 0.00 dB

Default (Downlink): −8.30 dB for physical channel #1, −8.30 for physical channel #2, −5.30 for physical channel #3, −3.30 for physical channel #4

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > `Power`

Range (Uplink): −40.00 dB to 0.00 dB

Default (Uplink): −2.69 dB for physical channel #1, 0.00 dB for physical channel #2

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** or **2** > `Power`

PSCH

This key selects the primary synchronization channel.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **PSCH**

Puncture

This field is not user-defined. The value cannot be changed and the field is grayed-out. The field displays the puncture rate percentage for the dedicated physical channel (DPCH). Data can be removed from or added to the fully coded channel. The number of bits removed or inserted is displayed as a percentage of the total number of bits. This is a calculated value. The negative value indicates that bits are to be added to the frame.

Range: –25400 to 100%

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **TrCH Setup** > Puncture

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > Puncture

R

`Rate Match Attr`

This field displays the rate matching attribute value for the selected transport channel. Press **Edit Item** to enter a value and terminate with the **Enter** softkey to set the value. A higher RMatch attribute number indicates more data for the channel and allows for a higher puncture percentage.

Range: 1 to 256

Default: 1 for all Transport Channels

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCh Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Rate Match Attr`

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > `Rate Match Attr`

Rectangle

This key selects a one-symbol-wide rectangle filter in either the Select (Filter) menu or the Load Default FIR menu.

Select Menu

This key selects a rectangle FIR filter for use in the filter setup.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **Rectangle**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **Rectangle**

Load Default FIR Menu

This key followed by **Generate** loads the FIR table editor with coefficient values for a rectangle filter. The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter response as defined in the FIR table editor.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Rectangle**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Rectangle**

Ref Measure Setup

This key accesses a menu from which you can select a reference measurement test setup for a physical channel. For downlink, this key is only available for the dedicated physical channels (DPCH). For uplink, this key is valid only for physical channel #2 (DPDCH).

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup**

Default (Uplink): RMC 12.2 kbps

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup**

Rename

This key accesses a menu from which you can rename the selected file.

Rename is located in table editor menus under the **Edit File** or **Create File** softkeys.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > FBI Pattern > **Edit Item** > **User File** > **Edit File** or **Create File** > **Rename**

Restore Default Filter

This key replaces the current FIR filter with the default filter.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Restore Default Filter**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Restore Default Filter**

RMC 12.2 kbps (25.141 v3.4)

This key sets the uplink reference measurement channel (RMC) test setup rate to 12.2 kbps as described in the 3GPP Technical Specification (TS 25.141 V3.4).

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **RMC 12.2 kbps (25.141 v3.4)**

RMC 64 kbps (25.141 v3.4)

This key sets the uplink reference measurement channel (RMC) test setup rate to 64 kbps as described in the 3GPP Technical Specification (TS 25.141 V3.4).

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **RMC 64 kbps (25.141 v3.4)**

RMC 144 kbps (25.141 v3.4)

This key sets the uplink reference measurement channel (RMC) test setup rate to 144 kbps as described in the 3GPP Technical Specification (TS 25.141 V3.4).

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **RMC 144 kbps (25.141 v3.4)**

RMC 384 kbps (25.141 v3.4)

This key sets the uplink reference measurement channel (RMC) test setup rate to 384 kbps as described in the 3GPP Technical Specification (TS 25.141 V3.4).

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **RMC 384 kbps (25.141 v3.4)**

Root Nyquist

This key selects a root Nyquist (root-raised cosine) filter in either the Select (Filter) menu or the Load Default FIR menu.

Select (Filter) Menu

This key selects a root Nyquist FIR filter. After the selection is made, the Select (Filter) menu will be returned.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **Root Nyquist**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **Root Nyquist**

Load Default FIR Menu

This key followed by the **Generate** softkey loads the FIR table editor with the coefficient values for a root Nyquist filter. The filter alpha and number of filter symbols are defined with the softkeys in this menu. If you change either parameter after loading the filter coefficients, press the **Generate** softkey again.

The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter response as it is currently defined in the FIR table editor.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**

S

Scale To 0dB

This key adjusts the displayed power so that the sum of the power of all channels is 0 dB. The ratios between individual channel power values are maintained.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **Adjust Code Domain Power** > **Scale To 0dB**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **Adjust Code Domain Power** > **Scale To 0dB**

Scrambling Code

This field displays the scrambling code in use. Press **Edit Item** to change the scrambling code number.

Range (Downlink): 0 to 511

Default: 0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Scrambling Code

Range (Uplink): 0 to 16777215

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Scrambling Code

SecScr Code OS

This field displays the secondary scrambling code offset. Press **Edit Item** to change the scrambling code offset number. This field is displayed for the downlink DPCH and OCNS physical channel types.

Range: 0 to 15

Default: 0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **DPCH** or **OCNS** > **PhyCH Setup** > SecScr Code OS

Select

This key accesses a menu from which you can select a filter type. You can select from standard filter types, such as Root Nyquist, Nyquist, Gaussian, several IS-95 filters, User FIR, Rectangle, APCO 25 C4FM, and UN3/4 GSM Gaussian.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select**

Select File

This key displays a menu from which you can select a file in the `Catalog of Binary/Bit Files` or `Catalog of FIR Files`. This key appears in several locations.

Select Menu

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **User FIR** > **Select File**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **User FIR** > **Select File**

User File Menu

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `FBI`, `TFCI`, or `TPC Pattern` > **Edit Item** > **User File** > **Select File**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **User File** > **Select File**

Select Pattern

This key accesses a menu from which you can select a transmit power control (TPC) pattern for uplink physical channel #1. The choices are: All Up, All Down, Up/Down and Down/Up.

Default: Up/Down

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Select Pattern**

SFN RST Polarity Neg Pos

This key changes the polarity of the system frame number (SFN) reset (RST) signal for uplink synchronization from negative (**Neg**) to positive (**Pos**).

Default: Positive

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **SFN RST Polarity Neg Pos**

Signal Setup

This key displays a menu from which you can select the following softkeys: Sync Source, Frame Clock Interval, Frame Clock Polarity, and SRN RST Polarity.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup**

Slot Delay (numeric value)

This key enables you to specify the number of slots to be delayed between the downlink frame clock and uplink frame timing signals. The actual delay time is the sum of 1024 chips, the slot delay, and the timing offset. See "System Triggering and Synchronization" on page 4-28 for more information.

Range: 0 to 119 slots

Default: 0 slots

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Slot Delay (numeric value)**

`Slot Format`

This field displays the slot format used for the dedicated physical channel. Press the **Edit Item** key to change the slot format. Slot formats are coupled with the channel code and symbol rate. For downlink, the 17 slot formats are described in the 3GPP Technical Specification (TS 25.141 V3.3). For uplink, the 6 slot formats for DPCCH and the 7 slot formats for DPDCH are described in the 3GPP Technical Specification (TS 25.211 V3.4).

Range (Downlink): 0 to 16

Default (Downlink): 0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Slot Format`

Slot Format	0-1	2-7	8-11	12	13	14	15	16
Symbol Rate	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	511	255	127	63	31	15	7	3

Range (DPCCH of Uplink): 0 to 5

Default (DPCCH of Uplink): 0

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > `Slot Format`

Slot Format	0	1	2	3	4	5
Symbol Rate	15 ksps	15 ksps	15 ksps	15 ksps	15 ksps	15 ksps
Max Ch Code	255	255	255	255	255	255
Pilot Bits/Slot	6	8	5	7	6	5
TFCI Bits/Slot	2	0	2	0	0	2
FBI Bits/Slot	0	0	1	1	2	2
TPC Bits/Slot	2	2	2	2	2	1

Range (DPDCH of Uplink): 0 to 6

Default (DPDCH of Uplink): 2

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
Link Control > **2** > `Slot Format`

`Slot Format`	0	1	2	3	4	5	6
`Symbol Rate`	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
`Max Ch Code`	255	127	63	31	15	7	3

SSCH

Press this key to select the secondary synchronization channel.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** >
2 > **PhyCH Type** > **SSCH**

Store To File

This key accesses a menu from which you can select a name for a file to
be stored in the catalog of FIR files.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** >
`Filter` > **Edit Item** > **Define User FIR** > **Load/Store** > **Store To File**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** >
UE Setup > `Filter` > **Edit Item** > **Define User FIR** > **Load/Store** >
Store To File

`Symbol Rate`

This field displays the symbol rate as set in the PhyCH Setup menu. Highlight the `Symbol Rate` then press the **Edit Item** key to set the symbol rate. The symbol rate is shown in the active entry area of the display. For uplink, this field is active only for physical channel #2.

Range: 7.5 to 960 ksps

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Symbol Rate`

Slot Format, Symbol Rate and Maximum Channel Code for downlink are determined from the table below:

`Slot Format`	0-1	2-7	8-11	12	13	14	15	16
`Symbol Rate`	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
`Max Ch Code`	511	255	127	63	31	15	7	3

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Symbol Rate`

Slot Format, Symbol Rate and Maximum Channel Code for uplink are determined from the table below:

`Slot Format`	0	1	2	3	4	5	6
`Symbol Rate`	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
`Max Ch Code`	255	127	63	31	15	7	3

Sync Source FClk SFN

This key sets the uplink synchronization source to either frame clock (FClk) or system frame number (SFN).

Default: FClk

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Signal Setup** > **Sync Source FClk SFN**

Sync Trigger Mode Single Cont

This key selects either a single or a continuous synchronization trigger mode.

Default: Single

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Sync Trigger Mode Single Cont**

T

TFCI Pattern

This field displays the transport format combination indicator (TFCI) pattern set in the **PhyCH Setup** menu for a physical channel. Press the **Edit Item** key to enter in a desired bit pattern. See "Slot Format" on page 3-62 for more information.

The TFCI is an optional field describing what services are in use for example, data and video. Fixed rate service does not include TFCI.

Range (Downlink): 0x0 to 0x3FF

Default (Downlink): 0x0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > TFCI Pattern

Range (Uplink): 0000 to 1111

Default (Uplink): 0000

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > TFCI Pattern

TFCI State

This field displays whether or not the transport format combination indicator (TFCI) bits are included in the dedicated physical control channel (DPCCH). The TFCI is coupled to the Slot Format field.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > TFCI State

Time Offset

This field displays the timing offset for the DPCH channel. The timing offset is in chips and is used to sync the base station (BS) and the user equipment (UE). Press the **PhyCH Setup** softkey, highlight the field and press the **Edit Item** key to enter the offset. Each number in the range represents 256 bits and 1/10 of a time slot.

Range: 0 to 149

Default: 0

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Time Offset

Timing Offset (numeric value) chip

This key enables you to specify the number of chips to be delayed in addition to the slot delay between the downlink frame clock and uplink frame timing signals. The actual delay time is the sum of 1024 chips, the slot delay, and the timing offset.

Range: –512 to 2560 chips

Default: **0**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup** > **Timing Offset (numeric value) chip**

Total Bits

This field displays the actual number of total bits after the error bits are inserted into the current data of each transport channel. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Total Bit

Total Blocks

This field displays the actual number of total blocks after the error blocks are inserted into the current data of each transport channel. This data field is on the second page of the table editor.

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > Total Block

TPC Pat Steps

This field displays the number of successive down and up commands for the transport power control (TPC) pattern, when the TPC Pattern field is set to Up/Down or Down/Up. The power of the user equipment (UE) or the base station (BS) will decrease or increase by 1 dB on a slot-by-slot basis for every down or up command. For uplink, the TPC pattern has a number of different formats. For downlink, the pattern is limited to four formats. Press the **Edit Item** key to select the TPC pattern steps.

Range: 1 to 80

Default: 1

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > TPC Pat Steps

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > TPC Pat Steps

TPC Pat Trig Off On

This key sets the pattern trigger state of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH).

Default: Off

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > **TPC Pat Trig Off On**

TPC Pat Trig Polarity Neg Pos

This key sets the pattern trigger polarity of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH). The choices are: Positive (**Pos**) edge or Negative (**Neg**) edge.

Default: Positive

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Setup** > **TPC Pat Trig Polarity Neg Pos**

`TPC Pattern`

This field displays the power control command format in use. The `TPC Pattern` is used to change the user equipment (UE) or the base station (BS) power level. Press the **Edit Item** key to select the power format for the transmit power control (TPC). For uplink, the TPC pattern has a number of different formats (see "Select Pattern" on page 3-60 for more information). For downlink, the pattern is limited to four formats.

Default: Up/Down

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `TPC Pattern`

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TPC Pattern`

Transport CH

This key selects the transport channel to be configured as data for the selected dedicated physical channel. In uplink mode this key is active only with physical channel #2.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH**

Transport Channel

This key selects a transport channel. The **Transport Channel # 1** softkey is always active unless the **Frequency** or **Amplitude** key is activated. Press the up/down arrow keys or rotate the front panel knob to select transport channels #2, #3, #4, #5, and #6.

Default: Transport channel #1

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **Config Transport** > **Transport Channel # 1** to **6**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6**

TrCH Setup

This key accesses a menu in which you can edit transport channel (TrCH) data. This key is active with physical channel type DPCH for downlink and physical channel type DPDCH for uplink configurations.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup**

TrCH State Off On

This key turns the selected transport channel off or on. Transport channel #1 is always in the active state; the user has no control over this state and the key is grayed-out. Select transport channel #2, #3, #4, #5, or #6 to active this key. These transport channels can be turned on or off with this softkey.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH State Off On**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH State Off On**

`Tr Position`

This field displays the transport channel (Tr) position on the physical channel. This field is an indicator only and not a user-defined function.

Default: Flexible

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **1**, **2**, **3**, or **4** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCh Setup** > `Tr Position`

`TTI`

This field displays the transmission time interval set for the transport channel. The time interval is the time allowed for the transport channel to transmit. Press **Edit Item** to set a value for the time interval. The choices are 10, 20, 40, or 80 msecs.

Default: 20.0 msec

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `TTI`

Data Field Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** > **TrCH Setup** > `TTI`

Turbo

This key selects a turbo code to be used for transport channel coding. Turbo coding has better error rate performance than convolutional encoding.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > `Data` > **Edit Item** > **Transport CH** > **Return** > **Config Transport** > **Transport Channel # 1** to **6** > **TrCH Setup** > `Coding` > **Edit Item** > **Turbo**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Config Transport** >**Transport Channel # 1** to **6** > **TrCH Setup** > `Coding` > **Edit Item** > **Turbo**

U

UDI 64 (25.944 v3.0)

This key selects the unrestricted digital information (UDI) 64 kbps reference measurement test setup for the downlink DPCH channel or the uplink DPDCH channel.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **UDI 64 (25.944 v3.0)**

UDI 64 kbps

This key selects the unrestricted digital information (UDI) 64 kbps reference measurement test setup for the downlink DPCH channel or the uplink DPDCH channel.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **Ref Measure Setup** > **UDI 64 kbps**

UDI ISDN (25.944 v3.3)

This key sets the downlink DPCH channel to UDI (unrestricted digital information) ISDN for the reference measurement test setup. Transport channel 1 is configured to carry four blocks of 640 and transport channel 2 is configured to carry one block of 148.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **Ref Measure Setup** > **UDI ISDN (25.944 v3.3)**

UE Setup

This key accesses the uplink table editor from which you can select and modify user equipment (UE) parameters. Highlight the data field you want to change and press the **Edit Item** key. Press a softkey, use the numeric keypad, or front panel knob to change values displayed in the table. Press the appropriate softkey to terminate the entry.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup**

UN3/4 GSM Gaussian

This key selects an Option UN3/4 delay-compatible, GSM, Gaussian filter with a fixed (non-adjustable) BbT of 0.300.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Select** > **UN3/4 GSM Gaussian**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Select** > **UN3/4 GSM Gaussian**

Up/Down

This key sets the transport power control (TPC) pattern to repeatedly send consecutive up and consecutive down commands. The number of successive down and up commands is defined in the `TPC Pat Steps` field of the **PhyCH Setup** menu.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH** > **DPCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Up/Down**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > `TPC Pattern` > **Edit Item** > **Select Pattern** > **Up/Down**

Uplink Sync Setup

This key displays a menu from which you can configure the uplink synchronization signal.

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Uplink Sync Setup**

User File

This key displays a file management menu from which you can create, edit, or select a user-defined file to be used as a data pattern.

The maximum size of each user-defined file is as follows:

PhyCh Data	Up to 32768 bits
TrCH Data	Up to 1024 bits for both downlink and uplink,
	Up to 32768 bits and a multiple of `Blk Size` for downlink, or
	Up to 32768 bits and a common multiple of `Blk Size` and `Number of Blk` for uplink
FBI Pattern	Up to 2048 bits
TFCI Pattern	Up to 2048 bits

TPC Pattern   Up to 2048 bits

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **DPCH** > **PhyCH Setup** > Data > **Edit Item** > **User File**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Control** > **PhyCH Type** > **PCCPCH** > **PhyCH Setup** > Data > **Edit Item** > **User File**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **1** > **PhyCH Type** > **DPCCH** > **PhyCH Setup** > Data > **Edit Item** > **User File**

Or: **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **Link Control** > **2** > **PhyCH Setup** > FBI Pattern, TFCI Pattern, or TPC Pattern > **Edit Item** > **User File**

User FIR

This key displays a menu and the Catalog of FIR Files from which you can make a selection.

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > Filter > **Edit Item** > **Select** > **User FIR**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > Filter > **Edit Item** > **Select** > **User FIR**

V

Voltage Other ESG

Press the **Edit Item** key to select the total voltage value of the paired ESG after setting the channel powers of both the current ESG and the paired ESG. After setting this value, the IQ voltage scale will be automatically generated. See "Adjust the Relative Power Mapping" on page 2-14. This field is not valid for downlink configurations.

NOTE   For the single-ESG setup, this field should be set to 0.0 V.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup** > Voltage Other ESG

Voltage This ESG

Press the **Edit Item** key to select the voltage level for the ESG. This key displays the total voltage for the ESG. Enter a value in the Voltage Other ESG data field of the ESG that is paired with this ESG. See "Adjust the Relative Power Mapping" on page 2-14. This field is not valid for downlink configurations.

Data Field Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **2 Box Setup** > Voltage This ESG

W

W-CDMA Off On

This key turns W-CDMA modulation off or on. At least one physical channel must be turned on before W–CDMA can be activated. To turn on a physical channel use the **Channel State Off On** softkey.

Default: Off

Softkey Location: **Mode** > **CDMA** > **W-CDMA** > **W-CDMA Off On**

Window

This key displays a menu from which you can apply a windowing function to the selected filter. The default is to use no windowing which optimizes the passband response (EVM). Several windowing selections are provided in this menu. The windowing will smooth the filter's transition to zero. Windowing improves adjacent channel power performance (ACP) but degrades passband response (EVM). The choices available are: None, Hamming, Hann, and Kaiser.

Default: None

Softkey Location (Downlink): **Mode** > **CDMA** > **W-CDMA** > **BS Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window**

Softkey Location (Uplink): **Mode** > **CDMA** > **W-CDMA** > **Link Up** > **UE Setup** > `Filter` > **Edit Item** > **Define User FIR** > **Load Default FIR** > **Root Nyquist**, **Nyquist**, **Gaussian**, or **Rectangle** > **Window**

4   Operation

This chapter contains detailed information that will help you understand the operation of your Option 200 signal generator.

The chapter is divided into the following sections:

- "W-CDMA Frame Structures" on page 4-2

- "Understanding W-CDMA Data Generation" on page 4-7

- "Understanding the Reference Measurement Channel" on page 4-18

- "Understanding the Single-ESG Downlink Configuration" on page 4-20

- "Understanding the Two-ESG Downlink Configuration" on page 4-21

- "Understanding Relative Power Mapping" on page 4-24

- "Calculating Downlink Scramble Codes" on page 4-25

- "Understanding the Uplink Configuration" on page 4-27

W-CDMA Frame Structures

This section contains graphical representations of W-CDMA frame structures, with associated tables, for both downlink and uplink channels.

Downlink PICH Frame Structure

Figure 4-1. PICH Frame Structure
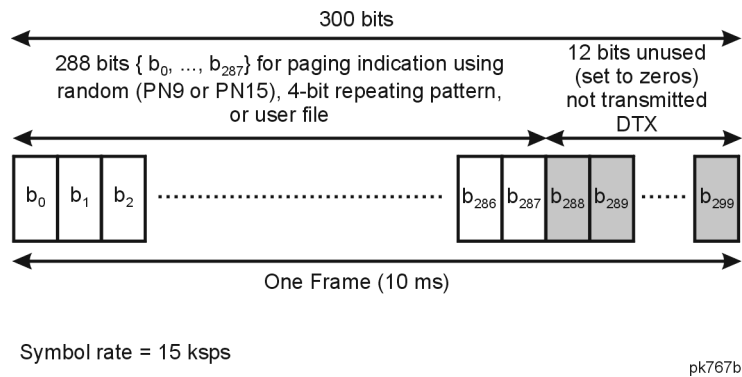
Downlink PCCPCH + SCH Frame Structure

Figure 4-2. PCCPCH + SCH Frame Structure
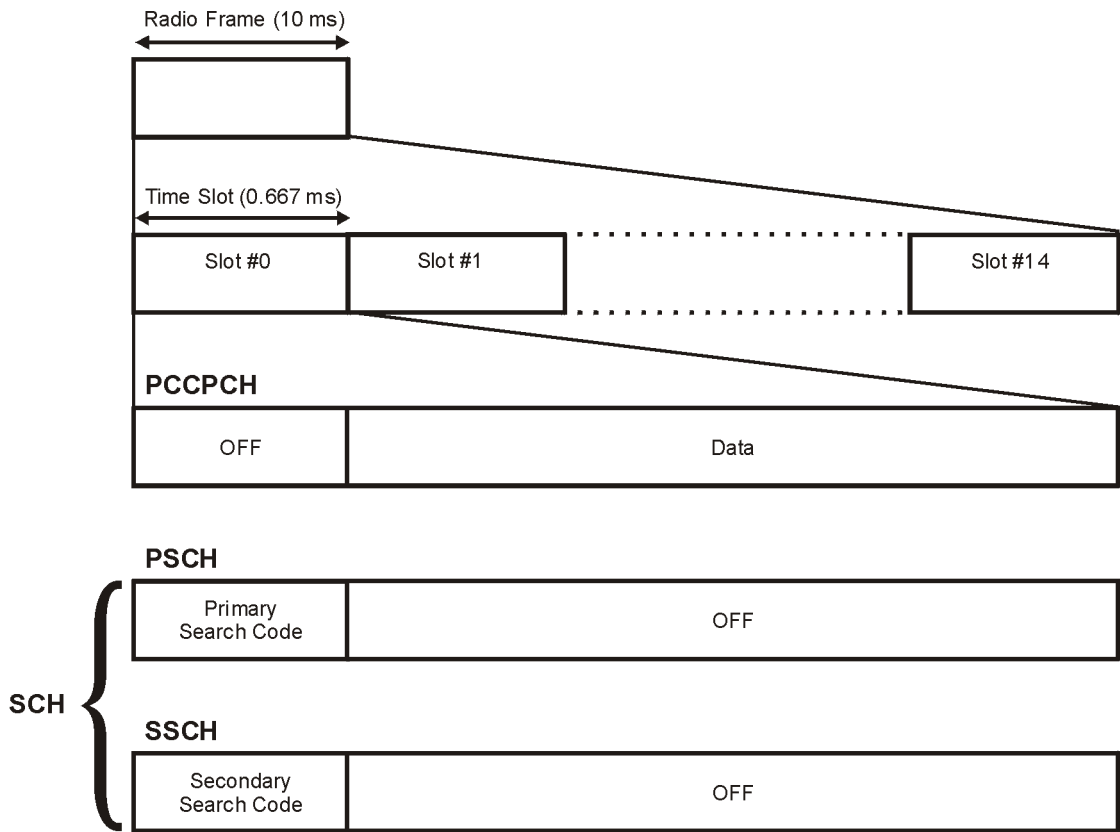
pk760b

Table 4-1 Lengths of PCCPCH + SCH Fields

Parameter	Symbols Per Slot
N_{data}	9
N_{SCH}[a]	1

a. SCH is comprised of PSCH and SSCH

Downlink DPDCH/DPCCH Frame Structure

Figure 4-3. DPDCH/DPCCH Frame Structure
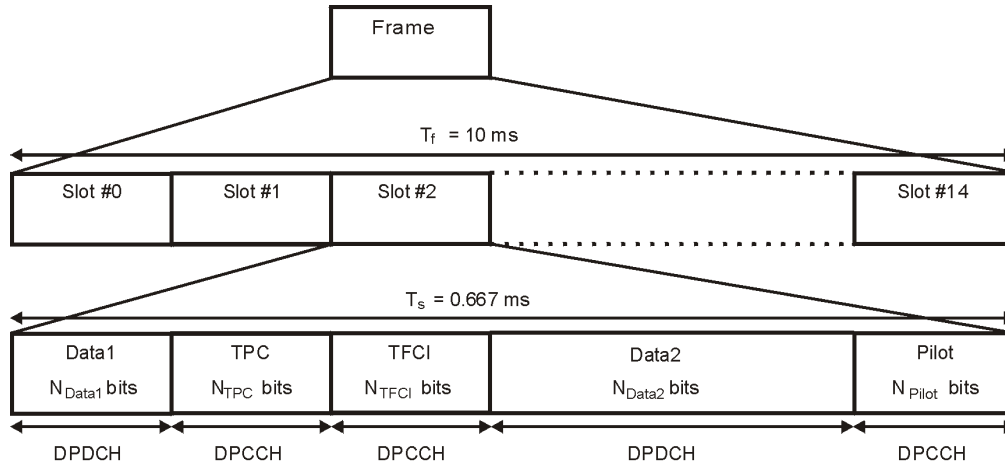
Table 4-2 DPDCH and DPCCH Fields

Slot Format	Chan. Bit Rate (kbps)	Chan. Sym. Rate (ksps)	Spread Factor	Bits/Frame			Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot		
				DPDCH	DPCCH	TOTAL		N_{data1}	N_{data2}	N_{TPC}	N_{TFCI}	N_{pilot}
0	15	7.5	512	60	90	150	10	0	4	2	0	4
1	15	7.5	512	30	120	150	10	0	2	2	2	4
2	30	15	256	240	60	300	20	2	14	2	0	2
3	30	15	256	210	90	300	20	2	12	2	2	2[a]
4	30	15	256	210	90	300	20	2	12	2	0	4[a]
5	30	15	256	180	120	300	20	2	10	2	2	4[a]
6	30	15	256	150	150	300	20	2	8	2	0	8[a]
7	30	15	256	120	180	300	20	2	6	2	2	8[a]
8	30	60	128	510	90	600	40	6	28	2	0	4[a]
9	60	30	128	480	120	600	40	6	26	2	2	4[a]
10	60	30	128	450	150	600	40	6	24	2	0	8[a]
11	60	30	128	420	180	600	40	6	22	2	2	8[a]
12	120	60	64	900	300	1200	80	12	48	4	8	8[a]
13	240	120	32	2100	300	2400	160	28	112	4	8	8
14	480	240	16	4320	480	4800	320	56	232	8	8	16
15	960	480	8	9120	480	9600	640	120	488	8	8	16
16	1920	960	4	18720	480	19200	1280	248	1000	8	8	16

a. The number of pilot bits can vary with channel symbol rates of 15 and 30 ksps.

Uplink DPDCH/DPCCH Frame Structure

There are two types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH) and the uplink Dedicated Physical Control Channel (uplink DPCCH). The DPDCH and the DPCCH are I/Q multiplexed within each radio frame.

The uplink DPCCH is used to carry control information generated at Layer 1. The Layer 1 control information consists of known pilot bits (Pilot) to support channel estimation for coherent detection, transmit power control (TPC) commands, feedback information (FBI), and an optional transport format combination indicator (TFCI) as shown in Figure 4-4. The TFCI informs the receiver regarding the instantaneous transport format combination of the transport channels mapped to the simultaneously transmitted uplink DPDCH radio frame.

Figure 4-4   Uplink DPDCH/DPCCH Frame Structure
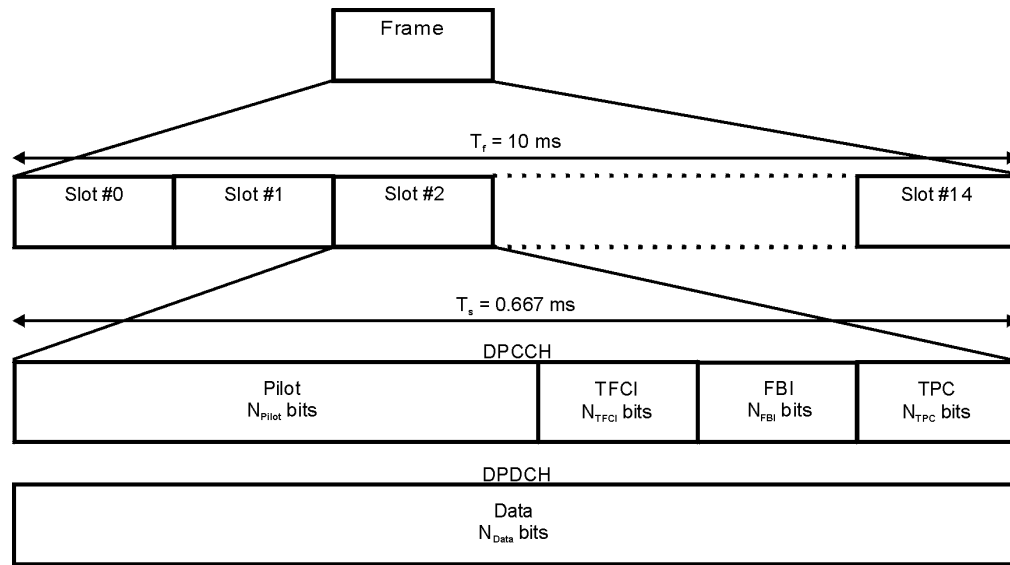
ul_pk762b

The exact number of uplink DPDCH bits is shown in Table 4-3.

Table 4-3 Uplink DPDCH Fields

Slot Format	Bit Rate (kbps)	Symbol Rate (ksps)	Spread Factor	Bits per Frame	Bits per Slot	N_{Data}
0	15	15	256	150	10	10
1	30	30	128	300	20	20
2	60	60	64	600	40	40
3	120	120	32	1200	80	80
4	240	240	16	2400	160	160
5	480	480	8	4800	320	320
6	960	960	4	9600	640	640

The exact number of uplink DPCCH bits is shown in Table 4-4.

Table 4-4 Uplink DPCCH Fields

Slot Format	Bit Rate (ksps)	Symbol Rate (ksps)	Spread Factor	Bits per Frame	Bits per Slot	N_{Pilot}	N_{TFCI}	N_{FBI}	N_{TPC}
0	15	15	256	150	10	6	2	0	2
1	15	15	256	150	10	8	0	0	2
2	15	15	256	150	10	5	2	1	2
3	15	15	256	150	10	7	0	1	2
4	15	15	256	150	10	6	0	2	2
5	15	15	256	150	10	5	2	2	1

DPCCH Pattern Coding

Depending on the selected pattern and pattern type (user file, PN9 or PN15, or FIX4), coding effects differ as shown in Table 4-5.

Table 4-5 DPCCH Pattern Coding Effect

Pattern	User File, PN9, or PN15	FIX4
TFCI	<no coding done>	10 bits/frame to 30 bits/frame by the second order Reed Muller coding (puncturing 2 bits/frame)
FBI	<no coding done>	<no coding done>

TPC	1 bit becomes,
	    1 TPC bit if 1 bit/frame,
	    2 TPC bits if 2 bits/frame	

Limitation for User File Size

Depending on the selected data or pattern types, user file size limitations differ as shown in Table 4-5.

Table 4-6 DPCCH Pattern Coding Effect

Data or Pattern	User File Size Limitation
Data (TrCH)	1024 bits maximum, or 4096 bytes maximum: multiple of "information bit/TTI (= "block size" * "number of blocks")"
Data (DPDCH)	4096 bytes maximum
TFCI	256 bytes maximum
FBI	256 bytes maximum
TPC	256 bytes maximum

Understanding W-CDMA Data Generation

This section will familiarize you with the types of signals that can be generated, including information on valid channel combinations, parameter couplings, and value restrictions by channel type. It is divided into separate subsections for downlink and uplink.

Downlink Data Generation

Valid Channel-Type-to-Channel-Number Assignments

Channel #	Available Channel Types
1	OCNS, DPCH[a], or PSCH
2	OCNS, DPCH, or SSCH
3	OCNS, DPCH, PCCPCH, or PICH[b]
4	OCNS, DPCH, or CPICH

a. Up to six dedicated channels (DCH) may be activated within the transport channel carried by a DPCH.
b. When selected and active, PICH occupies both Channel #3 and Channel #4 due to DTX bits.

Valid Channel Combinations per ESG

Configuration	Available Channel Types
Receiver Control	PSCH + SSCH + CPICH + PCCPCH[a]
Information Data Transmission, Code Domain Power Adjustment	$(DPCH \times m) + (OCNS \times n) + PICH$ Where: $m + n \leq 4$ for configurations without PICH $m + n \leq 2$ for configurations with PICH

a. Any combination of these four channel types disallows DPCH and OCNS.

Parameter Couplings

Changing the value of certain W-CDMA waveform parameters will cause value changes in other W-CDMA waveform parameters. In the following table, a bullet indicates coupling between two parameters. Value changes in one parameter necessitate value changes in coupled parameters. These coupled value changes occur automatically.

Table 4-7 Parameter Couplings

	12.2 RMC[a]	64 RMC	144 RMC	384 RMC	Block Size	# of Blocks	Coding	Rate Match Attribute	CRC Size
Slot Format	●	●	●	●			●		
Channel Code	●	●	●	●					
Symbol Rate	●	●	●	●					
Bits Rate	●	●	●	●		●	●		
12.2 RMC	—				●	●	●	●	●
64 RMC		—			●	●	●	●	●
144 RMC			—		●	●	●	●	●
384 RMC				—	●	●	●	●	●
UDI 64					●	●	●	●	●
AMR 12.2					●	●	●	●	●
UDI ISDN					●	●	●	●	●

a. Reference Measurement Channel

Table 4-8 DPCH Slot Format and OCNS, Symbol Rate, Channel Code, OVSF Couplings and Values

Slot Format	Channel Code	Symbol Rate (ksps)	Spread Factor (OVSF)
0	0 to 511	7.5	512
1	0 to 511	7.5	512
2	0 to 255	15	256
3	0 to 255	15	256
4	0 to 255	15	256
5	0 to 255	15	256
6	0 to 255	15	256
7	0 to 255	15	256
8	0 to 127	30	128
9	0 to 127	30	128
10	0 to 127	30	128
11	0 to 127	30	128
12	0 to 63	60	64
13	0 to 31	120	32
14	0 to 15	240	16
15	0 to 7	480	8
16	0 to 3	960	4

Parameter Value Restrictions and Couplings by Channel Type

This section contains information on parameter value restrictions, changes requiring data precomputation and regeneration, and parameter couplings.

CPICH

Parameter	Restrictions	Notes
Power	None	
Channel Code	Not user-selectable.	0 only, by 3GPP specification.

DPCH

General restriction: in order for the ESG to precompute data for baseband generation, you must press the **Apply Channel Setup** after any one of following actions:

- Changing any DPCH parameter value (except for power)
- Changing from any other channel type to DPCH
- Changing from DPCH to any other channel type

Parameter	Restrictions	Notes
Power	None	No **Apply Channel Setup** key press necessary.
Channel Code	None	Coupled to Slot Format, Spread Factor, and Symbol Rate. For valid values, see Table 4-8.
SecScr Code OS	None	Coupled to BS primary scramble code.
TPC Pat Steps	Must be same for all DPCH.	Entering a value in one DPCH will enter the same value in all other DPCHs.
Data	Must be same for all DPCH.	Entering a value in one DPCH will enter the same value in all other DPCHs.
Symbol Rate	Not user selectable.	Assigned based on Slot Format. Also coupled to Channel Code and Spread Factor. For valid values, see Table 4-8.
TFCI Pattern	Must be same for all DPCH.	Entering a value in one DPCH will enter the same value in all other DPCHs.
TPC Pattern	Must be same for all DPCH.	Entering a value in one DPCH will enter the same value in all other DPCHs.
Slot Format	Must be same for all DPCH.	Coupled to Channel Code, Symbol Rate and Spread Factor. For valid values, see Table 4-8.
Time Offset	Must be same for all DPCH.	Entering a value in one DPCH will enter the same value in all other DPCHs.

OCNS

Parameter	Restrictions	Notes
Power	None	
Data	PN9 and PN15 only	
Symbol Rate	None	Coupled to Channel Code, Slot Format and Spread Factor. For valid values, see Table 4-8.
Channel Code	None	Coupled to Symbol Rate, Slot Format and Spread Factor. For valid values, see Table 4-8.
SecScr Code OS	None	

PCCPCH No restrictions. Contains incrementing system frame number.

PICH General restriction: due to DTX (discontinuous transmission), PICH is only available on Channel #3 and occupies the state reserved for Channel #4 when active.

PSCH No restrictions

SSCH No restrictions

Transport Channel Layer

General restrictions:

- In order for the ESG to precompute data for baseband generation, you must press the **Apply Channel Setup** after changing *any* parameter value.

- The TrCH assigned on the ESG's user interface becomes the TrCH referred to in the 3GPP RF specification.

- DCHs must be turned on sequentially (DCH 1 and 2 must be ON before DCH 3 is activated).

- DTCH data is transmitted on DCH channels 1, 3, 4, 5, and 6.

  DCCH data is transmitted on DCH 2.

Parameter	Restrictions	Notes
Block Size	Max size = 5000 bits	Coupled to Bits Rate, Puncture, and Bits/Frame values.
Number of Blocks	None	Coupled to Bits Rate, Puncture, and Bits/Frame values.
Coding	None	Coupled to Puncture and Bits/Frame values.
TTI	None	Coupled to Puncture and Bits Rate values.

Parameter	Restrictions	Notes
Interleaver	Not user selectable.	Data field for value display only, to provide TTI period.
Data	Max user file size = 1024 bits	Transmission of user files > than 1024 bits will be truncated to a multiple of the block size.
Rate Match Attr	None	Coupled to Puncture and Bits/Frame values.
CRC Size	None	
Bits/Frame	Not user selectable.	Data field for value display only, to provide total information data bits-per-radio frame. Value based on Block Size, TTI, Coding and Rate Match Attribute values.
Puncture	Not user selectable.	Data field for value display only, to provide puncture percentage. Value based on Block Size, TTI, Coding and Rate Match Attribute values.
Bits Rate	Not user selectable.	Data field for value display only, to provide DCH bits rate, controlled by DPCH data rate.
Tr Position	Not user selectable.	Data field for value display only, to provide position of TRCH in radio frame. Rate matching algorithm depends on TrCH assignment. TrCH 1 should be assigned to DTCH and TrCH 2 should be assigned to DCCH for reference measurement channel.

Uplink Data Generation

Channel Type Assignment

Channel #	Available Channel Types
1	DPCCH
2	DPDCH[a]

a. Up to six dedicated channels (DCH) may be activated within the transport layer reference measurement channel carried by a DPDCH.

Parameter Couplings

Changing the value of certain W-CDMA waveform parameters will cause value changes in other W-CDMA waveform parameters. In Table 4-9, a bullet indicates coupling between two parameters. Value changes in one parameter necessitate value changes in coupled parameters. These coupled value changes occur automatically.

Table 4-9 Parameter Couplings

	RMC 12.2 kbps	RMC 64 kbps	RMC 144 kbps	RMC 384 kbps	Block Size	Coding Rate	RM Parameter	CRC Size	TFCI State
Slot Format	●	●	●	●		●			●
Channel Code	●	●	●	●					
Symbol Rate	●	●	●	●					
Bit Rate	●	●	●	●		●			
TFCI On/Off	●	●	●	●					
RMC 12.2 kbps	–				●	●	●	●	
RMC 64 kbps		–			●	●	●	●	
RMC 144 kbps			–		●	●	●	●	
RMC 384 kbps				–	●	●	●	●	

Table 4-10 DPCCH and Slot Format, Channel Code, Couplings and Values

Slot Format	DPCCH Bits/Slot	Pilot Bits/Slot	TFCI Bits/Slot	FBI Bits/Slot	TPC Bits/Slot	Max Channel Code
0	10	6	2	0	2	255
1	10	8	0	0	2	255
2	10	5	2	1	2	255
3	10	7	0	1	2	255
4	10	6	0	2	2	255
5	10	5	2	2	1	255

Table 4-11 DPDCH and Slot Format, Symbol Rate, Channel Code, Couplings and Values

Slot Format	DPDCH Bits/Slot	DPDCH Bits/Frame	DPDCH Bit Rate	Max Channel Code
0	10	150	15 kbps	255
1	20	300	30 kbps	127
2	40	600	60 kbps	63
3	80	1200	120 kbps	31
4	160	2400	240 kbps	15
5	320	4800	480 kbps	7
6	640	9600	960 kbps	3

Parameter Value Restrictions and Couplings by Channel Type

This section contains information on parameter value restrictions, changes requiring data pre-computation and regeneration, and parameter couplings.

DPCCH

General restriction: In order for the ESG to precompute data for baseband generation, you must press the **Apply Channel Setup** after any one of following actions:

- Changing any DPCCH parameter value (except for power)
- Changing from any other channel type to DPCCH
- Changing from DPCCH to any other channel type

Parameter	Restrictions	Notes
Power	None	No **Apply Channel Setup** key press necessary.
Channel Code	None	See Table 4-4.
TPC Pat Steps	None	
Symbol Rate	None	Always assigned to 15.0 ksps, see Table 4-4.
FBI Pattern	None	Maximum 256 bytes for user file size.
FBI State	Not user selectable.	Coupled to Slot Format.
TFCI Pattern	None	Maximum 256 bytes for user file size.
TFCI State	Not user selectable.	Coupled to Slot Format.
TPC Pattern	None	Maximum 256 bytes for user file size.
Slot Format	None	For valid values, see Table 4-4.

DPDCH

General restriction: In order for the ESG to precompute data for baseband generation, you must press the **Apply Channel Setup** after any one of following actions:

- Changing any DPDCH parameter value (except for power)
- Changing from any other channel type to DPDCH
- Changing from DPDCH to any other channel type

Parameter	Restrictions	Notes
Power	None	
Data	Max user file size = 4096 bytes	PN9, PN15, FIX4, user file, TRCH
Symbol Rate	None	Coupled to Channel Code and Slot Format. For valid values, see Table 4-3.
Channel Code	None	Coupled to Symbol Rate and Slot Format. For valid values, see Table 4-3.
Slot Format	None	Coupled to Channel Code and Symbol Rate. For valid values, see Table 4-3.

Transport Channel Layer

General restriction: In order for the ESG to precompute data for baseband generation, you must press the **Apply Channel Setup** after changing *any* parameter value.

- DCHs must be turned on sequentially (DCH 1 and 2 must be ON before DCH 3 is activated).

Parameter	Restrictions	Notes
Blk Size	Max user file size = 4096 bytes	Coupled to Bits Rate, Bits/Frame, and other values. "information bits"/TTI = "block size" * "num of blocks"
Num of Blks	Max 4095 blocks	
Coding	None	Coupled to Bits Rate, Bits/Frame, and other values.
TTI	None	Coupled to Bits Rate, Bits Rate, and other values.
Data	Max user file size = 1024 bits	Transmission of user files larger than 1024 bits will be truncated to a multiple of the block size.
Rate Match Attr	None	Coupled to Bits Rate, Bits/Frame, and other values.
CRC Size	None	
Bits/Frame	Not user selectable.	Data field for value display only, to provide total information data bits-per-radio frame. Value based on Blk Size, TTI, Coding and Rate Match Attr values.

Parameter	Restrictions	Notes
Max Puncture	Not used.	Data field for value display only, to provide maximum power puncture percentage. Value based on Blk Size, TTI, Coding and Rate Match Attr values.
Puncture	Not user selectable.	Data field for value display only, to provide power puncture percentage. Value based on Blk Size, TTI, Coding and Rate Match Attr values.
Bits Rate	Not user selectable.	Data field for value display only, to provide DCH bits rate.
Interleaver	Not user selectable.	Data field for value display only, to provide interleaver operating state information.
Err Insert	None	
BLER	None	Resolution 0.001%
Err Blocks	Not user selectable.	Data field for value display only, to provide the number of error blocks inserted.
Total Blocks	Not user selectable.	Data field for value display only, to provide the number of total blocks.
Actual BLER	Not user selectable.	Data field for value display only, to provide the actual block error ratio.
BER	None	Resolution 0.0001
Err Bits	Not user selectable.	Data field for value display only, to provide the number of error bits inserted.
Total Bits	Not user selectable.	Data field for value display only, to provide the number of total bits.
Actual BER	Not user selectable.	Data field for value display only, to provide the actual bit error ratio.

Understanding the Reference Measurement Channel

The signal generator provides one-button setup capabilities for transport channel configuration. The dedicated physical channel DCH (downlink) or DPDCH (uplink) is predefined by pressing the **Ref Measure Setup** softkey (or sending the appropriate SCPI commands). For downlink, at least one physical channel needs to be set to DPCH to activate the **Ref Measure Setup** softkey. Also, to activate the **Config Transport** softkey, one of the reference measurement rates must be selected or the DPCH `Data` field value must be set to `Transport CH`. For uplink, **DPDCH** and **RMC 12.2 kbps** are the default selections, respectively.

Table 4-12 and Table 4-13 describe the downlink and uplink reference measurement channel (RMC) configurations generated by pressing the **Ref Measure Setup** softkey after signal generator preset. Transport channel parameters can be modified in a table editor by pressing the **Config Transport** softkey, then moving the cursor to the desired data field and pressing **Edit Item**. DPCH and DPDCH parameters can be individually modified in a table editor by pressing **PhyCH Setup**, then moving the cursor to the desired data field and pressing **Edit Item**.

Table 4-12 The Downlink RMC Predefined DPCH Configuration

Parameter	DPCH Values at Specified Reference Measurement Channel						
	12.2 kbps	64 kbps	144 kbps	384 kbps	UDI 64	AMR 12.2	UDI ISDN
Power	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB
Channel Code[a]	6	6	6	6	6	6	6
SecSrc Code OS	0	0	0	0	0	0	0
TPC Pat Steps	1	1	1	1	1	1	1
Data[b]	Ref 12	Ref 64	Ref 144	Ref 384	ISDN64	AMR 12	ISDN
Symbol Rate[c]	30.00 ksps	120.0 ksps	240.0 ksps	480.0 ksps	120.0 ksps	30.0 ksps	120.0 ksps
TFCI Pattern	00000000	00000000	00000000	00000000	00000000	00000000	00000000
TPC Pattern	Up/Down	Up/Down	Up/Down	Up/Down	Up/Down	Up/Down	Up/Down
Slot Format	11	13	14	15	13	8	13
Time Offset	0	0	0	0	0	0	0

a. ESG Channel # 1 default shown. Default channel code for Channels 2 through 4 are based on the equation: Default Channel Code = (Channel #) + 5.

b. If a transport configuration parameter is changed using the **Config Transport** softkey and the table editor, the `Data` field reverts to `Transport CH`, showing that it no longer contains a specified reference measurement channel.

c. Symbol rate is not user-selectable. It is coupled to slot format. To change symbol rate, use the appropriate slot format.

Table 4-13 The Uplink RMC Predefined DPDCH Configuration

Parameter	DPCH Values at Specified Reference Measurement Channel					
	12.2 kbps	**64 kbps**	**144 kbps**	**384 kbps**	**UDI 64 kbps**	**AMR 12.2 kbps**
Power	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB
Beta	15	15	15	15	15	15
Data	TransportCH	TransportCH	TransportCH	TransportCH	TransportCH	TransportCH
Symbol Rate[a]	60.000 ksps	240.000 ksps	480.000 ksps	960.000 ksps	240.000 ksps	60.000 ksps
Slot Format[a]	2	4	5	6	4	2
Channel Code	16	4	2	1	4	16

a. The user-selectable symbol rate and slot format parameters are coupled together.

Understanding the Single-ESG Downlink Configuration

Capabilities

The Option 200 single-ESG setup provides four fully coded 3GPP channels for use in testing 3GPP mobile receiver designs.

Channel Types

The single-ESG setup can provide up to four of the following downlink channel types:

- primary synchronization channel (PSCH)
- secondary synchronization channel (SSCH)
- primary common control physical channel (PCCPCH)
- common pilot channel (CPICH)
- dedicated physical channel (DPCH)
- paging indicator channel (PICH)
- orthogonal channel noise simulator (OCNS)

A single ESG can provide a control configuration (PSCH, SSCH, PCCPCH, and CPICH) or an information data transmission configuration (DPCH and PICH, with optional OCNS).

For valid channel type/channel number, see "Valid Channel-Type-to-Channel-Number Assignments" on page 4-7. For valid channel combinations, see "Valid Channel Combinations per ESG" on page 4-7.

Reference Measurement Channels

Option 200 provides reference measurement channels at 12.2, 64, 144, and 384 kbits per second. This option also provides transport layer channelization for AMR 12.2 (adaptive multi-rate) and UDI 64 (unrestricted digital information) protocols.

System Triggering and Synchronization

This configuration utilizes internal I/Q triggering. The rear panel EVENT 2 BNC connector provides a system synchronization signal in the form of a chip-wide pulse that resets the system every time a parameter change that requires system re-synchronization is made. For increased measurement accuracy, the signal generator's rear panel 10 MHZ OUT frequency reference can be utilized by other instruments in the test system.

Understanding the Two-ESG Downlink Configuration

Capabilities

The two-ESG downlink configuration provides a 3GPP solution in situations where more than four fully coded W-CDMA channels are required. Using two ESG signal generators, Option 200 utilizes the combination of both baseband generators to build the W-CDMA waveforms required to test 3GPP user equipment designs.

The Option 200 3GPP setup provides the following downlink channel types:

- primary synchronization channel (PSCH)

- secondary synchronization channel (SSCH)

- primary common control physical channel (PCCPCH)

- common pilot channel (CPICH)

- dedicated physical channel (DPCH)

- paging indicator channel (PICH)

- orthogonal channel noise simulator (OCNS)

In a typical two-ESG setup, the baseband generator from one ESG provides a control configuration (PSCH, SSCH, PCCPCH, and CPICH) while the other provides an information data transmission configuration (DPCH and PICH, with optional OCNS). Fully coded and channelized W-CDMA signals are available at the RF outputs of both ESGs.

For valid channel type/channel number, see "Valid Channel-Type-to-Channel-Number Assignments" on page 4-7. For valid channel combinations, see "Valid Channel Combinations per ESG" on page 4-7.

System Functionality

Separate sections of the 3GPP frame are generated by separate baseband generators, one within ESG 1 and another within ESG 2. The two sections of the frame are then combined at the I/Q inputs of both ESGs and modulated to the carrier by the RF section within each ESG. After carrier frequency and amplitude are introduced, the fully coded and channelized 3GPP signals are output to the DUT(s) through the RF output of both ESGs. An external function generator is used to supply the chip clock. See Figure 4-5.

Figure 4-5. The Two-ESG 3GPP Downlink System Block Diagram
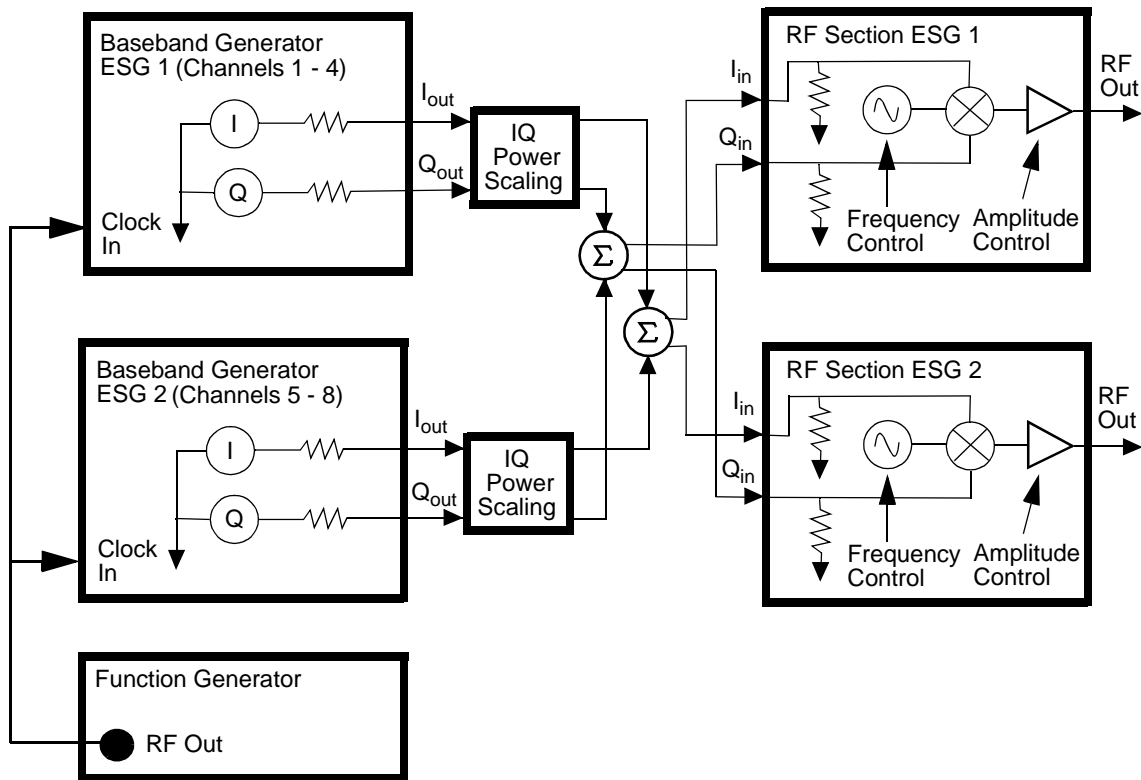
Downlink I/O Signal Descriptions and Timing Relationships

The following sections describe the functionality of various input and output signals available at the BNC connectors on the Option 200 signal generator. Option 200 changes some of the standard characteristics of these signals for use with 3GPP applications.

Connector descriptions are divided into two subsections: front panel BNC inputs and rear panel BNC inputs and outputs.

Front Panel BNC Input Connectors

DATA This connector is not used for Option 200.

DATA CLOCK This BNC connector is used for chip clock input.

For use with external data clock sources. To use an external signal source as the data clock input, press **BBG Data Clock Ext Int** until **Ext** is highlighted or execute the appropriate SCPI command.

SYMBOL SYNC This connector is not used for Option 200.

Rear Panel BNC Input/Output Connectors

PATTERN TRIG IN This BNC connector is used for system sync input.

This connector uses the signal from the EVENT 2 system synchronization output to keep the two baseband generators synchronized.

EVENT 1 OUT This BNC connector is used for an 80 ms synchronization clock output.

This connector outputs an 80 ms synchronization clock aligned with the RF, 40 ms high and 40 ms low.

EVENT 2 OUT This BNC connector is used for system synchronization output.

The system synchronization signal is a chip-wide pulse that resets the system every time a parameter change that requires system synchronization is made.

DATA OUT This BNC connector is used to output the TPC bit.

This signal indicates the state of the transmit power control bit (CMOS high to increase power, CMOS low to decrease power). The signal leads the RF by 24 chips and is active for the entire timeslot.

SYMBOL SYNC OUT This BNC connector is used for symbol synchronization output.

The synchronization output signal is a one-chip wide pulse every 80 ms.

Understanding Relative Power Mapping

The Option 200 3GPP two-ESG downlink system configuration requires power adjustments for each active channel, in order to achieve the required 3GPP code domain power output.

Once the test system has been properly connected and configured, a relative power mapping procedure must be performed after entering channel power values into the signal generators. ESG 1 and ESG 2 cannot communicate channel power level information between the two signal generators. The relative power mapping procedure solves this problem. This procedure ensures that the channel power levels generated on ESG 1 are aligned with the channel power levels produced by ESG 2 to achieve the required 3GPP code domain power levels.

By making adjustments to percent power paired and total voltage paired, the power output of the second baseband generator is matched to the first, resulting in a 0 dB overall system code domain output power value.

The OCNS channel generates orthogonal noise in the code domain. If specific downlink channel power levels are required, adding and/or adjusting the power level of the orthogonal channel noise simulator is an easy way to add fill-in power while keeping the original channel power values intact.

`Voltage Other ESG` values and `% Power Other ESG` values must be input to ESG 1 and ESG 2 via the front panel user interface or by executing SCPI commands via remote interface. See "Adjust the Relative Power Mapping" on page 2-14.

NOTE   To ensure accuracy, the relative power mapping procedure must be repeated *every time* a channel power level setting is modified on either ESG.

Calculating Downlink Scramble Codes

The Option 200 signal generator implements scrambling codes for downlink OCNS and DPCH channels in compliance with the 3G TS 25.101 V3.3 specification. This is done through the use of the `Scrambling Code` (primary scramble code) field, located in the BS setup menu, and the `SecScr Code OS` (secondary scramble code offset) fields located in the OCNS and DPCH Physical Channel Setup menus. These fields are linked so that an entry to any field affects the actual scramble code. To better understand the relationship, refer to the following formula:

$$n = (16 \times i) + k$$

Where n = scramble code   Range: 0 to 8191

             i = Scrambling Code field input   Range 0 to 511

             k = SecScr Code OS field input   Range: 0 to 15

The primary and secondary sets are determined by the `SecScr Code OS` field values. If the `SecScr Code OS` field value is zero, then the scramble code is in the primary set. Any non-zero entry enables the secondary set. The `SecScr Code OS` field value has a range of 0 through 15.

A primary scramble code is the product of the `Scrambling Code` field value and 16. Therefore, the primary scramble code set contains all the multiples of 16, from 0 through 8176.

A secondary scramble code is the sum of the non-zero `SecScr Code OS` field value and the primary scramble code. The secondary scramble code set uses the numbers in between the multiples of 16.

Thus, all numbers from 0 through 8191 are available for scramble codes.

Refer to the following for examples of scramble codes generated with the primary and secondary sets:

$$n = (16 \times i) + k$$

Where n = scramble code

         i = Scrambling Code field input

         k = SecScr Code OS field input

A: Primary set   **B: Secondary set**

           i = 6   i = 8

           k = 0   k = 7

           n = 96   n = 135
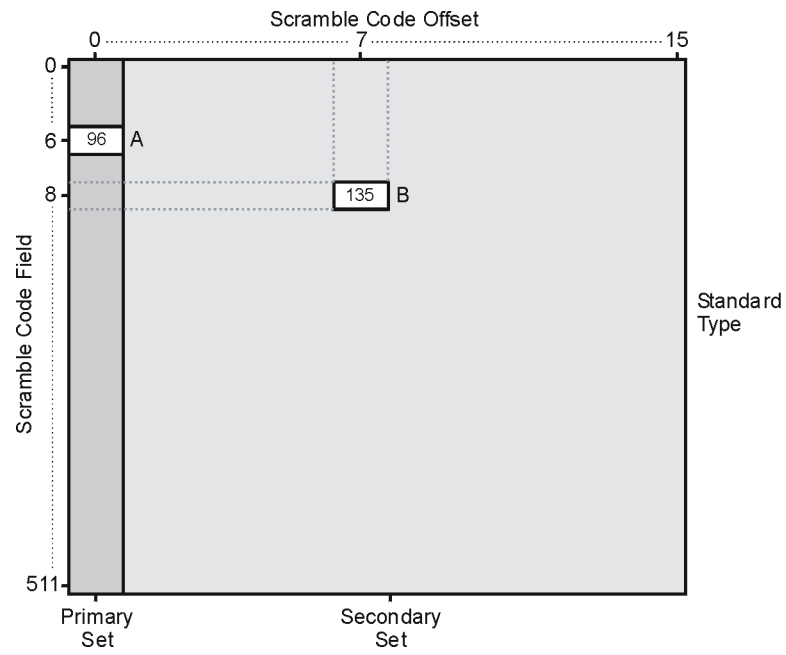
pk765b

Understanding the Uplink Configuration

Uplink Capabilities

The Option 200 single-ESG setup provides two 3GPP channels with real-time generation capability for use in testing 3GPP base station receiver designs.

Channel Types

The single-ESG setup provides the following uplink channel types:

- dedicated physical control channel (DPCCH)
- dedicated physical data channel (DPDCH)

Uplink Data Channel Air Interface

The spreading and scrambling used on the uplink DPCCH and DPDCH channels differ from the downlink in two key areas: I/Q multiplexing of the DPCCH and DPDCH, and the use of the scrambling codes as the channelization.

Figure 4-6 W-CDMA Uplink Data Channel Air Interface Block Diagram
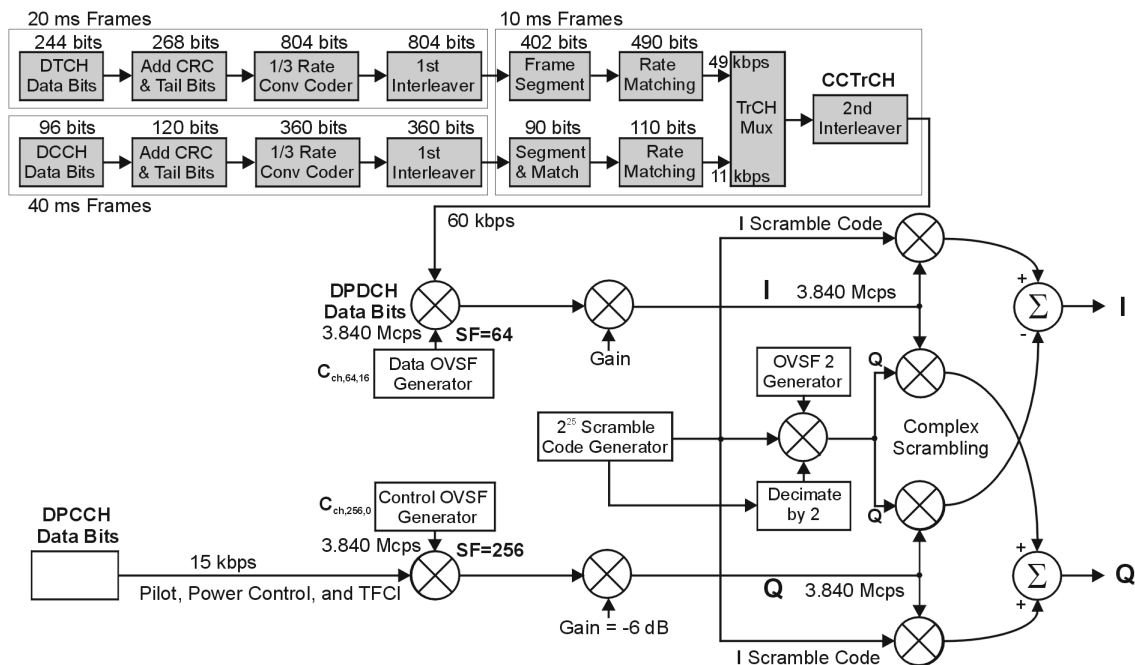
Reference Measurement Channels

Option 200 provides reference measurement channels at 12.2, 64, 144, and 384 kbits per second. This option also provides transport layer channelization for AMR 12.2 (adaptive multi-rate) and UDI 64 (unrestricted digital information) protocols.

System Triggering and Synchronization

Either of the system frame number reset signal or the frame clock which is applied to the PATTERN TRIG IN port can be set as a system trigger signal. After a delay time defined by the sum of 1024 chips (T0 = the standard timing offset between downlink and uplink), Timing Offset, and Slot Delay (plus 10 ms when the SFN reset signal is used), a sync signal is generated to time align all other signals. The RF output signal is generated after the fixed delay of the processing time by the hardware.

For increased measurement accuracy, the signal generator's rear panel 10 MHZ OUT frequency reference can be utilized by other instruments in the test system.

Uplink I/O Signal Descriptions and Timing Relationships

The following sections describe the functionality and timing relationships of various input and output signals available at the BNC connectors on the Option 200 signal generator. Option 200 changes some of the standard characteristics of these signals for use with 3GPP applications.

Front Panel BNC Input Connectors

Other input connectors are used for configuring the downlink tests.

DATA CLOCK This BNC connector is used for chip clock input.

For use with external data clock sources. To use an external signal source as the data clock input, press **BBG Data Clock Ext Int** until **Ext** is highlighted or execute the appropriate SCPI command. This clock rate can be multiplied by setting the **Ext Clock Rate** softkey to x2 or x4. Also, the polarity of this signal can be selected by the **Ext Clock Polarity** softkey to either Pos (positive) or Neg (negative).

Rear Panel BNC Input/Output Connectors

PATTERN TRIG IN This BNC connector is used for system reset trigger input.

The input signal can be set to either the frame clock or the system frame number reset signal by toggling the **Sync Source FClk SFN** softkey. The frame clock is selectable from 10, 20, 40, and 80 ms.

EVENT 1 OUT This BNC connector is used for raw data output of the DPDCH channel.

The DPDCH raw data is aligned with the clock signal (EVENT 2) for the DPDCH raw data. The length of this raw data is dependent on the slot format currently selected for the DPDCH channel.

EVENT 2 OUT This BNC connector is used for clock signal output for DPDCH raw data.

This clock signal is aligned with the DPDCH raw data. The one-cycle length is dependent on the slot format currently set to the DPDCH channel.

DATA OUT This BNC connector is used for DPCCH raw data output.

The value aligned with the 15 ksps symbol rate may change every 256 chips. The output is aligned with data generation timing and leads the RF output by typically 33 chips.

SYMBOL SYNC OUT This BNC connector is used for system sync output.

The sync output signal is triggered by the system frame number reset signal or by the frame clock which is applied to the PATTERN TRIG IN connector. With this sync signal, the time alignment of the earliest frame timing for baseband data generation is made. A number of frames are generated until the next sync signal is introduced for time alignment. The delay time from the trigger input is the sum of 1024 chips (T0), Timing Offset, and Slot Delay (also add 10 ms if the SFN reset signal is used).

This output can be used to synchronize receiver measurements of the base station.

Uplink I/O Signal Timing Diagram

The following figure illustrates the timing relationships between the signals from the rear panel BNC input and output connectors. Signal states are referenced to the chip clock provided at the DATA CLK OUT connector.
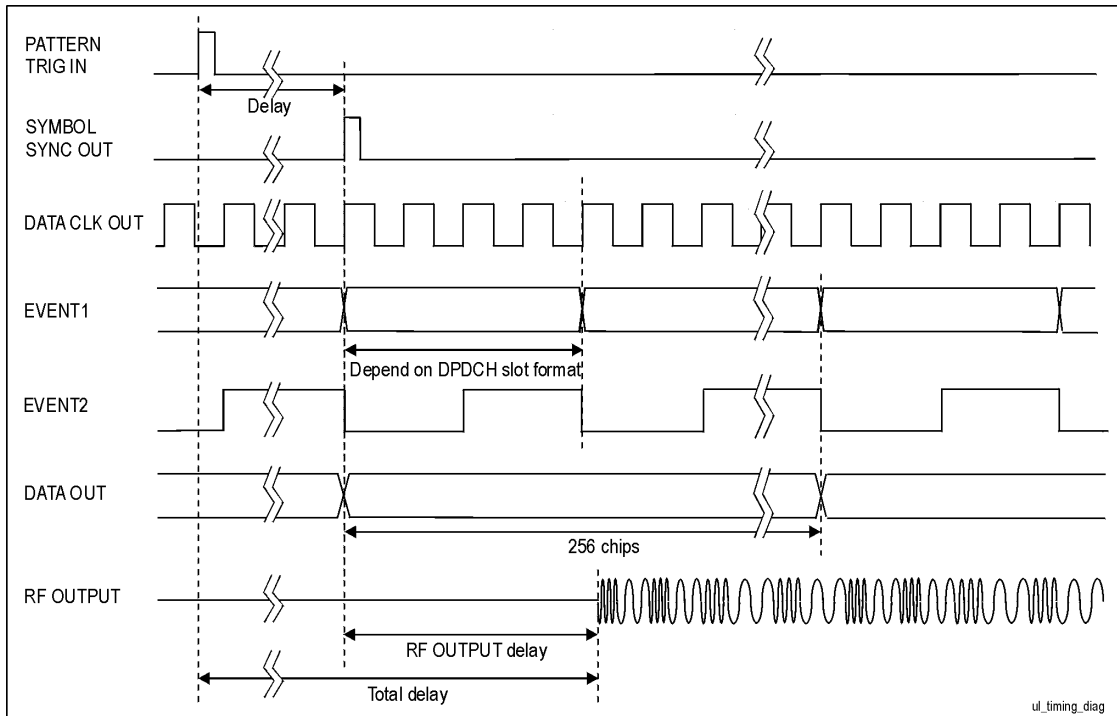
5   Remote Programming and Examples

This chapter describes Option 200 SCPI commands and provides programming examples. The descriptions of commands include syntax requirements, ranges, restrictions, queries, and *RST.

W-CDMA Subsystem SCPI Command Reference

Use the SCPI commands described in this chapter to remotely set the controls and parameters associated with the W-CDMA communications standard. The commands are grouped under general headings and listed in alphabetical order by subject. The general headings are common SCPI commands for downlink and uplink, downlink SCPI commands and uplink SCPI commands. Commands are further organized by their association with the physical channel types.

Common SCPI Commands for Downlink and Uplink

Baseband Generator Data Clock Selection

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock?
```

This command selects the baseband generator data clock source for the radio channel. The choices are Internal (INT[1]) or External (EXT[1]).

*RST: Internal

External Clock Polarity Selection

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:POLarity?
```

This command sets the external clock polarity to either the positive edge or negative edge for the baseband generator. The choices are positive or negative.

*RST: Positive

IQ Percent Power Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:PPOWer?
```

This command query returns the IQ percent power of the ESG. The IQ percent power is that value displayed in the ESG `% Power This ESG` field.

*RST: 0

IQ Percent Power Paired

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:PPPaired <0 - 40>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:PPPaired?
```

This command sets the percent power of the paired ESG. The IQ percent power for the paired ESG. The IQ percent power is that value displayed in the ESG `% Power Other ESG` field.

*RST: 0

IQ Voltage Scale

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:SCALe <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:SCALe?
```

This command adjusts the total IQ output power in the 2 box setup. Changing this value affects the total power and channel power levels will be internally scaled. The output power is automatically calculated when the `Voltage Other ESG` field changes.

Range: 0 to −40 dB

*RST: 0.00

IQ Total Voltage Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVOLtage?
```

This command query returns the total voltage level value from the ESG. This value will displayed in the `Voltage This ESG` data field.

*RST: 0.00

IQ Total Voltage Paired

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVPaired <0 to 4V>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVPaired?
```

This command adjusts the total IQ output power of the paired ESG. The IQ Voltage Other ESG value is for a 2-ESG setup. Entering a value in the `IQ Voltage Other ESG` field forces a calculation of the IQ voltage scale.

*RST: 0

Link Down Up

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK DOWN|UP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK?
```

This command sets the ESG for uplink or downlink parameters.

*RST: Down

Phase Polarity

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL]?
```

This command selects the polarity for the Q channel.

*RST: Normal

W-CDMA State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe]?
```

This command turns W-CDMA functionality on or off.

*RST: Off (0)

Downlink SCPI Commands

Apply Channel Setup

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy?
```

This command immediately starts the channel coding generation process according to the channel setup and data entered for the downlink physical and transport channels. If pre-computing is required, then a progress bar will appear on the signal generator's display. You may query for operation complete with the command "*OPC?". If the apply query command is sent and a "1" is returned, then immediately outputting the command "*OPC?" will force an execution of the "APPLy" command and the channel generation process.

Chip Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CRATe <1kcps to 4.25Mcps>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CRATe?
```

This command adjusts the chip rate. The default value (3.84 Mcps) is in accordance with the 3GPP v3.3 specification.

Range: 1.000 kcps to 4.250000 Mcps

*RST: 3.84 Mcps

Reference Measurement Channel

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup REF122|REF64|REF144|
REF384|AMR122|UDI64|ISDN
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?
```

This command configures the downlink reference measurement setup. The following choices are available:

REF122   Reference Measurement Channel 12.2 kbps (25.101 V3.3)

REF64   Reference Measurement Channel 64.0 kbps (25.101 V3.3)

REF144   Reference Measurement Channel 144.0 kbps (25.101 V3.3)

REF384   Reference Measurement Channel 384.0 kbps (25.101 V3.3)

AMR122   Adaptive Multiple Rate 12.2 kbps (25.944 V3.0)

UDI64   Unrestricted Digital Information 1B 64.0 kbps (25.944 V3.0)

ISDN   ISDN Unrestricted Digital Information. Configures transport channel
                    1 to carry four blocks of 640 and transport channel 2 to carry one block
                    of 148.

*RST: REF122

Scramble Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode <0 to 511>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode?
```

This command selects the scramble code number to be used.

Range: 0 to 511

*RST: 0

CPICH Setup

Power Level

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:POWer?
```

This command sets the power level for this channel.

*RST: 0.00 dB

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh[:STATe]?
```

This command turns the CPICH channel on or off. The CPICH channel type will be activated on channel 4 with the ON[1] command.

*RST: Off (0)

DCH Transport Channel Setup

Block Size

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:
BLKSize <0 to 5000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:BLKSize?
```

This command sets the block size for the selected DCH transport channel.

Range: 0 to 5000

*RST: 20

BP Frame Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:BPFRame?
```

This command query returns the bits per frame for the DCH transport channel.

Range: 16 to 380

*RST: 343

Bits Rate Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:BRATe?
```

This command query returns the bit rate of the selected DCH transport channel.

*RST:12.2 kbps

Coding Type

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE
HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE?
```

This command selects the encoder type. The choices are turbo, none, 1/2 convolutional (HCONv), 1/3 convolutional (TCONv).

*RST: HCONv

CRC

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CRC 0|8|16|24
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CRC?
```

This command sets the number of CRC (cyclic redundancy check) bits for the DCH transport channel.

*RST: 8

Data

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:DATA PN9|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the downlink dedicated channel (DCH) selected. The following choices are available:

PN9	9-bit ITU pseudorandom sequence bit data pattern
FIX4	4-bit repeating sequence data pattern
"<file name>"	A file name in the catalog of binary files

*RST: PN9

FIX4

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:DATA:
FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:DATA:FIX4?
```

This command sets a fixed data type to be transmitted on the selected DCH transport channel.

Range: 0 to 15

*RST: 0

Number of Blocks

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:NBLocks <1 to 8>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:NBLocks?
```

This command sets the number of blocks transmitted by the active transport (DCH) channel.

*RST: 1

Puncture Percentage Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:PPERcentage?
```

This command query returns the percentage of the total bits removed from or added to the fully coded channel.

*RST: 1

Rate Match Attribute

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:RMATch <1 to 256>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:RMATch?
```

This command sets the rate matching attribute.

*RST: 1

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6[:STATe]?
```

This command turns the selected DCH transport channel on or off. The channels must be turned on sequentially. If one channel is turned off then all higher numbered channels will automatically be turned off. Channels #2 to 6 are off at reset while channel #1 is always on.

*RST: On (DCH 1)

TTI

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:TTI 10|20|40|80
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the transmission time interval (in milliseconds) allowed for the transport channel to transmit. Choices are 10, 20, 40, or 80 milliseconds.

*RST: 10

DPCH Setup

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:CCODe <0 to 511>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:CCODe?
```

This command sets the channel code number. The channel code is coupled with the slot format and symbol rate.

Range: 0 to 511

*RST: 6

Slot Format	0-1	2-7	8-11	12	13	14	15	16
Symbol Rate	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	511	255	127	63	31	15	7	3

Data

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:
DATA PN9|PN15|TRANspch|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:DATA?
```

This command configures the data pattern for the downlink DPCH channel. The following choices are available:

PN9   9-bit ITU pseudorandom sequence bit pattern

PN15   15-bit ITU pseudorandom sequence bit pattern

FIX4   4-bit repeating sequence bit pattern

TRANspch   DCH transport channel data pattern

"<file name>"   A file name in the catalog of binary files

*RST: PN9

FIX4

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:DATA:FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:DATA:FIX4?
```

This command sets the data type to a FIX4 pattern.

Range: 0 to 15

*RST: 0

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:POWer <−40.00 to
0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:POWer?
```

This command sets the power level for the DPCH physical channel.

*RST: 0.00 dB

Slot Format

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:SLOTformat <0 to 16>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:SLOTformat?
```

This command configures the DPCH physical channel for a slot format. Slot format is coupled with the channel code and symbol rate. TPC, TFCI and Pilot bits are also set as per specification and not displayed. For a description of slot formats, see the 3GPP Technical Specifications (TS 25.211 v3.3).

Range: 0 to 16

*RST: 0

Slot Format	0-1	2-7	8-11	12	13	14	15	16
Symbol Rate	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	511	255	127	63	31	15	7	3

Secondary Scrambling Code Offset

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:SSCodeos <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:SSCodeos?
```

This command sets the secondary scrambling code offset for the DPCH channel.

Range: 0 to 15

*RST: 0

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4[:STATe]?
```

This command turns the DPCH channel on or off. The DPCH channel type will be activated on the selected channel with the `ON[1]` command.

*RST: Off (0)

Symbol Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:SRATe <7.5 to 960 kbps>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:SRATe?
```

This command selects a symbol rate. The choices are 7.5, 30, 60, 120, 240, 480 or 960 kbps. The symbol rate is dependent on the slot format.

Range: 7.5 to 960 kbps

*RST: 7.5 kbps

TFCI Pattern

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TFCI:PATTern <0 to 0x3FF>`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TFCI:PATTern?`

This command sets a 10-bit pattern for the transport format combination indicator (TFCI). The TFCI is optional and describes the services in use (for example, voice and data).

Range: 0 to 0x3FF

*RST: 0

Timing Offset

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TOFFset <0 to 149>`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TOFFset?`

This command adjusts the timing offset for the DPCH physical channel. The offset is in chips.

Range: 0 to 149

*RST: 0

TPC Pattern

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern UDOWn|DUP|UALL|DALL`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern?`

This command controls the power of the users equipment (UE). The increase/decrease direction for UE power level changes is determined by the TPC Pattern. The power can be stepped all up, stepped all down, alternately step up then down, or step down then up.

*RST: Up/Down

TPC Pattern Steps

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:NUMSteps <1 - 80>`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:NUMSteps?`

This command sets the number of 1 dB steps for increasing/decreasing the UE power. The command is used with the TPC Patterns Up/Down (UDOWn) or Down/Up (DUP) and is the number of 1 db steps taken before the increasing/decreasing power direction changes. The command causes the UE power level to continually increase and decrease by the number of 1 dB steps assigned.

Range: 1 to 80

*RST: 1

Filter Setup

Filter

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<User FIR>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
```

This command selects one of the following filter types:

RNYQuist	Root Nyquist
NYQuist	Nyquist
GAUSsian	Gaussian
RECTangle	Rectangle
IS95	IS-95
IS95_EQ	IS-95 with equalizer
IS95_MOD	IS-95 modified
IS95_MOD_EQ	IS-95 modified with equalizer
AC4Fm	APCO 25 C4FM
UGGaussian	UN3/4 delay compatible, 0.300 fixed BbT, GSM Gaussian
"<User FIR>"	User defined FIR

Filter Alpha (for Nyquist or Root Nyquist)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:ALPHa <0.000 to 1.000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:ALPHa?
```

Execute this command to change the alpha value for a Nyquist or root Nyquist filter. The pre-defined alpha value is 0.220. This command is effective only after selection of a root Nyquist or Nyquist filter; it does not affect other types of filters.

Range: 0.000 to 1.000

Once set, this value is not affected by an instrument preset or by a power cycle.

Filter BbT (for Gaussian)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:BBT <0.000 to 1.000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:BBT?
```

Execute this command to change the bandwidth-multiplied-by-bit-time filter parameter value. The pre-defined BbT value is 0.500, This command is effective only after selection of a Gaussian filter; it does not affect other types of filters.

Range: 0.000 to 1.000

Once set, this value is not affected by an instrument preset or by a power cycle.

Filter EVM/ACP Optimization (for Nyquist or Root Nyquist)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel?
```

Execute this command to optimize a filter for minimized error vector magnitude (EVM) or for minimized adjacent channel power (ACP).

*RST: EVM

OCNS Setup

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:CCode <0 to 511>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:CCode?
```

This command sets the channel code number. The channel code is coupled with the slot format and symbol rate.

Range: 0 to 511

*RST: 6

Slot Format	0-1	2-7	8-11	12	13	14	15	16
Symbol Rate	7.5 ksps	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	511	255	127	63	31	15	7	3

Data

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:DATA PN9|PN15
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:DATA?
```

This command configures the data pattern for the downlink OCNS channel. The following choices are available:

PN9   9-bit ITU pseudorandom sequence bit pattern

PN15   15-bit ITU pseudorandom sequence bit pattern

*RST: PN9

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:POWer <−40.00 to
0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:POWer?
```

This command sets the power level for the OCNS channel.

*RST: 0.00 dB

Secondary Scrambling Code Offset

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:SSCodeos <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:SSCodeos?
```

This command sets the secondary scrambling code offset for the OCNS channel.

Range: 0 to 15

*RST: 0

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[:STATe]?
```

This command turns the OCNS channel on or off. The OCNS channel type will be activated on the selected channel with the `ON[1]` command.

*RST: Off (0)

Symbol Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:SRATe <7.5 to 960 kbps>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:SRATe?
```

This command selects the symbol rate.

Range: 7.5 to 960 kbps

*RST: 7.5 kbps

P–CCPCH Setup

BCH Data

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData PN9|PN15|FIX4|
"<file name>"|TRANspch
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData?
```

This command sets the data type to one of the formats available. The BCH data will be transmitted on the PCCPCH channel. The following choices are available:

PN9   9-bit ITU pseudorandom sequence bit pattern

PN15   15-bit ITU pseudorandom sequence bit pattern

FIX4   4-bit repeating sequence bit pattern

"<file name>"   A file name in the catalog of binary files

TRANspch   DCH transport channel data pattern

*RST: FIX4 0000

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe <0 to 255>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe?
```

This command sets the channel code to the desired code number.

Range: 0 to 255

*RST: 1

FIX4

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData:FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData:FIX4?
```

This command sets a fixed 4-bit data pattern.

Range: 0 to 15

*RST: 0

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:POWer <-40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:POWer?
```

This command sets the power level for the channel.

*RST: 0.00 dB

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch[:STATe]?
```

This command turns the PCCPCH channel on or off. The PCCPCH channel type will be activated on channel 3 with the `ON[1]` command.

*RST: Off (0)

PICH Setup

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCode <0 to 255>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCode?
```

This command sets the channel code to the desired code number.

Range: 0 to 255

*RST: 3

Data

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA?
```

This command configures the data pattern for the downlink PICH channel. The following choices are available:

PN9	9-bit ITU pseudorandom sequence bit pattern
PN15	15-bit ITU pseudorandom sequence bit pattern
FIX4	4-bit repeating sequence bit pattern
"<file name>"	A file name in the catalog of binary files

*RST: PN9

FIX4

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA:FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA:FIX4?
```

This command sets a fixed 4-bit data pattern to be transmitted on a transport channel.

Range: 0 to 15

*RST: 0000

Paging Indicator Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PINDincator?
```

This command query returns the number of paging indicator fields per frame.

Paging Indicator Bits Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PIBits?
```

This command query returns the number of bits in the paging indicator field.

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer?
```

This command sets the power level for the PICH channel.

*RST: 0.00 dB

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PIPH[:STATe]?
```

This command turns the PICH channel on or off. The PICH channel type will be activated on the selected channel with the ON[1] command.

*RST: Off (0)

PSCH Setup

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer?
```

This command sets the power level for the PSCH physical channel.

*RST: 0.00 dB

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH[:STATe]?
```

This command turns the PSCH channel on or off. The PSCH channel type will be activated on channel 1 with the ON[1] command.

*RST: On

SSCH State

Power

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer?
```

This command sets the power level for the channel.

*RST: 0.00 dB

Secondary Scramble Code Group Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:SSGRoup?
```

This query returns the secondary scramble code group for the SSCH channel.

*RST: 0

State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH[:STATe]?
```

This command turns the SSCH channel on or off. The SSCH channel type will be activated on channel 2 with the ON[1] command.

*RST: On

Uplink SCPI Commands

External Clock Rate Multiplier

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE X1|X2|X4
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE?
```

This command sets the external clock rate for the baseband generator. The choices are ×1, ×2, or ×4.

X1	3.84 MHz external clock
X2	7.68 MHz external clock
X4	15.36 MHz external clock

*RST: ×1

DPCCH Setup

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe <0 to 255>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe?
```

This command sets the channel code for the uplink dedicated physical control channel. The maximum value is dependent on the symbol rate.

Range: 0 to 255

*RST: 0

Channel Power Control

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer?
```

This command sets the power level for the uplink dedicated physical control channel (DPCCH).

*RST: −2.69 dB

Channel State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe]?
```

This command sets the operating state for the uplink dedicated physical control channel (DPCCH). The choice is on (1) or off (0).

*RST: On (1)

FBI Fixed-Bit Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX <0 to
1073741823>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX?
```

This command sets the 30-bit feedback information (FBI) pattern for the uplink dedicated physical control channel (DPCCH).

Range: 0 to 1073741823 (0x3FFFFFFF)

*RST: 0

FBI Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?
```

This command configures the pattern of the feedback information (FBI) for the uplink dedicated physical control channel (DPCCH). The following choices are available:

PN9   9-bit ITU pseudorandom sequence bit pattern

PN15   15-bit ITU pseudorandom sequence bit pattern

FIX   Fixed 30-bit repeating sequence data pattern

"<file name>"   A file name in the catalog of binary files

*RST: FIX

FBI State Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI[:STATe]?
```

This query returns whether or not the feedback information (FBI) bits are included in the uplink dedicated physical control channel (DPCCH).

*RST: Off (0)

Signaling Value

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA?
```

This command sets the number of the signaling value for the amplitude ratio. After this command is sent, the channel power level for the uplink dedicated physical control channel (DPCCH) is re-calculated. If the channel power is set directly, the value of this command becomes invalid and is set to –1.

Range: 0 to 15

*RST: 11

Slot Format

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat <0 to 5>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat?
```

This command sets the slot format for the uplink dedicated physical control channel (DPCCH).

Range: 0 to 5

*RST: 0

Symbol Rate Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:RATE?
```

This query returns the symbol rate for the uplink dedicated physical control channel (DPCCH).

*RST: 15000 bps

TFCI Fixed-Bit Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:FIX <0 to 1023>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:FIX?
```

This command sets the 10-bit data pattern of the transport format combination indicator for the uplink dedicated physical control channel (DPCCH).

Range: 0 to 1023 (0x03FF)

*RST: 0

TFCI Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern?
```

This command configures the bit pattern of the transport format combination indicator for the uplink dedicated physical control channel (DPCCH). The following choices are available:

PN9	9-bit ITU pseudorandom sequence bit pattern
PN15	15-bit ITU pseudorandom sequence bit pattern
FIX	Fixed-bit repeating sequence data pattern
"<file name>"	A file name in the catalog of binary files

*RST: PN9

TFCI State Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI[:STATe]?
```

This query returns the status of the transport format combination indicator (TFCI) for the uplink dedicated physical control channel (DPCCH).

*RST: On (1)

TPC Fixed 4-Bit Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:FIX4?
```

This command sets the 4-bit data pattern of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH).

Range: 0 to 15

*RST: 0

TPC Number of Steps

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTeps <1 to 80>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTeps?
```

This command sets the number of steps to increase or decrease the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH).

*RST: 1

TPC Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern PN9|PN15|FIX4|
"<file name>"|UDOWn|DUP|UALL|DALL
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?
```

This command configures the pattern of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH). The following choices are available:

PN9	Pseudorandom bit pattern with 9 steps
PN15	Pseudorandom bit pattern with 15 steps
FIX4	4-bit repeating sequence data pattern
"<file name>"	A file name in the catalog of binary files
UDOWn	Repetitively stepping up and down pattern
DUP	Repetitively stepping down and up pattern
UALL	Consecutively stepping up pattern
DALL	Consecutively stepping down pattern

*RST: PN9

TPC Pattern Trigger Polarity

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger:POLarity?
```

This command sets the pattern trigger polarity of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH). The choices are either positive edge or negative edge.

*RST: Positive

TPC Pattern Trigger State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger
[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger[:STATe]?
```

This command sets the pattern trigger state of the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH). The choices are either (1) or off (0).

*RST: Off (0)

DPDCH Channel Setup

Channel Power Control

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer <−40.00 to 0.00dB>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer?
```

This command sets the power level for the uplink dedicated physical data channel (DPDCH).

*RST: 0.00 dB

Channel State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe]?
```

This command sets the operating state for the uplink dedicated physical data channel (DPDCH). The choices are either on (1) or off (0).

*RST: On (1)

Channel Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe <0 to 255>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe?
```

This command sets the channel code for the uplink dedicated physical data channel (DPDCH). The maximum value is dependent on the slot format value.

Range: 0 to 255

*RST: 16

Data Fixed 4-Bit Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:FIX4 <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:FIX4?
```

This command sets the fixed 4-bit binary data for the uplink dedicated physical data channel (DPDCH).

Range: 0 to 15

*RST: 0

Data Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN9|PN15|FIX4|
"<file name>"|TRANspch
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?
```

This command configures the data pattern for the uplink dedicated physical data channel (DPDCH). The following choices are available:

PN9	9-bit ITU pseudorandom sequence bit pattern
PN15	15-bit ITU pseudorandom sequence bit pattern
FIX4	4-bit repeating sequence bit pattern
"<file name>"	A file name in the catalog of binary files
TRANspch	Transport channel data pattern

*RST: TRANspch

Signaling Value

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA <0 to 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA?
```

This command sets the number of the signaling value for the amplitude ratio. After this command is sent, the value of the channel power level of the uplink dedicated physical data channel (DPDCH) is re-calculated. If the channel power is set directly, the value of this command becomes invalid and is set to –1.

Range: 0 to 15

*RST: 15

Slot Format

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat <0 to 6>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat?
```

This command sets the slot format for the uplink dedicated physical data channel (DPDCH). This value primarily decides the symbol rate value and the maximum channel code value as shown in the following table.

Slot Format	0	1	2	3	4	5	6
Symbol Rate	15 ksps	30 ksps	60 ksps	120 ksps	240 ksps	480 ksps	960 ksps
Max Ch Code	255	127	63	31	15	7	3

Range: 0 to 6

*RST: 2

Symbol Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:
RATE 15000|30000|60000|120000|240000|480000|960000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RATE?
```

This command sets the symbol rate for the uplink dedicated physical data channel (DPDCH). The choices range from 15 ksps to 960 ksps. The symbol rate is dependent on the slot format.

*RST: 60 ksps

UE Setup

Chip Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:CRATe <1000 to 4250000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:CRATe?
```

This command sets the chip rate for the uplink configuration.

Range: 1.000 kcps to 4.250000 Mcps

*RST: 3.840 Mcps

Filter

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<User FIR>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
```

This command selects one of the following filter types for the uplink configuration:

RNYQuist	Root Nyquist
NYQuist	Nyquist
GAUSsian	Gaussian
RECTangle	Rectangle
IS95	IS-95
IS95	IS-95 with equalizer
IS95_MOD	IS-95 modified
IS95_MOD_EQ	IS-95 modified with equalizer
AC4Fm	APCO 25 C4FM
UGGausian	UN3/4 delay compatible, 0.300 fixed BbT, GSM Gaussian
"<User FIR>"	User defined FIR

*RST: RNYQuist

Filter Alpha (for Nyquist or Root Nyquist)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:ALPHa <0.000 to 1.000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:ALPHa?
```

This command changes the alpha value for the Nyquist or root Nyquist filter. The pre-defined alpha value is 0.220. This command is effective only after a root Nyquist or Nyquist filter is selected; it does not effect other types of filters.

Range: 0.000 to 1.000

Once set, this value is not affected by an instrument preset or by a power cycle.

Filter BbT (for Gaussian)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:BBT <0.000 to 1.000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time filter parameter value for the Gaussian filter. The pre-defined BbT is 0.500. This command is effective only after a Gaussian filter is selected; it does not affect other types of filters.

Range: 0.000 to 1.000

Once set, this value is not affected by an instrument preset or by a power cycle.

Filter EVM/ACP Optimization (for Nyquist or Root Nyquist)

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel?
```

This command optimizes a filter for the minimized error vector magnitude (EVM) or for the minimized adjacent channel power (ACP). This command is effective only after choosing a root Nyquist or Nyquist filter; it does not effect other types of filters.

*RST: EVM

Scramble Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SCRamblecode <0 to 16777215>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SCRamblecode?
```

This command sets the scramble code.

Range: 0 to 16777215

*RST: 0

DCH Transport Channel Setup

Bit Error Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER
[:VALue] <0.0000 to 1.0000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER[:VALue]?
```

This command specifies the bit error rate to be applied for the uplink dedicated channel (DCH) selected.

Range: 0.000 to 1.000

*RST: 0.000

Bit Error Rate Actual Value Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER:ACTual?
```

This query returns the actual bit error rate value applied to the data for the uplink dedicated channel (DCH) selected. The actual bit error rate can be different from the specified bit error rate due to the internal bit generation.

Range: 0.000 to 1.000

*RST: 0.000

Bit Error Rate Error Bits Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER:ERRor:
BIT?
```

This query returns the total number of bit errors for the selected bit error rate applied to the data for the uplink dedicated channel (DCH).

Range: 0 to 4294967295

*RST: 0

Bit Error Rate Total Bits Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER:TOTal:
BIT?
```

This query returns the total number of bits for the bit error rate applied to the data for the uplink dedicated channel (DCH) selected.

Range: 0 to 4294967295

*RST: 0

Block Error Rate

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER
[:VALue] <0.000 to 1.000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER[:VALue]?
```

This command specifies the block error rate to be applied for the uplink dedicated channel (DCH) selected.

Range: 0.000 to 1.000

*RST: 0.000

Block Error Rate Actual Value Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER:ACTual?
```

This query returns the actual block error rate value applied to the data for the uplink dedicated channel (DCH) selected. The actual block error rate can be different from the specified block error rate due to the internal bit generation.

Range: 0.000 to 1.000

*RST: 0.000

Block Error Rate Error Blocks Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER:ERRor:
BLOCk?
```

This query returns the total number of block errors for the selected block error rate applied to the data for the uplink dedicated channel (DCH).

Range: 0 to 4294967295

*RST: 0

Block Error Rate Total Blocks Query

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER:TOTal:
BLOCk?
```

This query returns the total number of blocks for the block error rate applied to the data for the uplink dedicated channel (DCH) selected.

Range: 0 to 4294967295

*RST: 0

Block Size

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:BLKSize <0 to
5000>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:BLKSize?
```

This command sets the block size for the uplink dedicated channel (DCH) selected.

Range: 0 to 5000

*RST: 244 for DCH1

                96 for DCH2

                20 for DCH3 to DCH6

Channel State

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6[:STATe]?
```

This command sets the operating state of the uplink dedicated channel (DCH) selected. The choices are either on (1) or off (0).

*RST: Always on (1) for DCH1

                On (1) for DCH2

                Off (0) for DCH3 to DCH6

Cyclic Redundancy Code

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CRC 0|8|12|16|24
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CRC?
```

This command specifies the number of cyclic redundancy code (CRC) bits to be added to each transport channel block. The choices are 0, 8, 12, 16, and 24.

*RST: 16 bits for DCH1 and DCH2

                  8 bits for DCH3 to DCH6

Data Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA PN9|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the selected uplink dedicated channel (DCH). The following choices are available:

PN9   9-bit ITU pseudorandom sequence bit data pattern

FIX4   4-bit repeating sequence data pattern

"<file name>"   A file name in the catalog of binary files

*RST: PN9

Data Fixed 4-Bit Pattern

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:FIX4 <0 – 15>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:FIX4?
```

This command sets the 4-bit data pattern for the uplink dedicated channel (DCH) selected.

Range: 0 to 15

*RST: 0

Encoder Type

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE HCONv|TCONv|
TURBo|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE?
```

This command sets the encoder type for the uplink dedicated channel (DCH) selected. The following choices are available:

HCONv   Coding with the 1/2 rate convolutional encoder

TCONv   Coding with the 1/3 rate convolutional encoder

TURBo   Coding with the turbo coder

NONE   No coding

*RST: TCONv for DCH1 and DCH2

                HCONv for DCH3 to DCH6

Error Insertion Mode

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:
EINSert BLER|BER|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:EINSert?
```

This command toggles the error insertion mode between BLER (block error rate) and BER (bit error rate) for the uplink dedicated channel (DCH) selected. The following choices are available:

BLER: An incorrect CRC bit sequence is inserted in the data.

BER: An incorrect bit sequence is inserted in the data.

NONE: No error bit is inserted in the data.

*RST: None

Number of Blocks

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:NBLock <0 to 4095>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:NBLock?
```

This command sets the 4-bit data pattern for the uplink dedicated channel (DCH) selected.

*RST: 1

Rate Matching Attribute

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:RMATch <1 to 256>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:RMATch?
```

This command sets the rate matching attribute for the uplink dedicated channel (DCH) selected.

*RST: 1

Transmission Time Interval

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:
TTI 10000|20000|40000|80000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the transmission time interval for the uplink dedicated channel (DCH) selected. The choice is 10000, 20000, 40000, or 80000 microseconds.

*RST: 20000 microseconds for DCH1

               40000 microseconds for DCH2

               10000 microseconds for DCH3 to DCH6

Uplink Setup

Adjust Code Domain Power Level

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PADJust EQUal|SCALe`

This command adjusts the code domain power levels of all uplink channels. The following choices are available:

EQUal   Adjusts all channel powers to equal power settings that sum to 0 dB.

SCALe   Scales the channel power levels so that the sum of the powers is 0 dB and the power ratios for the individual channels are the same.

*RST: Scale

Apply Channel Setup

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy?`

This command immediately starts the channel coding generation process according to the channel setup and data for the uplink physical and transport channels. If pre-computing is required then a progress bar will appear on the signal generator display. You may query for operation complete with the command "*OPC?". If the apply query command returns a "1", the execution of the apply command is needed. If the apply query command returns a "0", the execution of the apply command is completed and is not needed.

Reference Measurement Channel

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC122|RMC64|RMC144|`
`RMC384|AMR122|UDI64`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`

This command configures the uplink reference measurement channel. The following choices are available:

RMC122   Reference Measurement Channel 12.2 kbps (25.141 V3.4)

RMC64   Reference Measurement Channel 64.0 kbps (25.141 V3.4)

RMC144   Reference Measurement Channel 144.0 kbps (25.141 V3.4)

RMC384   Reference Measurement Channel 384.0 kbps (25.141 V3.4)

AMR122   Adaptive Multiple Rate 12.2 kbps

UDI64   ISDN Unrestricted Digital Information 1B 64.0 kbps

*RST: RMC122

Uplink Synchronization Setup

Frame Clock Interval

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval
FCL10|FCL20|FCL40|FCL80
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?
```

This command sets the frame clock interval for the uplink synchronization source.

FCL10	10 milliseconds
FCL20	20 milliseconds
FCL40	40 milliseconds
FCL80	80 milliseconds

*RST: FCL80

Frame Clock Polarity

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:POLarity?
```

This command sets the operating state of the frame clock for the uplink synchronization source. The choices are either positive edge or negative edge.

*RST: Positive

SFN Reset Polarity

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:POLarity?
```

This command sets the operating state of the system frame number (SFN) reset signal for the uplink synchronization. The choices are positive edge or negative edge.

*RST: Positive

Slot Delay Control

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay <0 to 119>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay?
```

This command sets the number of slots to be delayed from the synchronization source. The actual timing offset is (T0) + (Timeslot Delay) + (Timing Offset) where T0 (= 1024 chips) is the standard timing offset between downlink and uplink.

Range: 0 to 119 slots

*RST: 0

Synchronization Triggering Mode

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE SINGle|CONTinuous
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE?
```

This command selects the synchronization triggering mode. The following choices are available:

SINGle   Once triggered, the ESG generates one set of frames based on the reference clock.

CONTinuous   The sync signal and frame timing are continuously aligned.

*RST: Single

Sync Source

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce] SFN_RST|FCLock
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce]?
```

This command selects the uplink synchronization source type. The following choices are available:

SFN_RST   System frame number reset signal

FCLock   Frame clock signal

*RST: FCLock

Timing Offset Control

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset <−512 to 2560>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset?
```

This command sets the timing offset in chips between the downlink signal and the uplink signal. A minus value means a negative delay. The actual timing offset is (T0) + (Timeslot Delay) + (Timing Offset) where T0 (= 1024 chips) is the standard timing offset between downlink and uplink.

Range: −512 to 2560 chips

*RST: 0

Programming Example

This section provides the following programming example:

- uplink reference sensitivity

Uplink Reference Sensitivity

Use this example to configure the reference sensitivity setup for uplink.

```
10  !*************************************************************
20  !
30  ! PROGRAM DESCRIPTION: In this example, the instrument is configured for
40  ! uplink (BS test). The carrier frequency is 1950 MHz at −121 dBm.
50  !
60  ! Text within '[]' is optional. Lower case is also optional.
70  !
80  ! If this example is used with HP Basic, every line must start with
90  ! 'OUTPUT < GPIB Address >;'.
100 !
110 !*************************************************************
120 *RST
130 [:SOURce]:FREQuency[:CW] 1950.0 MHZ
140 [:SOURce]:POWer[:LEVel][:AMPLitude] −121 DBM
150 :OUTPut:MODulation[:STATe] ON
160 !********************************************
170 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK UP
180 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL] NORmal
190 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBClock INT[1]
200 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:FILTer RNYQuist
210 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:FILTer:ALPHa 0.220
220 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:FILTer:SCRamblecode 0
230 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:CRATe 3840000
240 ! ********************************************
250 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce] SFN_RST
260 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE CONTinuous
270 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset 0
280 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL80
290 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC122
300 ! ********************************************
310 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe] ON
320 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer −2.69 DB
330 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat 0
340 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe 0
350 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:FIX 0
360 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX 0
370 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern UDOWn
380 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTep 1
390 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger OFF
400 ! ********************************************
410 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe] ON
420 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer 0.00 DB
430 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN9
440 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat 2
450 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe 16
460 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RATE 60000
470 ! ********************************************
480 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1][:STATe] ON
490 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:BLKSize 244
```

```
500 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:DATA PN9
510 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:NBLock 1
520 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:RMATch 1
530 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:CODE TCONv
540 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:CRC 16
550 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]:TTI 80000
560 !*********************************************
570 [:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe] ON
580 :OUTPut[:STATe] ON
590 END
```

Program Comments

10 to 110:	Program description
120:	Reset the signal generator.
130:	Set the signal generator's carrier frequency to 1950.000 MHz.
140:	Set the signal generator's carrier power to −121 dBm.
150:	Turn on the modulation function.
160:	Program border
170:	Set the ESG for uplink parameters.
180:	Set the phase polarity to normal.
190:	Set the data clock source of the baseband generator to internal.
200:	Set the filter type to root Nyquist.
210:	Set the alpha value of the root Nyquist filter to 0.220.
220:	Set the scrambling code to 0.
230:	Set the chip rate to 3.840 Mcps.
240:	Program border
250:	Set the synchronization source to SFN reset signal.
260:	Set the synchronization triggering mode to continuous.
270	Set the timing offset to 0 chip.
280:	Set the frame clock interval to 80 milliseconds.
290:	Set the reference measurement channel rate to 12.2 kbps.
300:	Program border
310:	Turn on the uplink dedicated physical control channel (DPCCH) operating state.
320:	Set the power of the uplink DPCCH to −2.69 dB.
330:	Set the slot format of the uplink DPCCH to 0.
340:	Set the channel code of the uplink DPCCH to 0.
350:	Set the TFCI fixed-bit pattern of the uplink DPCCH to 0000.
360:	Set the FBI fixed-bit pattern of the uplink DPCCH to 00000000.
370:	Set the TPC pattern of the uplink DPCCH to up and down pattern.
380:	Set the number of steps for TPC of the uplink DPCCH to 1.
390:	Set the pattern trigger for TPC of the uplink DPCCH to off.
400:	Program border
410:	Turn on the uplink dedicated physical data channel (DPDCH) operating state.
420:	Set the power of the uplink DPDCH to 0.00 dB.
430:	Set the data pattern of the uplink DPCCH to PN9.
440:	Set the slot format of the uplink DPCCH to 2.
450:	Set the channel code of the uplink DPDCH to 16.
460:	Set the symbol rate of the uplink DPCCH to 60 ksps.

470:	Program border
480	Turn on the uplink dedicated channel (DCH) #1.
490	Set the block size of the uplink DCH #1 to 244.
500	Set the data pattern of the transport channel #1 to PN9.
510	Set the number of blocks of the uplink DCH #1 to 1.
520	Set the rate matching parameter of the transport channel #1 to 1.
530	Set the encoder type of the uplink DCH to 1/3 convolutional encoder.
540	Set the cyclic redundancy code of the transport channel #1 to 16.
550	Set the transmission time interval (TTI) of the uplink DCH #1 to 80 milliseconds.
560	Program border
570	Turn on the W-CDMA functionality.
580	Turn on the signal generator output.
590	End of program

6 Programming Command Cross-Reference

This chapter lists the W-CDMA softkeys and data fields along with their corresponding SCPI commands. For a complete list of the signal generator hardkeys and softkeys and their corresponding SCPI commands, please refer to the programming guide.

Table 6-1. Mode – WCDMA Softkeys

Key or Data Field	SCPI Command
# of Blocks	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:NBLocks <1 to 8>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:NBLocks?`
% Power Other ESG	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:PPPaired <0 to 40>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:PPPaired?`
% Power This ESG	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:PPOWer?`
1/2 Conv (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE HCONv` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE?`
1/2 Conv (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE HCONv` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE?`
1/3 Conv (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE TCONv` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE?`
1/3 Conv (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE TCONv` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE?`
10 msec	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL10` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?`
12.2 kbps (25.101 v3.5)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup REF122` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`
20 msec	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL20` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?`
40 msec	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL40` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?`
64 kbps (25.101 v3.5)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup REF64` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`
80 msec	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL80` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?`
144 kbps (25.101 v3.5)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup REF144` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`
384 kbps (25.101 v3.5)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup REF384` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command
`Actual BER`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BER:ACTual?`
`Actual BLER`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:BLER:ACTual?`
Adjust Code Domain Power (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PADJust EQUal|SCALe`
Adjust Code Domain Power (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PADJust EQUal|SCALe`
All Down (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern DALL` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern?`
All Down (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern DALL` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`
All Up (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern UALL` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:PATTern?`
All Up (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern UALL` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`
AMR 12.2 kbps	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel AMR122` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
AMR 12.2 (25.944 v3.3)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup AMR122` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`
APCO 25 C4FM (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer AFC4Fm` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?`
APCO 25 C4FM (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer AC4Fm` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?`
Apply Channel Setup (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy?`
Apply Channel Setup (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy?`
BBG Data Clock Ext Int	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock INT[1]|EXT[1]` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock?`

`BCH Data` (P-CCPCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData`
	`PN9|PN15|FIX4|"<file name>"|TRANspch`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:BCHData?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or Data Field	SCPI Command
BER	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA: BER[:VALue] <0.0000 to 1.0000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA: BER[:VALue]?
Beta **(DPCCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA <0 to 15> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA?
Beta **(DPDCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA <0 to 15> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA?
Bits/Frame	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6: BPFRame?
Bits Rate	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6: BRATe?
BLER	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA: BLER[:VALue] <0.000 to 1.000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA: BLER[:VALue]?
Blk Size **(Downlink)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6: BLKSize < 0 to 5000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6: BLKSize?
Blk Size **(Uplink)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: BLKSize <0 to 5000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: BLKSize?
Channel Code **(CPICH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:CCODe?
Channel Code **(DPCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4: CCODe <0 to 511> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:CCODe?
Channel Code **(DPCCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe <0 to 255> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe?
Channel Code **(DPDCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe <0 to 255> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe?
Channel Code **(OCNS)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4: CCODe <0 to 511> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:CCODe?
Channel Code **(P-CCPCH)**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe <0 to 511> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe?

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command
`Channel Code` **(PICH)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCODe <0 to 511>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCODe?`

Channel State
Off On
(CPICH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh[:STATe]?`

Channel State
Off On
(DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6`
	`[:STATe]?`

Channel State
Off On
(DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe]?`

Channel State
Off On
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4`
	`[:STATe]?`

Channel State
Off On
(DPDCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe]?`

Channel State
Off On
(OCNS)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[:STATe]?`

Channel State
Off On
(P- CCPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch[:STATe]?`

Channel State
Off On
(PICH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH[:STATe]?`

Channel State
Off On
(PSCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH[:STATe]?`

Channel State
Off On
(SSCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH[:STATe]?`

`Chip Rate`
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:`
	`CRATe <1 kcps to 4.25 Mcps>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CRATe?`

`Chip Rate`
(Uplink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:`
	`CRATe <1000 to 4250000 cps>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:CRATe?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command

`Coding`
(Downlink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`CODE HCONv|TCONv|TURBo|NONE`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE?`

`Coding`
(Uplink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`CODE HCONv|TCONv|TURBo|NONE`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE?`

`CRC Size`
(Downlink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`CRC 0|8|12|16|24`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CRC?`

`CRC Size`
(Uplink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`CRC 0|8|12|16|24`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CRC?`

`Data`
(DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`DATA PN9|FIX4|"<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:DATA?`

`Data`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA PN9|PN15|FIX4|"<file name>"|TRANspch`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:DATA?`

`Data` **(DPDCH)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN9|PN15` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?`
`Data` **(OCNS)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:DATA PN9|PN15` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:DATA?`

`Data`
(PICH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:`
	`DATA PN9|PN15|FIX4|"<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA?`

`Data`
(Uplink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`DATA PN9|FIX4|"<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA?`

Down/Up
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`TPC:PATTern DUP`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`TPC:PATTern?`

Down/Up **(Uplink)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern DUP` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`
Equal Powers **(Downlink)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PADJust EQUal`
Equal Powers **(Uplink)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PADJust EQUal`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or Data Field	SCPI Command
Err Insert	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: DATA:EINSert BLER|BER|NONE [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: DATA:EINSert?
Error Bits	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: DATA:BER:ERRor:Bit?
Error Block**s**	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: DATA:BLER:ERRor:BLOCk?
Ext Clock Polarity **Neg Pos** (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT: POLarity POSitive|NEGative [:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:POLarity?
Ext Clock Rate **x1 x2 x4** (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE x1|x2|x4 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE?
FBI Pattern	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI: PATTern PN9|PN15|FIX|"<file name>" [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?
FBI State	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI[:STATe]?
Filter (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk: FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|IS95_EQ| IS95_MOD|IS95_MOD_EQ|AFC4Fm|UGGaussian|"<file name>" [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
Filter (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk: FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|IS95_EQ| IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<file name>" [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
Filter Alpha (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer: ALPHa <0.000 to 1.000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:ALPHa?
Filter Alpha (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer: ALPHa <0.000 to 1.000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:ALPHa?
Filter BbT (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer: BBT <0.000 to 1.000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:BBT?
Filter BbT (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer: BBT <0.000 to 1.000> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:BBT?

Table 6-**1. Mode – WCDMA Softkeys (Continued)**

Key or `Data Field`	SCPI Command

FIX
(FBI for DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:`
	`FIX <0 to 1073741823>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX?`

FIX
(TFCI for DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:`
	`FIX <0 to 1023>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:`
	`FIX?`

FIX4
(DPDCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:`
	`FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:FIX4?`

FIX4
(Uplink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`DATA:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`DATA:FIX4?`

FIX4
(Downlink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`DATA:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`DATA:FIX4?`

FIX4 (DPCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA:FIX4?`

FIX4 (P-CCPCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:`
	`BCHData:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData:FIX4?`

FIX4
(PICH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:`
	`DATA:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DATA:FIX4?`

FIX4
(TPC for DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern:FIX4 <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern:FIX4?`

Frame Clock Interval	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:`
	`INTerval FCL10|FCL20|FCL40|FCL80`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?`

Frame Clock Polarity Neg Pos	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:`
	`POLarity POSitive|NEGative`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:POLarity?`

Gaussian (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer GAUSsian` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or Data Field	SCPI Command
Gaussian (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer GAUSsian [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
IS-95 (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer IS95 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
IS-95 (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer IS95 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
IS-95 Mod (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer IS95_MOD [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
IS-95 Mod (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer IS95_MOD [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
IS-95 Mod w/EQ (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer IS95_MOD_EQ [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
IS-95 Mod w/EQ (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer IS95_MOD_EQ [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
IS-95 w/EQ (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer IS95_EQ [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
IS-95 w/EQ (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer IS95_EQ [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
IQ Voltage Scale	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:SCALe <-40 to 0dB> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:SCALe?
Link Down Up	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK DOWN|UP [:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK?
None (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6: CODE NONE [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:CODE?
None (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: CODE NONE [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:CODE?
Num of Blk	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: NBLock <0 to 4095> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6: NBLock?
Nyquist (Downlink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer NYQuist [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
Nyquist (Uplink)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer NYQuist [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or Data Field	SCPI Command
Offset	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4: TOFFset <0 - 149> [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TOFFset?
Optimize FIR For EVM ACP (BS Setup)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel EVM|ACP [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel?
Optimize FIR For EVM ACP (UE Setup)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel EVM|ACP [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel?
Paging Indicator	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PI?
Phase Polarity Normal Invert	[:SOURce]:RADio:WCDMa:TGPP[:BBG]: POLarity[:ALL] NORMal|INVerted [:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL]?
PI Bits	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PIBits?
PN9 (DPCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:DATA PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:DATA?
PN9 (DPDCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?
PN9 (FBI for DPCCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?
PN9 (TFCI for DPCCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern?
PN9 (TPC for DPCCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?
PN9 (Transport Channel)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA PN9 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA?
PN15 (DPCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:DATA PN15 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:DATA?
PN15 (DPDCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN15 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?
PN15 (FBI for DPCCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern PN15 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?
PN15 (TFCI for DPCCH)	[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI: PATTern PN15 [:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern?

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command
PN15 (TPC for DPCCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern PN15` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`

`Power` (CPICH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:`
	`POWer <-40 to 0dB>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:POWer?`

`Power`
(DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:`
	`POWer <-40 to 0dB>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer?`

`Power`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`POWer <-40 to 0dB>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:POWer?`

`Power`
(DPDCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:`
	`POWer <-40 to 0dB>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer?`

`Power` (OCNS)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:POWer <-40 to 0dB>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:POWer?`

`Power`
(P-CCPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:`
	`POWer <-40 to 0dB>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:POWer?`

`Power` (PICH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer <-40 to 0dB>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer?`
`Power` (PSCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer <-40 to 0dB>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer?`
`Power` (SSCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer <-40 to 0dB>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer?`
`Puncture` (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:` `PPERcentage?`
`Puncture` (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:` `PPERcentage?`

`Rate Match Attr`
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`RMATch <1 to 256>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH:DCH[1]|2|3|4|5|6:`
	`RMATch?`

`Rate Match Attr`
(Uplink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`RMATch <1 to 256>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`RMATch?`

Rectangle (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer RECTangle` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	**SCPI Command**
Rectangle (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer RECTangle` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?`

Ref Measure Setup
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:`
	`RCSetup REF122|REF64|REF144|REF384|AMR122|UDI64|ISDN`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`

Ref Measure Setup
(Uplink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:`
	`RMCHannel RMC122|RMC64|RMC144|RMC384|AMR122|UDI64`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`

RMC 12.2 kbps **(25.141 v3.4)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC122` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
RMC 64 kbps **(25.141 v3.4)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC64` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
RMC 144 kbps **(25.141 v3.4)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC144` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
RMC 384 kbps **(25.141 v3.4)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC384` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
Root Nyquist (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer RNYQuist` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?`
Root Nyquist (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer RNYQuist` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?`
Scale to 0dB (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PADJust SCALe`
Scale to 0dB (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PADJust SCALe`
`Scrambling Code:` (BS Setup)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode <0 to 511>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode?`

`Scrambling Code`
(UE Setup)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:`
	`SCRamblecode <0 to 16777215>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SCRamblecode?`

`Secondary`
`Scramble Code`
`Group`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:SSGRoup?`

`SecScr Code OS`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`SSCodeos <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`SSCodeos?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command

`SecScr Code OS` (OCNS)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:`
	`SSCodeos <0 to 15>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4:`
	`SSCodeos?`

Select Pattern	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern PN9|PN15|FIX4|"<file name>"|UDOW|DUP|UALL|DALL`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`

SFN RST Polarity Neg Pos	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:`
	`POLarity POSitive|NEGative`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:POLarity?`

Slot Delay	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay <0 to 119>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay?`

`Slot Format` (DPCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`SLOTformat <0 to 16>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`SLOTformat?`

`Slot Format` (DPCCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:`
	`SLOTformat <0 to 5>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat?`

`Slot Format` (DPDCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:`
	`SLOTformat <0 to 6>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat?`

`Symbol Rate` (DPCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH:SRATe?`
`Symbol Rate` (DPCCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:RATE?`

`Symbol Rate` (DPDCH)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:`
	`RATE 15000|30000|60000|120000|240000|480000|960000`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RATE?`

`Symbol Rate` (OCNS)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:`
	`SRATe 7.5|15|30|60|120|240|480 ksps`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS:SRATe?`

Sync Source FClk SFN	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:`
	`SYNC[:SOURce] SFN_RST|FCLock`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce]?`

Sync Trigger Mode Single Cont	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:`
	`MODE SINGle|CONTinuous`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	**SCPI Command**

`TFCI Pattern`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TFCI:`
	`PATTern <0 to 0x3FF>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TFCI:`
	`PATTern?`

`TFCI Pattern`
(DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:`
	`PATTern PN9|PN15|FIX|"<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern?`

`TFCI State`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI[:STATe]?`

`Time Offset`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`TOFFset <0 to 149>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TOFFset?`

Timing Offset	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset <–512 to 2560>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset?`
`Total Bits`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:` `BER:TOTal:Bit?`
`Total Blocks`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:DATA:` `BLER:TOTal:BLOCk?`

`TPC Pat Steps`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`NUMSteps <1 to 80>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`NUMSteps?`

`TPC Pat Steps`
(DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`NSTeps <1 to 80>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTeps?`

TPC Pat Trig
Off On
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:`
	`TRIGger[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:`
	`TRIGger[:STATe]?`

TPC Pat Trig Polarity
Neg Pos
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:`
	`TRIGger:POLarity POSitive|NEGative`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:`
	`TRIGger:POLarity?`

`TPC Pattern`
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`PATTern <UDOWn|DUP|UALL|DALL>`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`PATTern?`

`TPC Pattern`
(DPCCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern PN9|PN15|FIX4|"<file name>"|UDOWn|DUP|UALL|DALL`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command

Transport Channel	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA TRANspch`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA?`

TrCH State Off On	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6`
	`[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6`
	`[:STATe]?`

`TTI`
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`TTI 10|20|40|80 mSec`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`TTI?`

`TTI`
(Uplink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`TTI 10000|20000|40000|80000`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:TTI?`

Turbo	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`CODE TURBo`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6:`
	`CODE?`

UDI 64 (25.944 v3.0)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup UDI64` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RCSetup?`
UDI 64 kbps	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel UDI64` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?`
UDI ISDN **(12.944 v3.3)**	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup ISDN` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RCSetup?`
UN3/4 GSM **Gaussian** (Downlink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer UGGaussian` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?`
UN3/4 GSM **Gaussian** (Uplink)	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer UGGaussian` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?`

Up/Down
(Downlink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`PATTern UDOWn`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:TPC:`
	`PATTern?`

Up/Down
(Uplink)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern UDOW`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`

User File
(Downlink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6`
	`:DATA "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DCH[1]|2|3|4|5|6`
	`:DATA?`

Table 6-1. Mode – WCDMA Softkeys (Continued)

Key or `Data Field`	SCPI Command

User File
(Uplink DCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`DATA "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DCH[1]|2|3|4|5|6:`
	`DATA?`

User File
(DPCCH FBI
Pattern)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:`
	`PATTern "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?`

User File
(DPCCH TFCI
Pattern)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:`
	`PATTern "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:`
	`PATTern?`

User File
(DPCCH TPC
Pattern)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:`
	`PATTern "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?`

User File
(DPCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2|3|4:`
	`DATA?`

User File
(DPDCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:`
	`DATA "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?`

User File
(PCCPCH BCH)
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:`
	`BCHData "<file name>"`
	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData?`

`Voltage Other` `ESG`	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVPaired <4 to 0V>` `[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVPaired?`
Voltage This ESG	`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:IQ:TVoltage?`
W-CDMA Off On	`[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe] ON|OFF|1|0` `[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe]?`

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