

User's and Programming Guide
Agilent Technologies
ESG Family Signal Generators
Option 101 cdma2000 (Revision 8) Personality

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1 The cdma2000 (Revision 8) Personality

This guide provides information specific to the Option 101 cdma2000 (Revision 8) personality. This chapter contains an overview of Option 101.

NOTE This option requires the installation of Option UND, Dual Arbitrary Waveform Generator. Refer to the Option UND user's and programming guide for information.

Overview

This section contains an overview of the Option 101 cdma2000 (Revision 8) personality.

Option 101 cdma2000 (Revision 8)

The Agilent Technologies ESG-D and ESG-DP Series Option 101 signal generator is a multichannel, code division multiple access (cdma2000) stimulus intended for base station and mobile testing.

Option 101 enables you to generate forward and reverse link signals consistent with the developing cdma2000 (Revision 8) system specifications. These 1× or 3× chip rate, direct or multicarrier spread signals can be used for base station, mobile, component and subsystem testing. User-defined custom signals can be created using a simple table-based channel editor.

Option 101 includes:

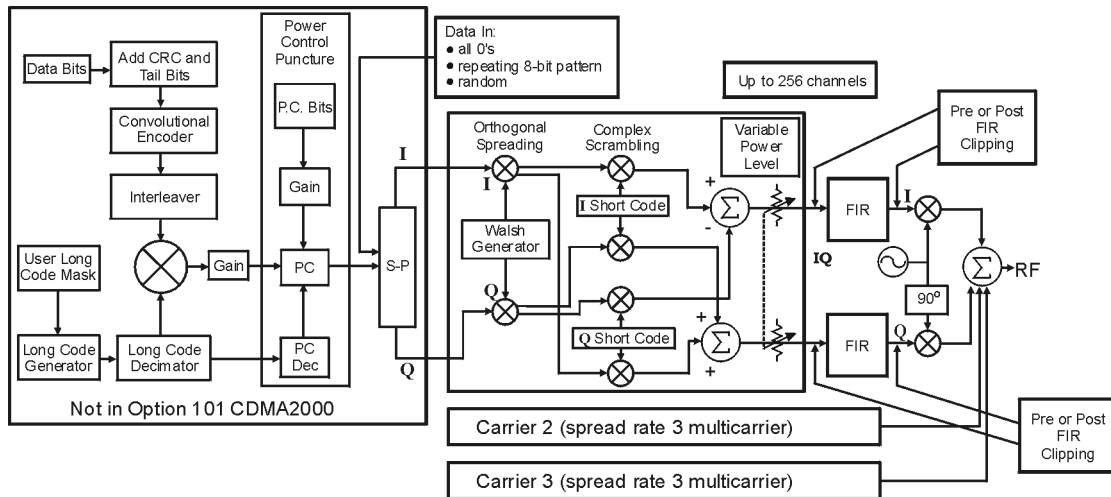
- multichannel cdma2000 forward link signals
- multiple cdma2000 carriers with direct or multicarrier spreading
- spread rates: 1× or 3×
- multicarrier or direct spreading forward link types
- predefined cdma2000 waveform configurations or use the table editor to fully configure a cdma2000 waveform per your requirements
- forward link channel types: pilot, paging, sync, dedicated control, fundamental traffic, and supplemental traffic
- user-definable forward link variables: data rate, Walsh code, code domain power, PN offset and data pattern for each channel
- HPSK spreading/modulation for reverse link
- reverse link channel types: pilot, dedicated control, fundamental traffic, and supplemental traffic
- user-definable reverse link variables: data rate, code domain power, and data pattern for each channel
- baseband clipping: clip the composite I/Q waveform or I and Q separately; choose either pre- or post-FIR filter clipping
- user-defined FIR filters
- predefined filters including Gaussian, IS-95, IS-95 modified ACP filters, raised cosine (Nyquist) and root raised cosine (root Nyquist)

NOTE Specifications for Option 101 are located in the technical specifications document.

Physical Layer Block Diagrams

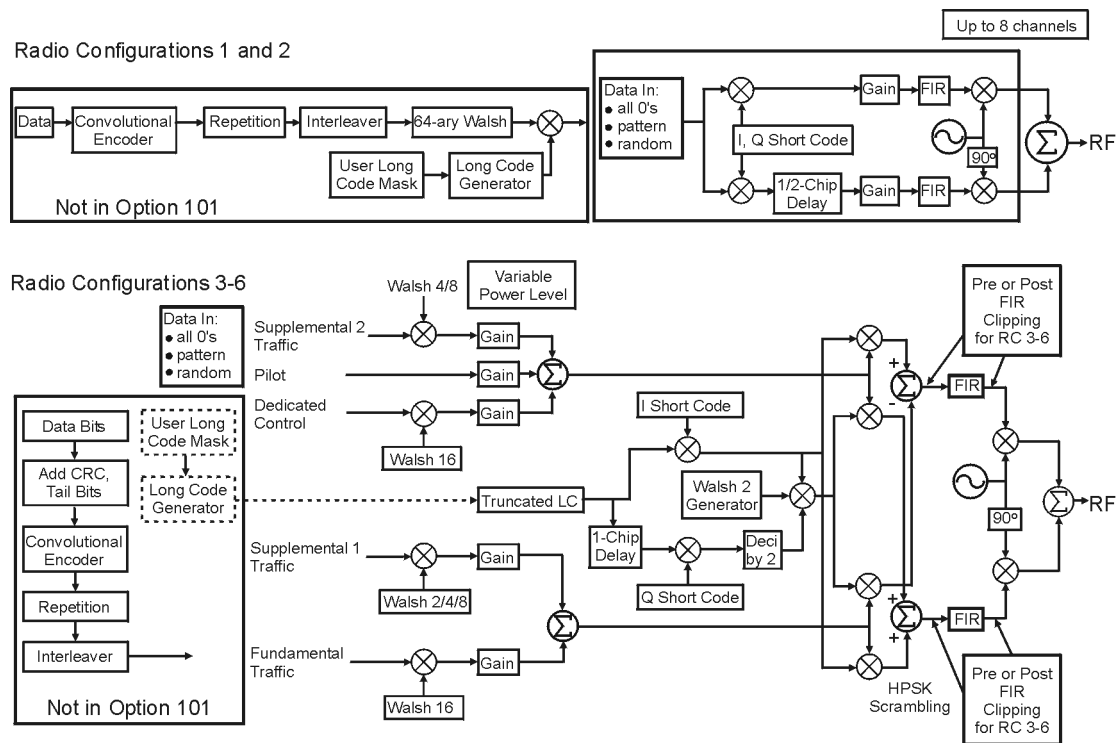
The following diagrams show the portions of the forward and reverse physical layers supported by Option 101.

Figure 1-1 Option 101 Forward Link Channel Structure



pk756b

Figure 1-2 Option 101 Reverse Link Channel Structure



pk754b

Revision Numbers

The firmware personality of the Option 101 signal generator is based on continually developing cdma2000 international standards. Therefore, the firmware must be upgraded periodically to stay current with these standards. For identification purposes, a revision number is assigned to each release of the Option 101 personality. The revision number appears in softkey menus, status displays, and this guide. This guide describes the features associated with *revision 8* of the Option 101 cdma2000 personality, designed according to Revision 8 cdma2000 specifications.

2 Using Functions

This chapter contains instructions for using the features associated with the Option 101, cdma2000 (Revision 8) personality.

Table Editor Basics

Option 101 provides several table editors that enable you to:

- modify cdma2000 forward link channel configurations (for details, see [page 2-8](#))
- modify cdma2000 reverse link channel configurations (for details, see [page 2-15](#))
- create a custom multicarrier waveform (for details, see [page 2-23](#))
- create a user-defined FIR filter (for details, see [page 2-30](#))
- modify a user-defined FIR filter (for details, see [page 2-35](#))

While each of these table editors performs a different function, they are all used in a similar manner, and most of the table editors have several editing softkeys in common.

Common Edit Functions

Edit Item	Enables you to use the front panel knob and arrow keys to edit the value of a selected entry. After highlighting the value you want to edit, press this softkey.
Insert Row	Inserts a row for data above the currently selected row.
Delete Row	Deletes the currently selected row of data.
Goto Row	Displays a new page of softkeys so that you can quickly move to the first, middle, or last row of data. This is especially helpful in a large table, or when using the filter table editor mirror function.
Load Default FIR	Enables you to reset factory default values for a FIR filter.
Load/Store	Displays a new page of softkeys that enables you to load data from a stored file, save data to a file, or delete a stored file.
Delete All Rows	Clears all data from a table.

CAUTION There is no “undo” command. Once you delete data from a table, you cannot retrieve it.

Using cdma2000 (Revision 8)

This chapter describes how to set up a waveform using predefined and user-defined channels.

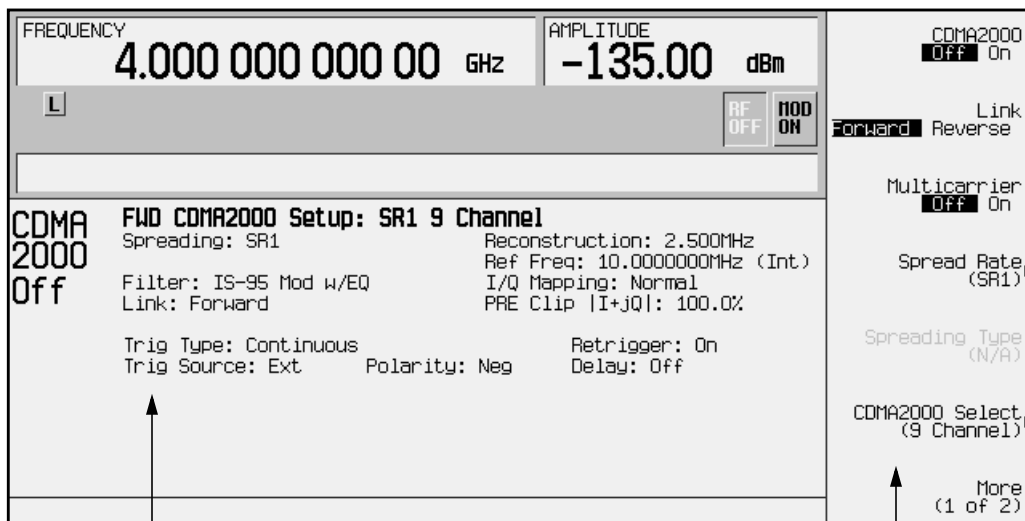
You will learn how to perform the following:

- select channels
- modify channels
- activate the modulation and the RF output
- use multicarrier waveforms
- create filters
- modify filters

Accessing the CDMA2000 Menu

Use the following procedure to access the cdma2000 personality.

1. Press **Preset**.
2. Press **Mode > Arb Waveform Generator** (if it appears).
3. Press **CDMA Formats**.
4. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu. The first page of cdma2000 softkeys is displayed on the right side of the display. The center text area of the display shows the status of cdma2000 configuration. These characteristics are immediately updated when you modify them in the softkey menus.



Selecting Predefined Channel Configurations

The Agilent Technologies Option 101 signal generator contains predefined channel setups for both forward and reverse link cdma2000 waveform generation.

Forward Link Predefined Channel Configurations

There are six predefined channel configurations for forward link:

- 1 pilot channel at spread rate 1
- 9 channels at spread rate 1
- 1 direct-spread pilot channel at spread rate 3
- 9 direct-spread channels at spread rate 3
- 1 multicarrier-spread pilot channel at spread rate 3
- 9 multicarrier-spread channels at spread rate 3

Reverse Link Predefined Channel Configurations

There are five predefined channel configurations for reverse link:

- 1 pilot channel at spread rate 1
- 1 pilot channel at spread rate 3
- 5 channels at spread rate 1
- 5 channels at spread rate 3
- 8 channels at spread rate 1

CAUTION

Unless previously saved to the signal generator's memory catalog, modifications made to predefined channel configurations are lost when changes are made to link direction, spreading type, or spreading rate.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

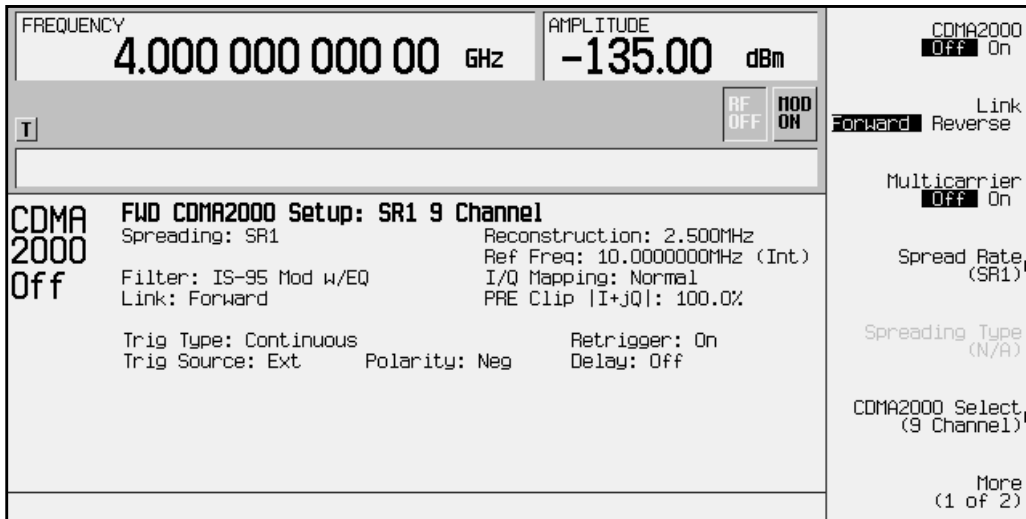
After an instrument preset, the default predefined channel configuration is forward link with 9 channels at spread rate 1. Predefined channel configurations can be used as defined, or modified using the channel table editor. See [“Modifying Forward Link Channel Configurations”](#) on page 2-8 for more information.

The following procedures explain how to select predefined channel setups for both forward and reverse link waveform configurations.

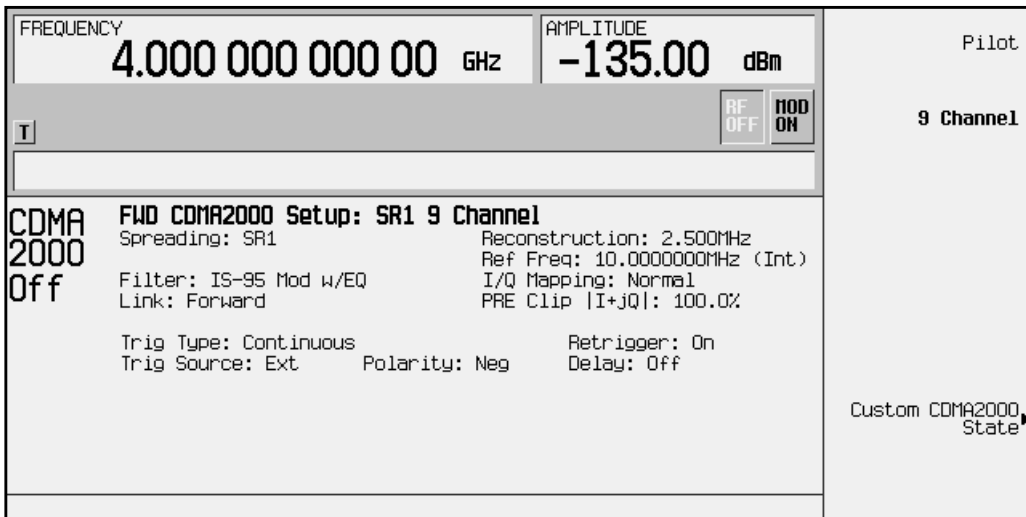
Selecting a Forward Link Predefined Channel Configuration

Use the following procedure to select forward link predefined channel configurations.

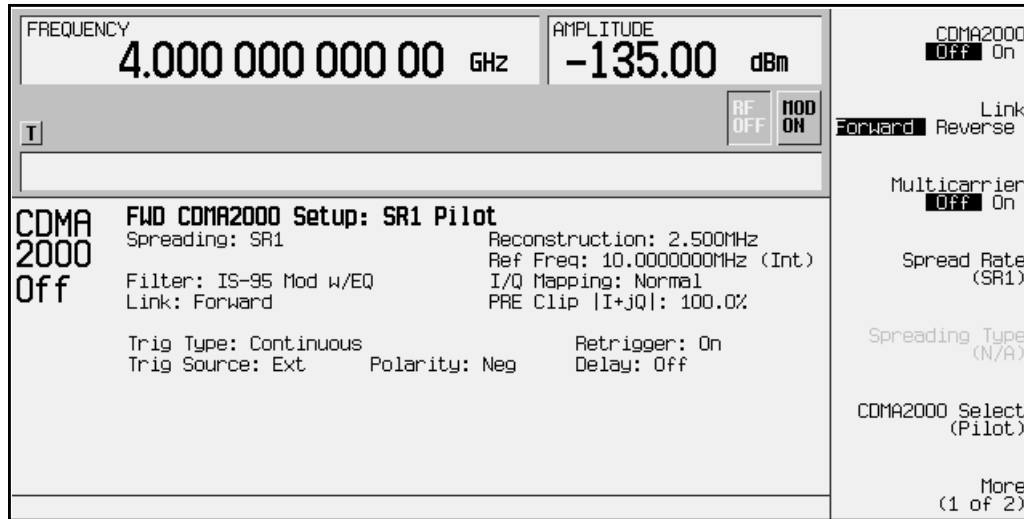
1. Press **Preset**.
2. Press **Mode > Arb Waveform Generator (if it appears) > CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu. The default predefined channel selection for forward link (9 Channel) appears below **CDMA2000 Select** in the softkey menu. The text area displays the current configuration, FWD CDMA2000 Setup: SR1 9 Channel, as shown in the following figure.



4. Press **CDMA2000 Select** to display the forward link CDMA2000 Select menu for predefined or custom channel setups, as shown in the following figure.



- Press **Pilot** to select a pilot cdma2000 forward link setup. (**Pilot**) appears below **CDMA2000 Select** in the softkey menu. The text area displays the current configuration, FWD CDMA2000 Setup: SR1 Pilot, as shown in the following figure.



Selecting a Reverse Link Predefined Channel Configuration

Use the following procedure to select reverse link predefined channel configurations.

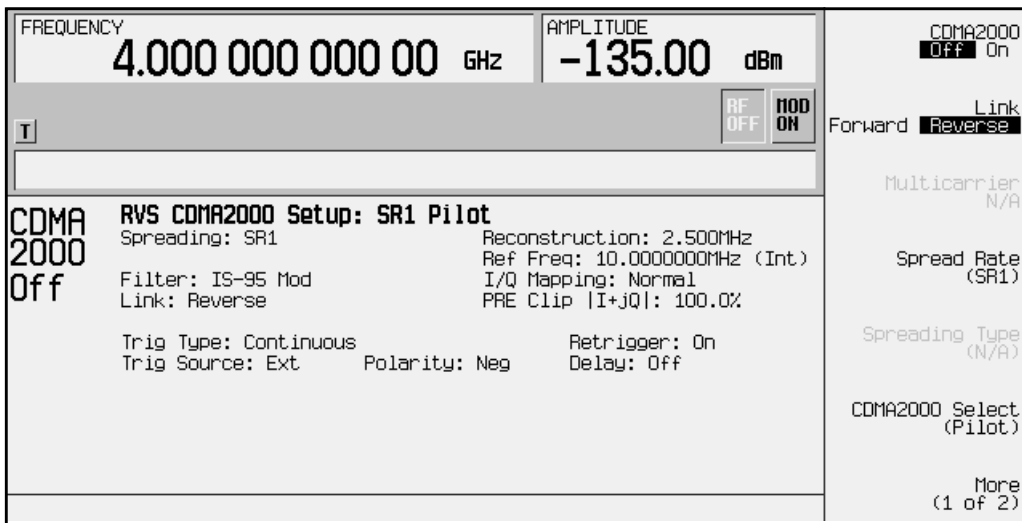
- Press **Preset**.
- Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
- Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.
- Press **Link Forward Reverse** until **Reverse** highlights. The default predefined channel selection for reverse link (5 Channel) appears below **CDMA2000 Select** in the softkey menu. The text area displays the current configuration, RVS CDMA2000 Setup: SR1 5 Channel, as shown in the following figure.



- Press **CDMA2000 Select** to display the reverse link CDMA2000 Select menu for predefined or custom channel setups, as shown in the following figure.



- Press **Pilot** to select a pilot cdma2000 reverse link setup. (**Pilot**) appears below **CDMA2000 Select** in the softkey menu. The text area displays the current configuration, RVS CDMA2000 Setup: SR1 Pilot, as shown in the following figure.



Modifying Forward Link Channel Configurations

You can modify forward link channel configurations using the channel setup table editor. The following examples show you how to modify predefined channel setups for forward link waveform configurations. Refer to [“Table Editor Basics”](#) on page 2-2 for additional information about table editors.

CAUTION

Unless previously saved to the signal generator’s memory catalog, modifications made to predefined channel configurations are lost when changes are made to link direction, spreading type, or spreading rate.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

Inserting Additional Channels

The default number of forward link channels after a normal instrument preset is nine. Available channel types include paging (radio configurations 1 and 2), pilot, sync, traffic, supplemental1 traffic, and supplemental2 traffic. The maximum number of forward link channels allowed in the table editor is 256.

In the following sections, examples are provided for inserting traffic channels and supplemental traffic channels into the forward link configuration.

Inserting Additional Traffic Channels

Use the following procedure to insert additional traffic channels.

In this example, 20 additional traffic channels are inserted into the predefined forward link configuration.

1. Press **Preset**.
2. Press **Mode > Arb Waveform Generator** (if it appears) **> CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.

- Press **More (1 of 2) > CDMA2000 Define > Edit Channel Setup** to display the channel table editor, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
RF OFF		MOD ON		Insert Row				Delete Row
Spreading: SR1		Link: Forward		Total Power: 0.00dB				Adjust Code Domain Power
Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data		
1	Pilot	N/A	0	-7.00	0	00000000	Display Code Domain Power	
2	Paging	N/A	1	-6.72	0	RANDOM	Goto Row	
3	Traffic	3	9600	8	-12.72	0	RANDOM	More (1 of 2)
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	

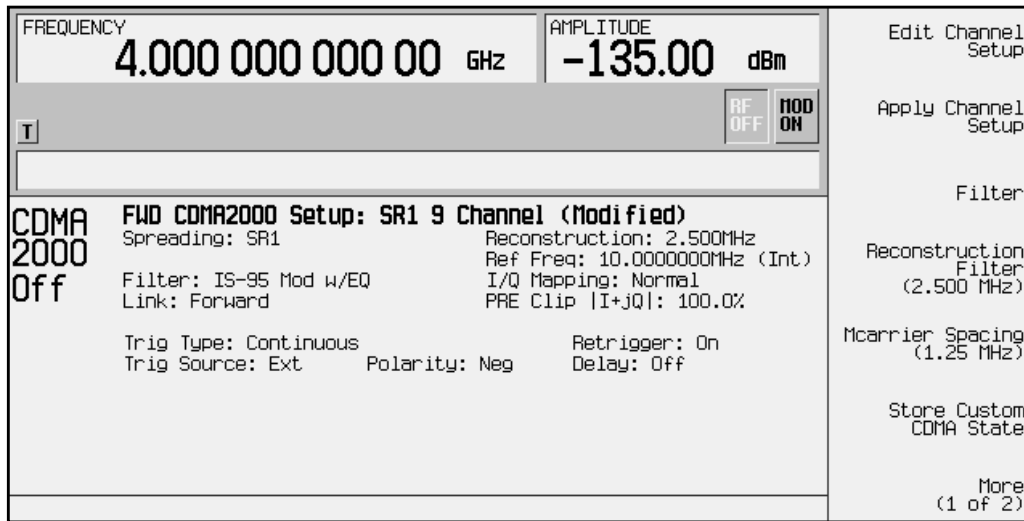
- Move cursor to the bottom row and press **Insert Row > Traffic > Channels** and enter 20. Terminate the entry with the **Enter** softkey.
- Press **Done**. The channel table editor now contains the 20 additional channels. The first page displays only channels one through nine. To see the additional channels, press **Return > Goto Row > Page Up**.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Pilot
RF OFF		MOD ON		Insert Row				Sync
Spreading: SR1		Link: Forward		Total Power: 13.22dB				Paging
Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data		
25	Traffic	3	9600	29	0.00	0	RANDOM	Traffic
26	Traffic	3	9600	30	0.00	0	RANDOM	Supplemental1 Traffic
27	Traffic	3	9600	31	0.00	0	RANDOM	
28	Traffic	3	9600	33	0.00	0	RANDOM	
29	Traffic	3	9600	34	0.00	0	RANDOM	Supplemental2 Traffic
30								

The display shows that the total power is now at 13.22 dB. You can rescale the total channel power to 0 dB by pressing **Adjust Code Domain Power > Scale to 0 dB**.

Press **Return**. The text area displays the current configuration, FWD CDMA2000 Setup: SR1 9 Channel (Modified), as shown in the following figure.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.



Inserting Supplemental Traffic Channels

Use the following procedure to insert additional supplemental traffic channels.

After a normal instrument preset, the cdma2000 default forward link setup consists of one pilot channel, one paging channel, two traffic channels, four supplemental1 traffic channels, and a sync channel. In this example, you insert one supplemental1 traffic channel before the sync channel.

1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.

- Press **More (1 of 2) > CDMA2000 Define > Edit Channel Setup** to display the channel table editor. Use the front panel knob or arrow keys to move the cursor to table row 9, as shown in the following figure.

Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data
9	Sunc N/A	1200	32	-12.72	0	RANDOM
10						

Spreading: SR1
Link: Forward
Total Power: 0.00dB

- Press **Insert Row > Supplemental1 Traffic > Data Rate > 19200 Bps > Done**. An additional supplemental1 traffic channel is inserted in the channel table editor.

The display shows that the total power is now at 3.01 dB. You can rescale the total channel power to 0 dB by pressing **Return > Adjust Code Domain Power > Scale to 0 dB**.

- Press **Return**. The text area displays the current configuration, **FWD CDMA2000 Setup: SR1 9 Channel (Modified)**, as shown in the following figure.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

CDMA 2000 Off

FWD CDMA2000 Setup: SR1 9 Channel (Modified)

Spreading: SR1
Filter: IS-95 Mod w/EQ
Link: Forward
Trig Type: Continuous
Trig Source: Ext
Polarity: Neg
Reconstruction: 2.500MHz
Ref Freq: 10.000000MHz (Int)
I/Q Mapping: Normal
PRE Clip |I+jQ|: 100.0%
Retrigger: On
Delay: Off

Editing Forward Link Channel Values in the Table Editor

Use the following procedure to edit forward link channel values in the channel table editor.

You can use the channel setup table editor to modify forward link configuration values in the following columns:

- Rate bps - data rate in bits-per-second
- Walsh - Walsh code
- Power dB - channel power (gain) in decibels (-40.0 to 0 dB)
- PN Offset - pseudorandom number offset (0 to 511)
- Data - specific 8-bit pattern of 1's and 0's or random data feeding Walsh code

Use the front panel arrows or knob to highlight the value you want to change, then enter the new value using the numeric keypad.

In the following example, you will edit the Rate bps, Walsh, Power dB, and Data fields of the traffic channel in table row 2 contained in the default predefined forward link channel setup.

1. Press **Preset**.
2. Press **Mode > Arb Waveform Generator** (if it appears) **> CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu. Notice that the default predefined channel selection for forward link is SR1 9 Channel.
4. Press **More (1 of 2) > CDMA2000 Define > Edit Channel Setup** to display the channel table editor, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row▶
Spreading: SR1		Link: Forward		Total Power: 0.00dB				Delete Row
	Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data	Adjust Code Domain Power▶
1	Pilot	N/A	N/A	0	-7.00	0	00000000	Display Code Domain Power▶
2	Paging	N/A	9600	1	-6.72	0	RANDOM	Goto Row▶
3	Traffic	3	9600	8	-12.72	0	RANDOM	More (1 of 2)
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	

5. Use the arrow keys to move the cursor to the traffic channel located in table row 3.
6. Use the arrow keys to highlight the Rate bps value (9600).
7. Press **Edit Item** > **4800** to change the data rate of the traffic channel to 4800 bits-per-second. The cursor moves to the next row in the Rate bps column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Forward		Total Power: 0.00dB				Delete Row
	Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data	Adjust Code Domain Power
1	Pilot	N/A	N/A	0	-7.00	0	00000000	
2	Paging	N/A	9600	1	-6.72	0	RANDOM	Display Code Domain Power
3	Traffic	3	4800	8	-12.72	0	RANDOM	
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	Goto Row
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	More (1 of 2)

8. Use the arrow keys to highlight the Walsh code value (8) in table row 3.
9. Press **Edit Item** > **3** > **Enter** to change the Walsh code of the traffic channel to 3. The cursor moves to the next row in the Walsh column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Forward		Total Power: 0.00dB				Delete Row
	Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data	Adjust Code Domain Power
1	Pilot	N/A	N/A	0	-7.00	0	00000000	
2	Paging	N/A	9600	1	-6.72	0	RANDOM	Display Code Domain Power
3	Traffic	3	4800	3	-12.72	0	RANDOM	
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	Goto Row
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	More (1 of 2)

10. Use the arrow keys to highlight the Power value (-12.72) in table row 3.

- Press **Edit Item** > **-10** > **dB** to change the power of the traffic channel to **-10.00 dB**. The cursor moves to the next row in the **Power dB** column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Forward		Total Power: 0.19dB				Delete Row
	Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data	Adjust Code Domain Power
1	Pilot	N/A	N/A	0	-7.00	0	00000000	
2	Paging	N/A	9600	1	-6.72	0	RANDOM	Display Code Domain Power
3	Traffic	3	4800	3	-10.00	0	RANDOM	
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	Goto Row
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	More (1 of 2)

The display shows that the total power is now at 0.19 dB. You can rescale the total channel power to 0 dB by pressing **Adjust Code Domain Power** > **Scale to 0 dB**.

- Use the arrow keys to highlight the **Data** value (RANDOM) in table row 3.
- Press **Edit Item** > **11001100** > **Enter** to change the transmitted data of the traffic channel to **11001100**. The cursor moves to the next row in the **Data** column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Forward		Total Power: 0.19dB				Delete Row
	Type	Config	Rate bps	Walsh	Power dB	PN Offset	Data	Adjust Code Domain Power
1	Pilot	N/A	N/A	0	-7.00	0	00000000	
2	Paging	N/A	9600	1	-6.72	0	RANDOM	Display Code Domain Power
3	Traffic	3	4800	3	-10.00	0	11001100	
4	Sup1Trf	3	19200	17	-9.72	0	RANDOM	Goto Row
5	Sup1Trf	3	19200	18	-9.72	0	RANDOM	
6	Traffic	3	9600	9	-12.72	0	RANDOM	
7	Sup1Trf	3	19200	19	-9.72	0	RANDOM	
8	Sup1Trf	3	19200	20	-9.72	0	RANDOM	More (1 of 2)

- Press **Return**. The text area displays **FWD CDMA2000 Setup: SR1 9 Channel (Modified)** as the current configuration. You now have a modified traffic channel with a data rate of 4800, a Walsh code of 3 and a power level of **-10.00 dB** transmitting **11001100**.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

Modifying Reverse Link Channel Configurations

You can modify reverse link channel configurations using the channel setup table editor. The following examples show you how to modify predefined channel setups for reverse link waveform configurations. Refer to [“Table Editor Basics”](#) on page 2-2 for additional information about table editors.

CAUTION

Unless previously saved to the signal generator’s memory catalog, modifications made to predefined channel configurations are lost when changes are made to link direction, spreading type, or spreading rate.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

Inserting Additional Channels

You can insert several different types of channels into a reverse link configuration. These include pilot, dedicated control, traffic, supplemental1 traffic and supplemental2 traffic channels. Up to eight different channels can be transmitted simultaneously in reverse link mode.

The following example explains how to insert a supplemental2 traffic channel into a reverse link channel configuration.

Inserting a Supplemental Traffic Channel

Use the following procedure to insert a supplemental2 traffic channel.

In this example, one supplemental2 traffic channel is inserted in the last row of the table editor.

1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.

- Press **Link Forward Reverse** until **Reverse** highlights. The display changes to reverse link mode, as shown in the following figure. The text area displays **RVS CDMA2000 Setup: SR1 5 Channel** as the current configuration.

The screenshot shows the RVS CDMA2000 Setup screen. At the top, the frequency is 4.000 000 000 00 GHz and the amplitude is -135.00 dBm. The CDMA2000 status is Off. The Link is set to Reverse. The main configuration area shows: RVS CDMA2000 Setup: SR1 5 Channel, Spreading: SR1, Reconstruction: 2.500MHz, Ref Freq: 10.0000000MHz (Int), I/Q Mapping: Normal, PRE Clip |I+JQ|: 100.0%, Filter: IS-95 Mod, Link: Reverse, Trig Type: Continuous, Trig Source: Ext, Polarity: Neg, Retrigger: On, Delay: Off. On the right side, there are options for Multicarrier (N/A), Spread Rate (SR1), Spreading Type (N/A), CDMA2000 Select (5 Channel), and More (1 of 2).

- Press **More (1 of 2) > CDMA2000 Define > Edit Channel Setup** to display the channel table editor. Use the arrow keys to move the cursor to table row 6, as shown in the following figure.

The screenshot shows the Edit Channel Setup screen. At the top, the frequency is 4.000 000 000 00 GHz and the amplitude is -135.00 dBm. The CDMA2000 status is Off. The Link is set to Reverse. The main configuration area shows: Spreading: SR1, Link: Reverse, Total Power: 0.00dB. The channel table editor shows a table with 6 rows. Row 6 is highlighted. On the right side, there are options for Edit Item, Insert Row, Delete Row, Adjust Code Domain Power, Radio Config 3, and More (1 of 2).

	Type	Config	Rate bps	Power dB	Data
1	Pilot	N/A	N/A	-7.00	00000000
2	DedCnt1	3	9600	-7.00	00000000
3	Traffic	3	9600	-17.36	RANDOM
4	Sup1Trf	3	153600	-5.36	RANDOM
5	Sup2Trf	3	153600	-5.36	RANDOM
6			-----	-----	-----

- Press **Insert Row** > **Supplemental2 Traffic** > **Done** to insert a supplemental2 traffic channel into the table editor on table row 6, as shown in the following figure.

The display shows that the total power is now at 3.01 dB. You can rescale the total channel power to 0 dB by pressing **Adjust Code Domain Power** > **Scale to 0 dB**.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Pilot	
RF OFF		MOD ON		Dedicated Control				Traffic▶	
Spreading: SR1		Link: Reverse		Total Power: 3.01dB				Supplemental1▶ Traffic	
	Type	Config	Rate bps	Power dB	Data				
1	Pilot	N/A	N/A	-7.00	00000000				
2	DedCnt1	3	9600	-7.00	00000000				
3	Traffic	3	9600	-17.36	RANDOM				
4	Sup1Trf	3	153600	-5.36	RANDOM				
5	Sup2Trf	3	153600	-5.36	RANDOM				
6	Sup2Trf	3	307200	0.00	RANDOM	Supplemental2▶ Traffic			
7	-----	-----	-----	-----	-----				

- Press **Return** twice. The text area displays **RVS CDMA2000 Setup: SR1 5 Channel (Modified)** as the current configuration.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

Editing Reverse Link Channel Values in the Table Editor

Use the following procedure to edit reverse link channel values in the channel table editor.

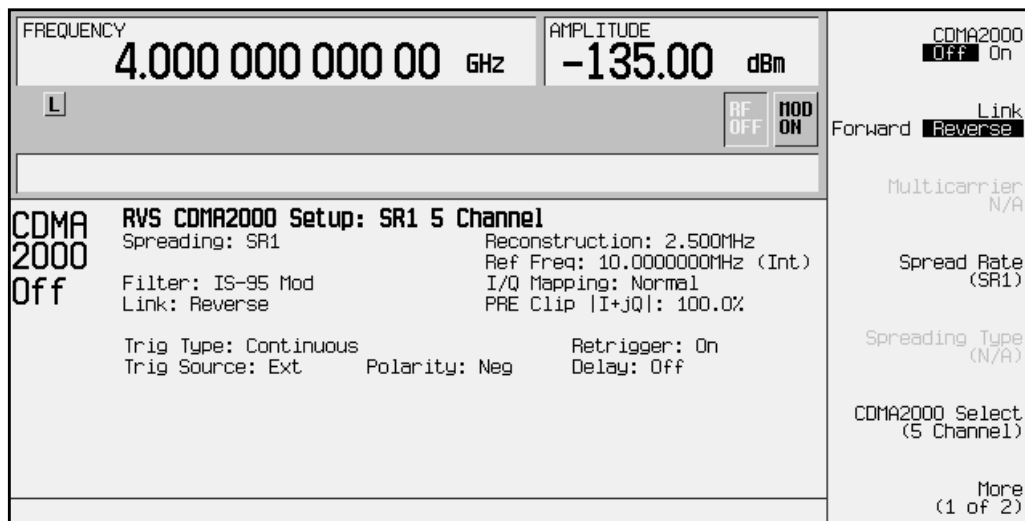
You can use the channel setup table editor to modify reverse link configuration values in the following columns:

- Rate bps - data rate in bits-per-second
- Power dB - channel power (gain) in decibels (0 to -40.0 dB)
- Data - specific 8-bit pattern of 1's and 0's or random data

Highlight the value you wish to change using the front panel arrow keys or knob, then enter the new value using the numeric keypad.

In the following example, you will edit the Rate bps, Power dB, and Data fields of the traffic channel in table row 3 of the default predefined reverse link channel configuration.

1. Press **Preset**.
2. Press **Mode > Arb Waveform Generator (if it appears) > CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.
4. Press **Link Forward Reverse** until **Reverse** highlights. The text area displays the current configuration, RVS CDMA2000 Setup: SR1 5 Channel, as shown in the following figure.



- Press **More (1 of 2) > CDMA2000 Define > Edit Channel Setup** to display the channel table editor. Use the arrow keys to move the cursor to the traffic channel located in table row 3, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Reverse		Total Power: 0.00dB				Delete Row
	Type	Config	Rate bps	Power dB	Data			Adjust Code Domain Power
1	Pilot	N/A	N/A	-7.00	00000000			Radio Config 3
2	DedCnt1	3	9600	-7.00	00000000			
3	Traffic	3	9600	-17.36	RANDOM			
4	Sup1Trf	3	153600	-5.36	RANDOM			
5	Sup2Trf	3	153600	-5.36	RANDOM			
6	-----	-----	-----	-----	-----			More (1 of 2)

- Highlight the **Rate bps** value (9600).
- Press **Edit Item > 4800** to change the data rate of the traffic channel to 4800 bits-per-second. The cursor moves to the next row in the **Rate bps** column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Reverse		Total Power: 0.00dB				Delete Row
	Type	Config	Rate bps	Power dB	Data			Adjust Code Domain Power
1	Pilot	N/A	N/A	-7.00	00000000			Radio Config 3
2	DedCnt1	3	9600	-7.00	00000000			
3	Traffic	3	4800	-17.36	RANDOM			
4	Sup1Trf	3	153600	-5.36	RANDOM			
5	Sup2Trf	3	153600	-5.36	RANDOM			
6	-----	-----	-----	-----	-----			More (1 of 2)

- Highlight the **Power** value (-17.36) in table row 3.

- Press **Edit Item** > **-10** > **db** > **Enter** to change the power of the traffic channel to **-10.00 dB**. The cursor moves to the next row in the **Power dB** column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Reverse		Total Power: 0.34dB				Delete Row
	Type	Config	Rate bps	Power dB	Data			Adjust Code Domain Power
1	Pilot	N/A	N/A	-7.00	00000000			Radio Config 3
2	DedCnt1	3	9600	-7.00	00000000			
3	Traffic	3	4800	-10.00	RANDOM			
4	Sup1Trf	3	153600	-5.36	RANDOM			
5	Sup2Trf	3	153600	-5.36	RANDOM			
6	-----	-----	-----	-----	-----			More (1 of 2)

The display shows that the total power is now at 0.34 dB. You can rescale the total channel power to 0 dB by pressing **Adjust Code Domain Power** > **Scale to 0 dB**.

- Highlight the **Data** value (RANDOM) in table row 3.
- Press **Edit Item** > **00110011** > **Enter** to change the transmitted data of the traffic channel to **00110011**. The cursor moves to the next row in the **Data** column, as shown in the following figure.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Edit Item
T				RF OFF		MOD ON		Insert Row
Spreading: SR1		Link: Reverse		Total Power: 0.34dB				Delete Row
	Type	Config	Rate bps	Power dB	Data			Adjust Code Domain Power
1	Pilot	N/A	N/A	-7.00	00000000			Radio Config 3
2	DedCnt1	3	9600	-7.00	00000000			
3	Traffic	3	4800	-10.00	00110011			
4	Sup1Trf	3	153600	-5.36	RANDOM			
5	Sup2Trf	3	153600	-5.36	RANDOM			
6	-----	-----	-----	-----	-----			More (1 of 2)

- Press **Return**. The text area displays **RVS CDMA2000 Setup: SR1 5 Channel (Modified)** as the current configuration. You now have a modified traffic channel with a data rate of 4800 and a power level of **-10.00 dB** transmitting **00110011**.

To store a custom cdma2000 state, see [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21.

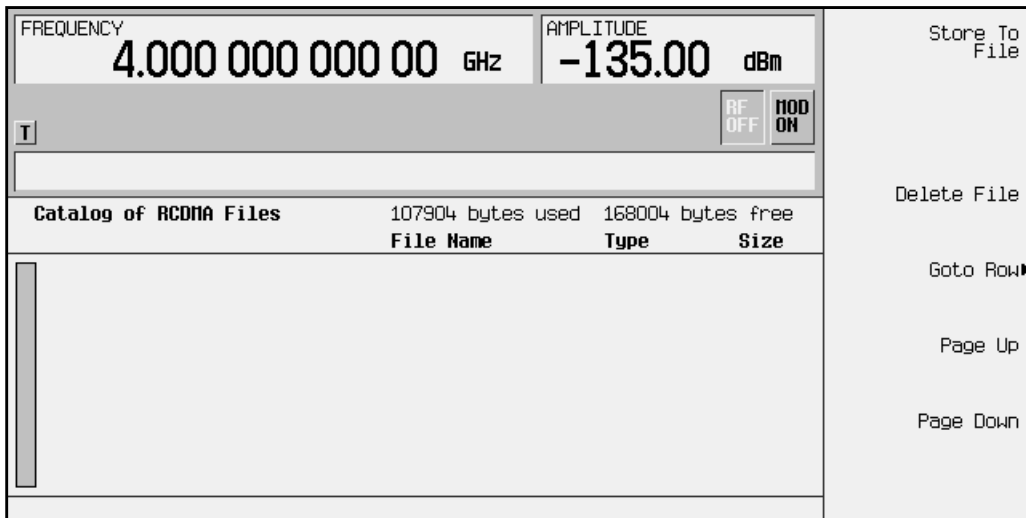
Storing a Custom cdma2000 State to Memory

In this procedure, you will store the custom cdma2000 state created in the previous procedure. If you have not performed the previous procedure, turn to “[Editing Reverse Link Channel Values in the Table Editor](#)” on page 2-18 and complete this procedure before continuing.

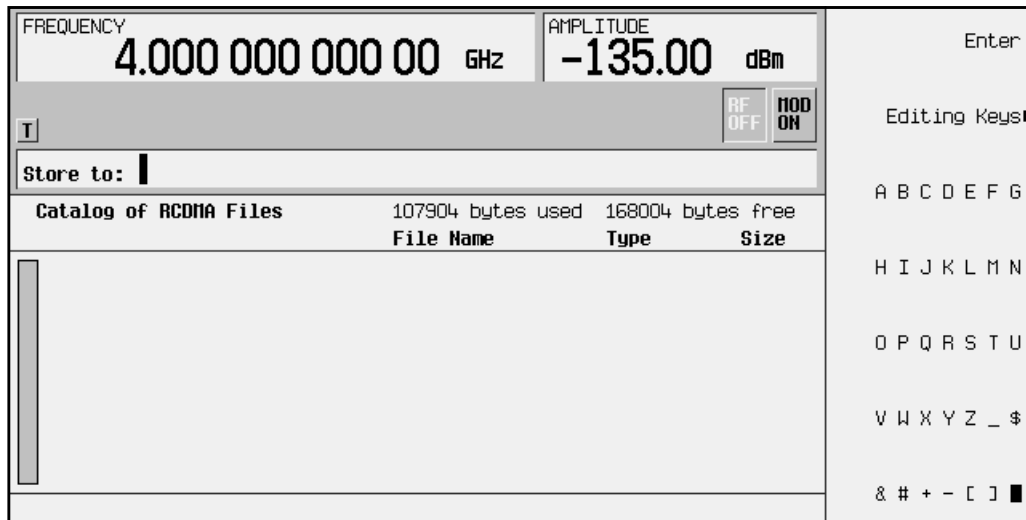
Use the following procedure to store the custom cdma2000 state to the signal generator’s memory catalog.

1. Press **Store Custom CDMA State**. This opens a menu that accesses the signal generator’s reverse cdma2000 (RCDMA) memory catalog, as shown in the following figure.

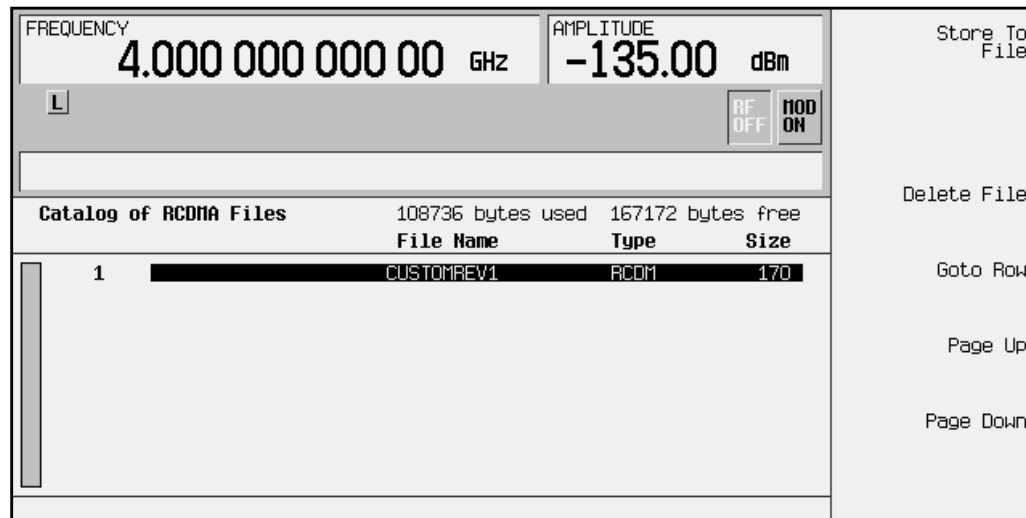
NOTE The forward link cdma2000 memory catalog is named FCDMA.



2. Press **Store to File**. This opens a menu that allows you to name the custom cdma2000 state, as shown in the following figure.



3. Using the alphabetic menu and the numeric keypad, enter the file name `CUSTOMREV1` and terminate your entry with the **Enter** key. Your custom cdma2000 state `CUSTOMREV1` is now saved to the reverse cdma2000 memory catalog, as shown in the following figure.



Creating, Storing, & Recalling a Custom Multicarrier cdma2000 Waveform

The signal generator provides a quick and easy way to create custom multicarrier cdma2000 waveforms: rather than building an entire 4-carrier setup from scratch, you can start with a 4-carrier cdma2000 template and modify the template's default values as desired.

Use the following procedure to create, store, and recall a custom, 4-carrier cdma2000 waveform.

Opening the Multicarrier cdma2000 Setup Table Editor

1. Preset the signal generator.

- Press **Preset**.

2. Activate the multicarrier cdma2000 mode.

- Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Multicarrier Off On** (until **On** highlights).

3. Select a 4-carrier template and open the Multicarrier cdma2000 Setup table editor.

- Press **CDMA2000 Select** > **4 Carriers** to select the template and return to the previous menu.
- Press **More (1 of 2)** > **Multicarrier Define** to open the Multicarrier cdma2000 Setup table editor. The 4-carrier cdma2000 template is automatically placed in the table editor, as shown in the following figure.

Active Entry Area

Multicarrier cdma2000 Setup softkeys

Carrier	Freq Offset	Power
1 SR1 9 Channel	-1.875000 MHz	0.00 dB
2 SR1 9 Channel	-625.000 kHz	0.00 dB
3 SR1 9 Channel	625.000 kHz	0.00 dB
4 SR1 9 Channel	1.875000 MHz	0.00 dB
5	-----	-----

Carrier Type

Frequency Offset Value

Power Value

Edit Item

Insert Row

Delete Row

Store Custom Multicarrier

Apply Multicarrier

Modifying a Multicarrier cdma2000 4-Carrier Template

Use the following steps to modify the standard 4-carrier cdma2000 template that was loaded in the previous procedure.

Edit the second carrier.

1. Highlight the second channel carrier (in table row 2), then press **Edit Item**.
2. Press **SR3 Direct Pilot** softkey. This changes the carrier type.
3. Highlight the second carrier's frequency offset value and press **Edit Item**.
4. Change the offset value to **-825** and press **kHz**.
5. Highlight the second carrier's power value and press **Edit Item**.
6. Change the power value to **-10** and press **dB**.

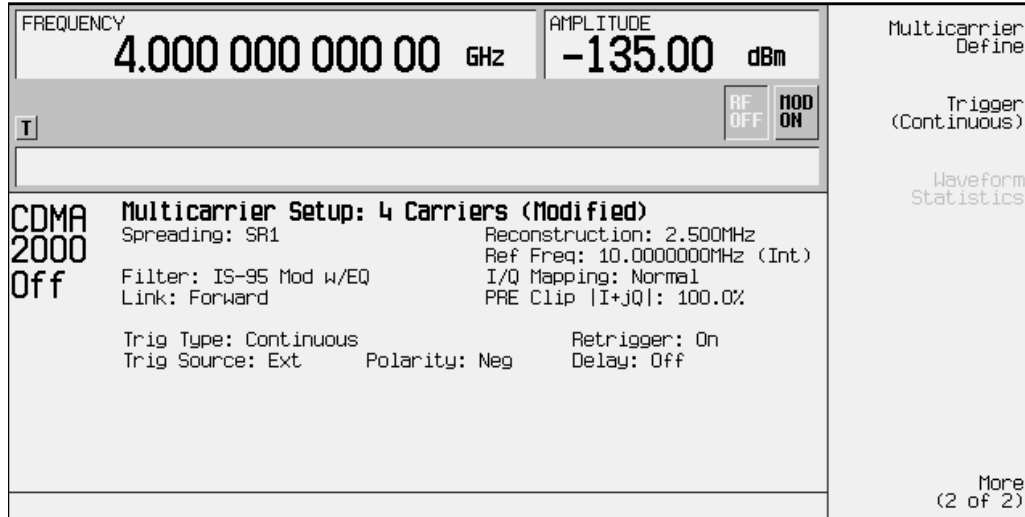
The following figure shows the edited template:

FREQUENCY		AMPLITUDE		Edit Item
4.000 000 000 00 GHz		-135.00 dBm		
T		RF OFF MOD ON		Insert Row
Multicarrier CDMA2000 Setup				Delete Row
	Carrier	Freq Offset	Power	
1	SR1 9 Channel	-1.875000 MHz	0.00 dB	
2	SR3 Direct Pilot	-825.000 kHz	-10.00 dB	
3	SR1 9 Channel	625.000 kHz	0.00 dB	
4	SR1 9 Channel	1.875000 MHz	0.00 dB	
5	-----	-----	-----	
				Store Custom Multicarrier
				Apply Multicarrier

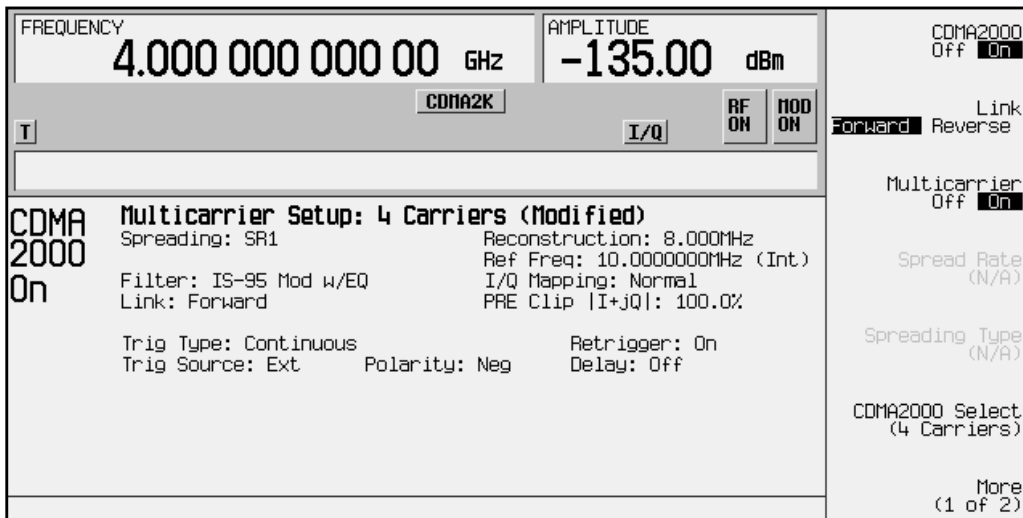
Activating a Custom Multicarrier cdma2000 Setup

Using the custom 4-carrier cdma2000 setup from the previous procedure, perform the following steps to activate the custom multicarrier cdma2000 signal.

1. Press **Return**, and note that the multicarrier setup is now displayed as Multicarrier Setup: 4 Carriers (Modified).



2. Press **More (2 of 2) > CDMA2000 Off On** until **On** highlights. After waveform generation, the new multicarrier cdma2000 waveform is stored in volatile memory.
3. Press **RF On/Off**. The **RF ON** annunciator replaces the **RF OFF** annunciator on the signal generator's display, as shown in the following figure, and the modulated signal is present at the RF output.



Storing a Custom Multicarrier cdma2000 Waveform

Use the following procedure to store a custom multicarrier cdma2000 waveform into the signal generator's memory. This example uses the custom 4-carrier cdma2000 waveform created in the previous procedure. If you have not created this custom multicarrier cdma2000 waveform already, refer to [“Creating, Storing, & Recalling a Custom Multicarrier cdma2000 Waveform”](#) on page 2-23.

1. Prepare to store the custom multicarrier cdma2000 waveform created in the previous section.
In the top-level CDMA2000 menu (CDMA2000 Off On is the top key), press **More (1 of 2) > Multicarrier Define**.
2. Open the MFCDMA memory catalog.
Press **Store Custom Multicarrier** to display the signal generator's catalog of multicarrier forward cdma2000 (MFCDMA) files.
3. Open the file naming menu in the memory catalog.
Press **Store To File** to open a file naming softkey menu of letters and symbols that you can use to name the file.
4. Name and store the file.
As described in [“Storing a Custom cdma2000 State to Memory”](#) on page 2-21, name and store this file as 4CARRIER.

Recalling a Custom Multicarrier cdma2000 Waveform

Use the following procedure to recall a custom multicarrier cdma2000 state from the MFCDMA memory catalog. This example recalls the custom 4-carrier cdma2000 waveform stored in the previous procedure.

1. Preset the signal generator.
Press **Preset**.
2. Activate the multicarrier cdma2000 mode.
Press **Mode > Arb Waveform Generator (if it appears) > CDMA Formats > CDMA2000 (Rev 8) > Multicarrier Off On (until On highlights)**.
3. Open the multicarrier forward cdma2000 (MFCDMA) memory catalog.
Press **CDMA2000 Select > Custom CDMA2000 Multicarrier**.
4. Choose a custom multicarrier cdma2000 waveform from the MFCDMA memory catalog.
Highlight the file 4CARRIER, then press **Select File**.
You can now use the waveform. For details, refer to [“Activating a Custom Multicarrier cdma2000 Setup”](#) on page 2-25.

Outputting a cdma2000 Waveform

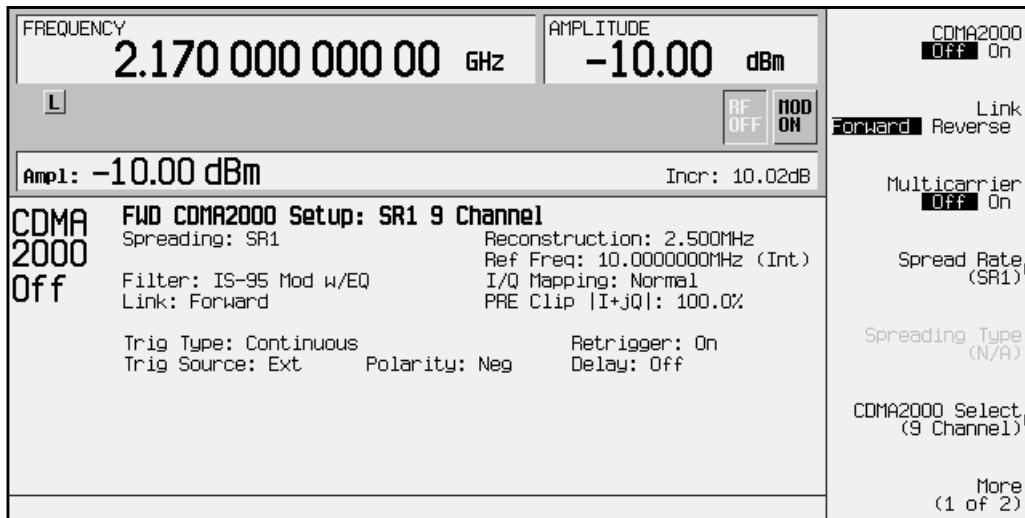
This section explains how to set the carrier frequency and power, generate a cdma2000 waveform, enable the modulation and the RF output, and set the waveform's clipping parameters.

Setting the Carrier Frequency and Power

Use the following procedure to set the carrier signal's power and frequency.

1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** to display the CDMA2000 menu.
4. For this example, set the RF output frequency to 2.17 GHz by pressing the front panel **Frequency** key. Enter 2.17 GHz by rotating the front panel knob, using the up and down arrow keys, or entering the value using the numeric keypad. (If using the numeric keypad to enter a new value, terminate the entry with the **GHz** softkey.)
5. Set the output power to -10 dBm by pressing the front panel **Amplitude** key. Enter -10 by rotating the front panel knob, using the up and down arrow keys, or entering the value using the numeric keypad. (If using the numeric keypad to enter a new value, terminate the entry with the **dBm** softkey.)

The carrier frequency and power are now set. The following figure shows the display with the current configuration.

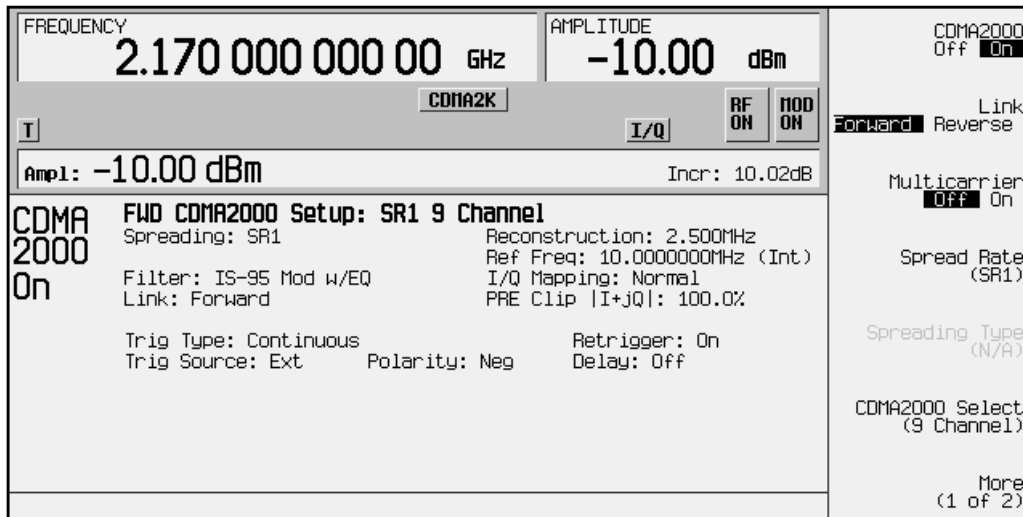


Generating the cdma2000 Waveform and Enabling the RF Output

Use the following procedure to generate a cdma2000 waveform and activate the RF output.

1. Press **CDMA2000 Off On** until **On** highlights to generate the cdma2000 waveform. (The signal generator displays a message while the waveform is being generated.) The **CDMA2K** and **I/Q** annunciators turn on.
2. Toggle the front panel **RF On/Off** key until the display annunciator reads **RF ON**.
3. Modulation is turned on as a default condition. (The display annunciator shows **MOD ON**.) If modulation is off, toggle the front panel **Mod On/Off** key.

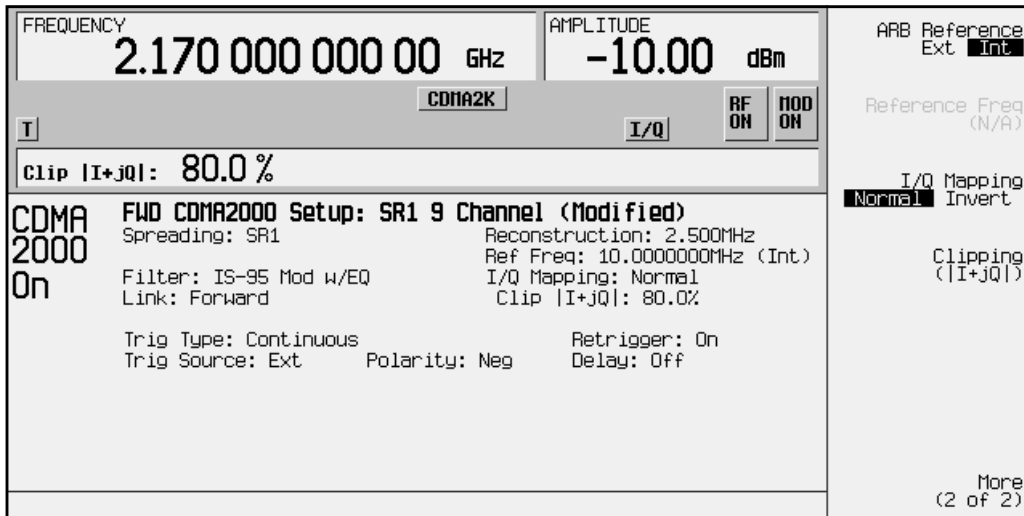
The cdma2000 signal is now present at the front panel **RF OUTPUT** connector. The following figure shows the display with the current configuration.



Clipping the cdma2000 Waveform

Use the following procedure to configure and apply clipping to the cdma2000 waveform.

1. In the status area of the display the current clipping setup is PRE Clip $|I+jQ|$: 100.0%. A clipping level of 100 percent is equal to no clipping.
2. Press More (1 of 2) > CDMA2000 Define > More (1 of 2) > Clipping to access the clipping setup menu.
3. The Clipping Type $|I+jQ|$ $|I|,|Q|$ softkey default is $|I+jQ|$ (*circular clipping*). This selection clips the combined I and Q waveform. Alternatively, $|I|,|Q|$ (*rectangular clipping*) clips the I and Q waveforms separately. Use the default selection for this example.
4. Press Clip $|I+jQ|$ To and enter 80 percent.
5. The Clip At PRE POST FIR Filter softkey default is PRE. With PRE selected, the waveform is clipped prior to FIR filtering. Alternatively, when you select POST, the waveform is clipped after FIR filtering. Use the default selection for this example.
6. Press Apply to Waveform. The signal generator rebuilds the waveform and the clipping settings are updated in the status area of the display, as shown in the following figure. For more information on clipping, refer to “[Understanding Baseband Clipping](#)” on page 4-2.



Creating a User-Defined FIR Filter Using the FIR Table Editor

Using this procedure you will create and store an 8-symbol, windowed sinc function filter with an oversample ratio of 4.

Accessing the Table Editor

Use the following procedure to access the FIR filter table editor.

1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Define User FIR**. The FIR table editor is displayed. The following figure shows the FIR table editor.

The screenshot shows the FIR Table Editor interface. At the top, the frequency is set to 4.000 000 000 00 GHz and the amplitude is -135.00 dBm. Below this, there are buttons for 'RF OFF' and 'MOD ON'. The main area contains a table titled 'FIR Values' with 'Coeff.' and 'Value' columns. The table has 10 rows, with the first row highlighted. The 'Oversample Ratio' is set to 4. To the right of the table are several menu options: 'Edit Item', 'Insert Row', 'Delete Row', 'Goto Row', 'Mirror Table', 'Oversample Ratio 4', and 'More (1 of 2)'.

FIR Values		Oversample Ratio: 4
Coeff.	Value	
0	0.000000	
1	0.000000	
2	1.000000	
3	1.000000	
4	1.000000	
5	1.000000	
6	1.000000	
7	1.000000	
8	1.000000	
9	1.000000	

Entering the Coefficient Values

Use the following procedure to enter coefficient values into the FIR filter table editor.

The FIR table editor creates a filter from values that you provide.

1. Use the cursor to highlight the `Value` field for coefficient 0. Use the numeric keypad to type the first value (`-0.000076`) from the table below. As you press the numeric keys, the numbers are displayed in the active entry area. (If you make a mistake, you can correct it using the backspace key.)

Coefficient	Value
0	-0.000076
1	-0.001747
2	-0.005144
3	-0.004424
4	0.007745
5	0.029610
6	0.043940
7	0.025852

Coefficient	Value
8	-0.035667
9	-0.116753
10	-0.157348
11	-0.088484
12	0.123414
13	0.442748
14	0.767329
15	0.972149

Terminate your entry by pressing the **Enter** softkey. The value for coefficient 0 is now displayed in the `Value` field, and the cursor has moved to the second row in the `Value` column. The following figure shows the FIR table editor at this point in the process.

FIR Values (UNSTORED)		Oversample Ratio: 4
Coeff.	Value	
0	-0.000076	
1	0.000000	
2	1.000000	
3	1.000000	
4	1.000000	
5	1.000000	
6	1.000000	
7	1.000000	
8	1.000000	
9	1.000000	

2. Continue entering the coefficient values from the table in step 1 until all 16 values have been entered.

Duplicating the First 16 Coefficients Using Mirror Table

Use the following procedure to duplicate the first 16 coefficients in the FIR filter table editor.

In a windowed sinc function filter, the second half of the coefficients are identical to the first half in reverse order. The signal generator provides a mirror table function that automatically duplicates the existing coefficient values in the reverse order.

1. Press **Mirror Table**. The last 16 coefficients (16 through 31) are automatically generated and the first of these coefficients (number 16) highlights. The following figure shows the display at this point in the process.

The screenshot shows the FIR Table Editor interface. At the top, the frequency is set to 4.000 000 000 00 GHz and the amplitude is -135.00 dBm. Below this, there are buttons for 'RF OFF' and 'MOD ON'. The main area is a table titled 'FIR Values (UNSTORED)' with 'Oversample Ratio: 4'. The table has two columns: 'Coeff.' and 'Value'. The values are symmetric around coefficient 16, which is highlighted. To the right of the table are several control buttons: 'Edit Item', 'Insert Row', 'Delete Row', 'Goto Row', 'Mirror Table', and 'Oversample Ratio 4'. At the bottom right, it says 'More (1 of 2)'.

FIR Values (UNSTORED)		Oversample Ratio: 4
Coeff.	Value	
10	-0.157348	
11	-0.088484	
12	0.123414	
13	0.442748	
14	0.767329	
15	0.972149	
16	0.972149	
17	0.767329	
18	0.442748	
19	0.123414	

Setting the Oversample Ratio

The oversample ratio (OSR) is the number of filter taps per symbol. Acceptable values range from 1 through 32; the maximum combination of symbols and oversampling ratio allowed by the table editor is 1024. The instrument hardware, however, is actually limited to 32 symbols, an oversample ratio between 4 and 16, and 512 coefficients. So if you enter more than 32 symbols or 512 coefficients, the instrument is unable to use the filter. If the oversample ratio is different from the internal, optimally selected one, then the filter is automatically resampled to an optimal oversample ratio.

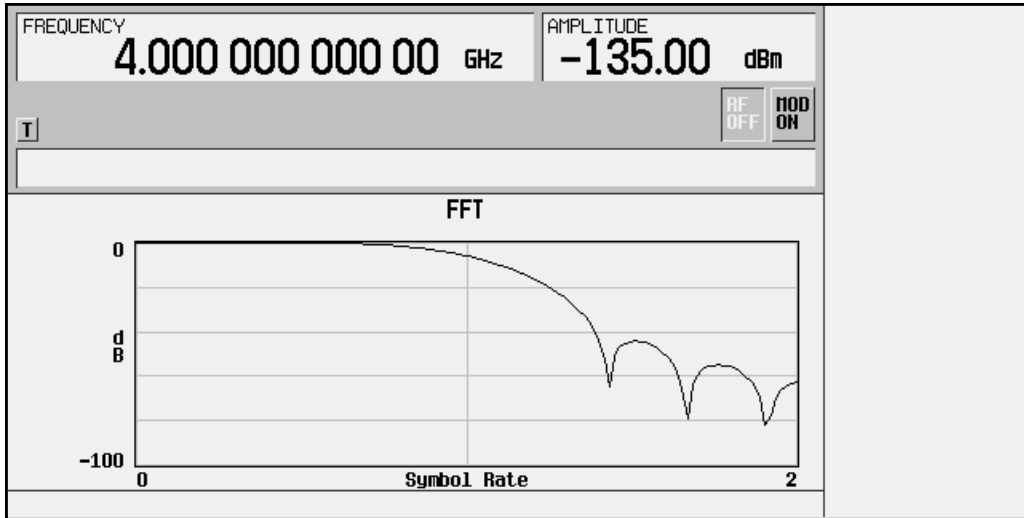
For this example, the desired OSR is 4, which is the default, so no action is necessary.

Displaying a Graphical Representation of the Filter

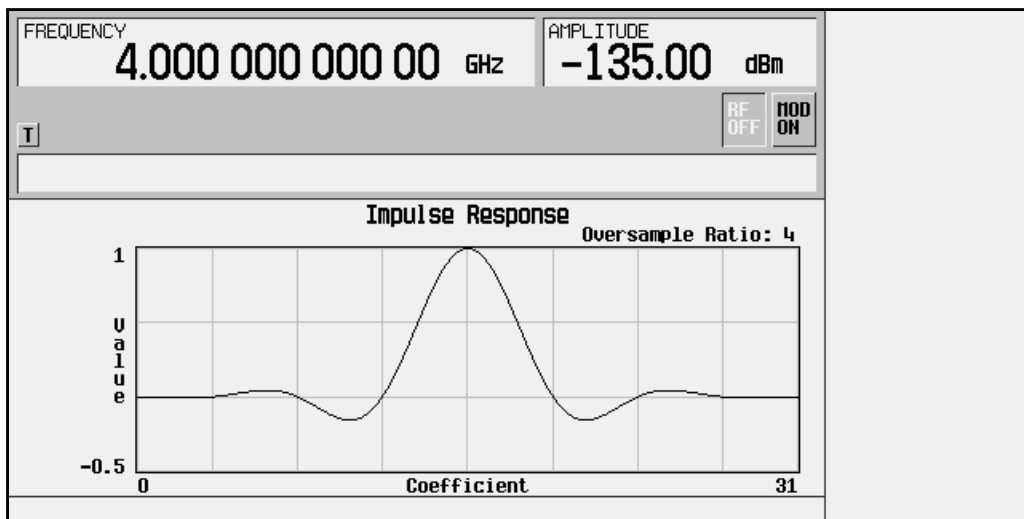
Use the following procedure to display graphical representations of the active FIR filter.

The signal generator has the capability of graphically displaying the filter in both time and frequency dimensions.

1. Press **More (1 of 2)** > **Display FFT** to view the filter frequency response (calculated using a fast Fourier transform). The following graph is displayed.



2. Press **Return** to return to the menu keys.
3. Press **Display Impulse Response** to display the filter impulse response in time. The following graph is displayed.



4. Press **Return** to return to the menu keys.

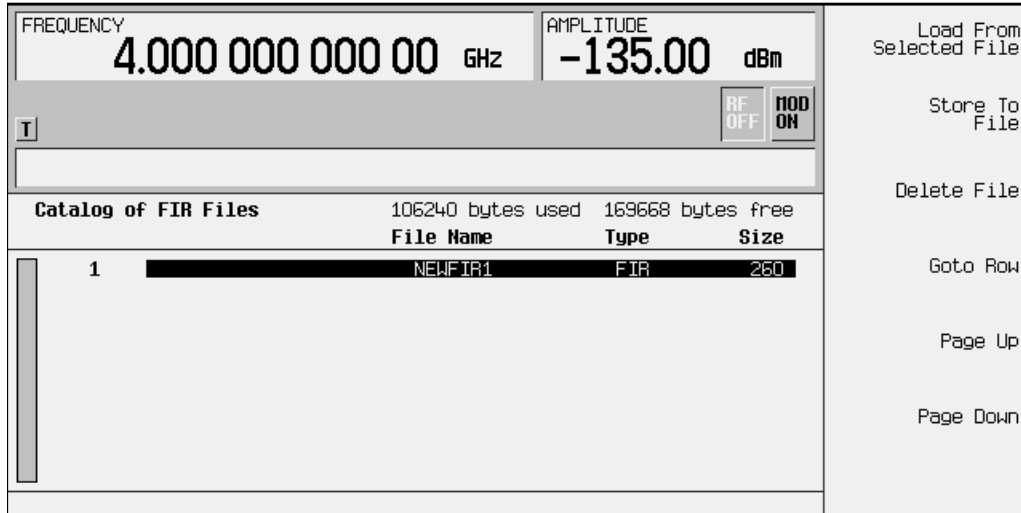
Storing the Filter to Memory

Perform the following procedure to store the FIR filter to the signal generator's memory catalog.

The filter is now complete and can be stored to non-volatile memory for future use. At any time you can check the information at the top of the FIR table editor to determine whether the current table has been stored. Your current table should display the following text: FIR Values (UNSTORED). If you attempt to exit the table editor mode without first storing to a file, the signal generator first prompts you to confirm that you want to exit without storing to a file. If you do *not* want to exit after all, press Return.

Use the following steps to store the file.

1. Press **Load/Store > Store To File**. The catalog of FIR files appears along with the amount of memory available.
2. For this example, title the file NEWFIR1. The file name is created by pressing the softkey containing the desired character, then selecting the softkey with that character from the subsequent menu. For example, press the **HIJKLMN** softkey. Then press the bottom softkey, **N**. **N** is displayed in the active entry area following the **Store to:** text.
3. Continue entering the characters for the file name until **NEWFIR1** is displayed in the active entry area. (Use the numeric keypad to enter the number 1.)
4. Press **Enter** when the file name is complete. The contents of the current FIR table editor are stored to a file in non-volatile memory. The following figure shows the display.



The NEWFIR1 file is the first file name listed. (If you have previously stored other FIR files, additional file names are listed below NEWFIR1.) The file type is FIR and the size of the file is 260 bytes. The amount of memory used is also displayed. The number of files that can be saved depends on the size of the files and the amount of memory used. Memory is also shared by instrument state files and list sweep files.

This filter can now be used to customize a modulation or it can be used as a basis for a new filter design. (Refer to the additional filter examples in this chapter.)

Modifying an FIR Filter Using the FIR Table Editor

FIR filters stored in signal generator memory can easily be modified using the FIR table editor. You can load the FIR table editor with coefficient values from user-defined FIR files stored in the signal generator's memory or from one of the default FIR filters. Then you can modify the values and store the new files. In this example, you will load the FIR table editor with the values for a default Gaussian filter and then modify it.

Loading the Default Gaussian FIR File

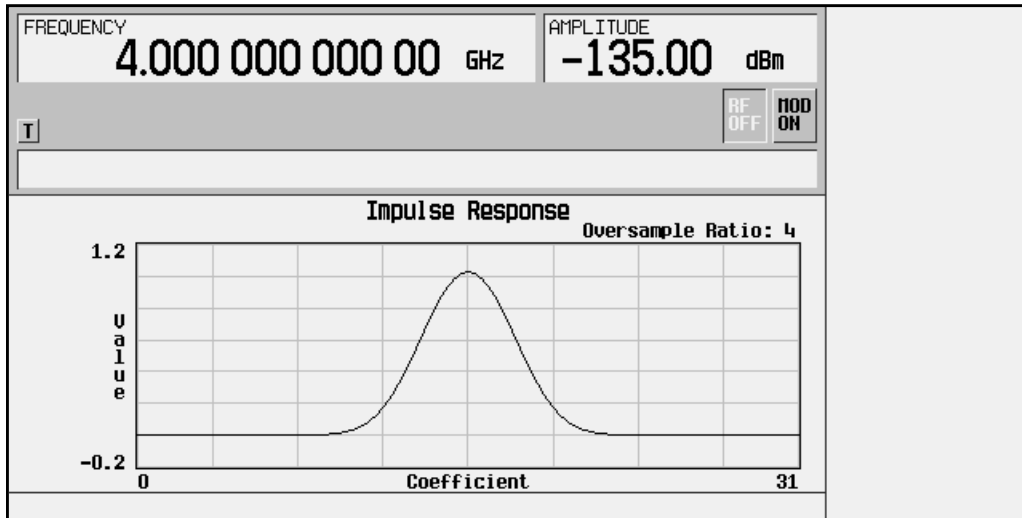
Use the following procedure to load the default Gaussian FIR filter into the FIR filter table editor.

1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears).
3. Press **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define**.
4. Press **Filter** > **Define User FIR** > **More (1 of 2)** > **Load Default FIR** > **Gaussian**.
5. Set the filter BbT to 0.300 (if **Filter BbT** is not already set to this value) by pressing **Filter BbT** and rotate the front panel knob until 0.300 is displayed.
6. Set the number of filter symbols to 8 (if **Filter Symbols** is not already set to this value) by pressing **Filter Symbols** and rotating the front panel knob until 8 is displayed.
7. Press **Generate**. The FIR table editor should now contain the coefficient values for the specified Gaussian filter.

NOTE

The actual oversample ratio during modulation is automatically selected by the instrument. A value between 4 and 16 is chosen dependent on the symbol rate, the number of bits per symbol of the modulation type, and the number of symbols.

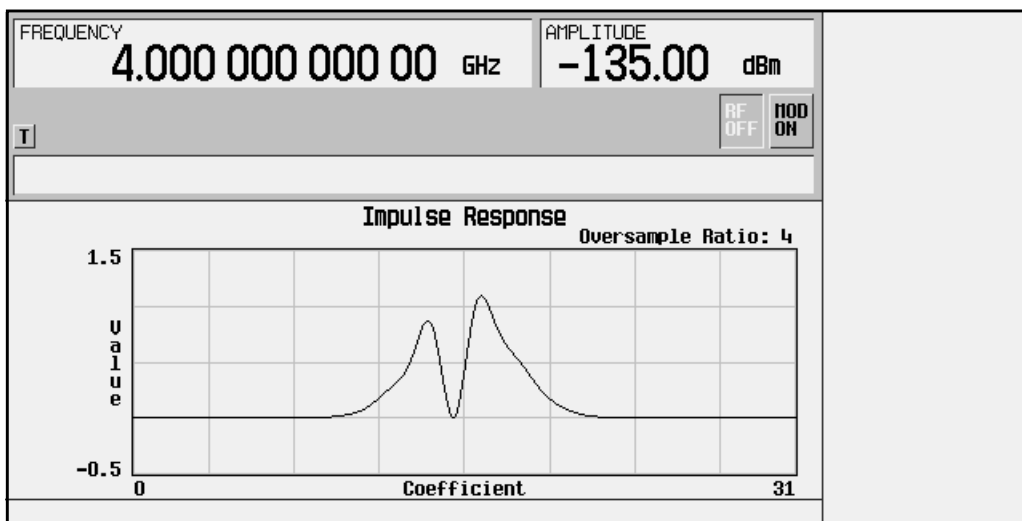
8. Press **Display Impulse Response** for a graphic representation of the filter impulse response as shown in the following figure.
9. Press **Return** to return to the menu keys.



Modifying the Coefficients

Use the following procedure to modify the filter coefficients in the FIR filter table editor.

1. Highlight coefficient 15.
2. Press **0 > Enter** to change the value of the coefficient to 0.
3. Press **Display Impulse Response** to see the effects of the change.



The graphic display can provide a useful troubleshooting tool (in this case, it indicates that a coefficient value is missing, resulting in an improper Gaussian response).

4. Press **Return** to return to the menu keys.
5. In addition to changing existing values, you can also insert and delete rows of coefficients and change the oversample ratio. (Press **More (2 of 2)** to access these softkeys.)
6. Highlight coefficient 15.
7. Press **1 > Enter**. This changes coefficient 15 back to its original value.

Storing the Filter to Memory

Use the following procedure to store the modified Gaussian filter to the signal generator's memory catalog.

1. Press **Load/Store > Store To File**. The catalog of FIR files is displayed along with the amount of memory available.
2. Name the file NEWFIR2.
3. Press **Enter** when the file name is complete. The contents of the current FIR table editor are stored to a file in non-volatile memory and the catalog of FIR files is updated to show the new file.

Applying a User-Defined FIR Filter to a cdma2000 Waveform

Perform the following procedure to apply a user-defined FIR filter to the cdma2000 waveform.

Custom FIR filters can be created using the FIR table editor feature or they can be created externally and downloaded into signal generator memory. Once the filter is stored in memory, it can be selected for use with your custom modulation state. This example requires that at least one FIR file be already stored in memory. For an example of creating and storing a FIR filter, see [“Creating a User-Defined FIR Filter Using the FIR Table Editor”](#) on page 2-30.

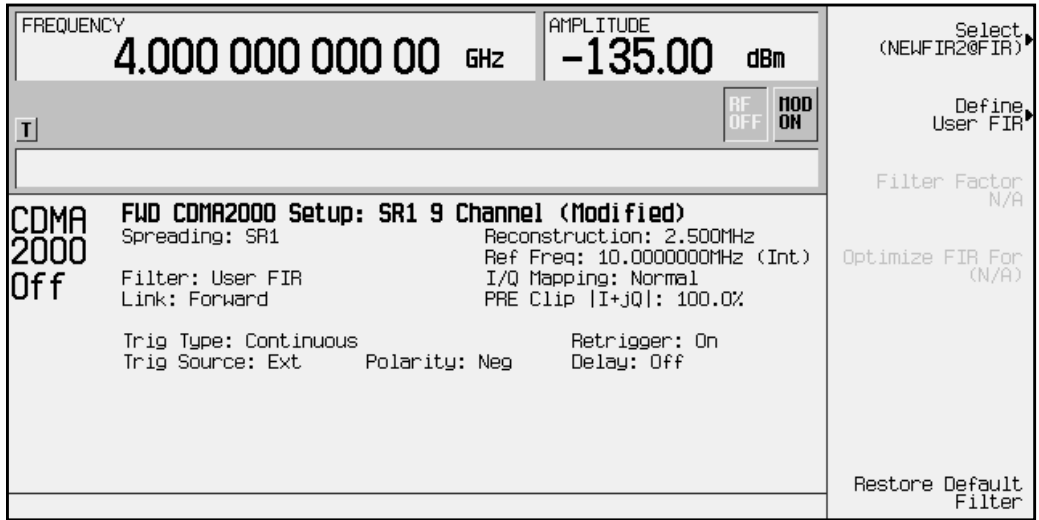
1. Press **Preset**.
2. Press **Mode** > **Arb Waveform Generator** (if it appears) > **CDMA Formats**.
3. Press **CDMA2000 (Rev 8)** > **More (1 of 2)** > **CDMA2000 Define** > **Filter** > **Select** > **User FIR**. The catalog of FIR files should now be displayed. The following figure shows an example of the catalog.

FREQUENCY		4.000 000 000 00 GHz		AMPLITUDE		-135.00 dBm		Select File
RF OFF		MOD ON						
Catalog of FIR Files		110464 bytes used		165444 bytes free				
		File Name	Type	Size				
1		NEWFIR1	FIR	260	Goto Row▶			
2		NEWFIR2	FIR	260	Page Up			
					Page Down			

In this example, there are two FIR files listed: NEWFIR1 and NEWFIR2. (These files were created in the previous examples.)

4. Scroll down in the list until the desired filter highlights. In this example, NEWFIR2 is the desired filter. You can use the front panel knob or the arrow keys as well as the GoTo Row function to highlight the filter.

5. Press **Select File**. The highlighted filter is now selected for use in your custom modulation state, as shown in the following figure.



The filter you selected is NEWFIR2. You can see the name, followed by @FIR, displayed below the **Select** softkey. In the Filter field, near the left of the display, **User FIR** is displayed to indicate that a user-defined FIR filter has been selected.

Once you have set the other modulation parameters to your satisfaction, turn on **Custom** and the RF output and your user-defined filter is in use.

NOTE

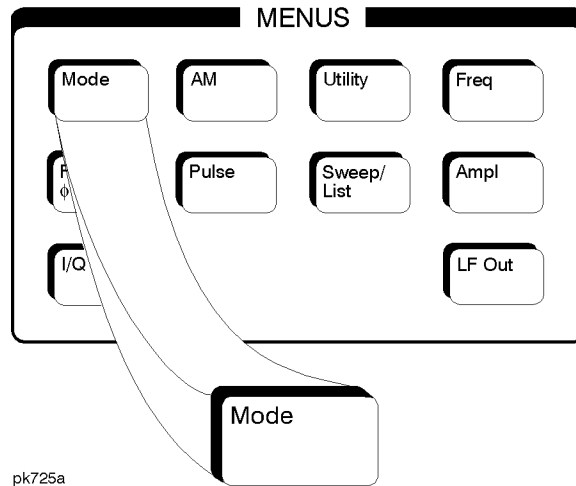
The actual oversample ratio during modulation is automatically selected by the instrument. A value between 4 and 16 is chosen dependent on the symbol rate, the number of bits per symbol of the modulation type, and the number of symbols.

3 Softkey Reference

This chapter describes the front panel **Mode** key and the associated softkeys used to configure and activate functions specific to the Option 101, cdma2000 (Revision 8) personality.

The softkeys are presented in alphabetical order.

Mode Key



When you press the front panel **Mode** key, the softkeys that appear depend on how many options are included in the instrument. When an instrument has options in addition to Option UND, the softkey **Arb Waveform Generator** provides access to all Dual Arbitrary Waveform Generator softkeys (including the optional personalities).

The softkeys described in this chapter are for cdma2000 and are located under the **CDMA2000 (Rev 8)** key.

***n* Bps**

There are a number of softkeys available for setting the data rate in bits per second (Bps) for a traffic, supplemental1 traffic, or supplemental2 traffic channel. Where ***n* Bps** can be any of the following data rate softkeys:

1200 Bps	9600 Bps	115200 Bps
1500 Bps	14400 Bps	153600 Bps
1800 Bps	19200 Bps	230400 Bps
2700 Bps	28800 Bps	307200 Bps
3600 Bps	38400 Bps	460800 Bps
4800 Bps	57600 Bps	614400 Bps
7200 Bps	76800 Bps	1036800 Bps

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row > Traffic (or Supplemental1 Traffic or Supplemental2 Traffic) > Data Rate > *n* Bps** (See above description of *n* Bps.)

1.23 MHz

Sets the multicarrier frequency spacing to 1.23 MHz, when a spread rate 3 multicarrier mode signal is generated. Cellular band uses a spacing of 1.23 MHz.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Mcarrier Spacing > 1.23 MHz**

1.25 MHz

Sets the multicarrier frequency spacing to 1.25 MHz when a spread rate 3 multicarrier mode signal is generated. PCS band uses a spacing of 1.25 Mhz.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Mcarrier Spacing > 1.25 MHz**

2 SR3 Carriers

Selects a 2-carrier cdma2000 setup with the settings listed below. (See also “[CDMA2000 Select](#)” on page 3-8.)

Carrier 1: spread rate 3, direct spread, 9 channel;
–2.5 MHz frequency offset; 0 dB power

Carrier 2: spread rate 3, direct spread, 9 channel;
2.5 MHz frequency offset; 0 dB power

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Multicarrier Off On (until On highlights) > CDMA2000 Select > 2 SR3 Carriers**

2.500 MHz

Selects a reconstruction filter with a cutoff frequency of 2.500 MHz.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Reconstruction Filter > 2.500 MHz**

3 Carriers

Selects a 3-carrier cdma2000 setup with the settings listed below. (See also “[CDMA2000 Select](#)” on page 3-8.)

Carrier 1: spread rate 1, 9 channel; -1.25 MHz frequency offset;
0 dB power

Carrier 2: spread rate 1, 9 channel; 0 kHz frequency offset;
0 dB power

Carrier 3: spread rate 1, 9 channel; 1.25 MHz frequency offset;
0 dB power

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until **On** highlights) > **CDMA2000 Select** > **3 Carriers**

4 Carriers

Selects a 4-carrier cdma2000 setup with the settings listed below. (See also “[CDMA2000 Select](#)” on page 3-8.)

Carrier 1: spread rate 1, 9 channel; -1.875 MHz frequency offset;
0 dB power

Carrier 2: spread rate 1, 9 channel; -625 kHz frequency offset;
0 dB power

Carrier 3: spread rate 1, 9 channel; 625 kHz frequency offset;
0 dB power

Carrier 4: spread rate 1, 9 channel; 1.875 MHz frequency offset;
0 dB power

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until **On** highlights) > **CDMA2000 Select** > **4 Carriers**

5 Channel

Selects a reverse link five channel cdma2000 setup consisting of a pilot, dedicated control, traffic, and two supplemental1 traffic channels.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Select > **5 Channel**

8.000 MHz

Selects a reconstruction filter with a cutoff frequency of 8.000 MHz.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Reconstruction Filter** > **8.000 MHz**

8 Channel

Selects a reverse link eight channel cdma2000 setup consisting of a traffic and seven supplemental channels, which can only be selected with spreading rate one (according to IS95-B).

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Select > 8 Channel**

9 Channel

Selects a forward link nine channel cdma2000 setup consisting of a pilot, paging, sync, two traffic, and four supplemental channels.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Select > 9 Channel**

250.0 kHz

Selects a reconstruction filter with a cutoff frequency of 250.0 kHz.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Reconstruction Filter > 250.0 kHz**

Adjust Code Domain Power

Opens a menu that enables you to adjust the code domain power (the relative power in each of the channels) to either equal Powers or scale to 0 dB.

Equal Powers sets all channels to equal power, and the total power to 0 dB.

Scale to 0dB scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Adjust Code Domain Power**

APCO 25 C4FM

Press this softkey to select an APCO 25-specified C4FM filter in the Select (filter) menu. This is a Nyquist filter with an alpha of 0.2 which is combined with a shaping filter. This softkey is only available when **Multicarrier Off On** is toggled to **Off**.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > APCO 25 C4FM**

Apply Channel Setup

Applies the changes made in the channel setup table editor (see [“Edit Channel Setup”](#) on page 3-15). If the cdma2000 mode is set to **On**, then the new channel data is used to generate a new modulation waveform in ARB waveform memory.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Apply Channel Setup**

Apply Multicarrier

Applies the current settings in the multicarrier table editor. (See also [“Multicarrier Define”](#) on page 3-23.)

Softkey Location: **Mode > CDMA Formats > CDMA2000 (REV 8) > Multicarrier Off On (until On highlights) > Multicarrier Define > Apply Multicarrier**

Apply To Waveform

Use this terminator softkey to apply the current clipping settings you have selected to the waveform. Press **Return** if you do not want to apply the new settings at this time.

NOTE

The settings are applied the next time you generate a waveform.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Clipping > Apply To Waveform**

ARB Reference Ext Int

Selects either an internal or an external reference for the waveform clock. If you choose external, you must enter the reference frequency (as described under the [Reference Frequency](#) softkey, see [page 3-29](#)) and apply the signal to the BASEBAND GEN REF IN connector.

Default Value: **Int**

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > ARB Reference Ext Int**

Bus

Sets the trigger source to bus. When the trigger source is set to bus, the signal generator will trigger an event when it receives the appropriate command via GPIB.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Bus**

CDMA2000 (Rev 8)

Opens a menu of softkeys for generating data patterns that are formatted into a structure defined by the cdma2000 Revision 8 standard.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)**

CDMA2000 Define

Displays the CDMA2000 Define menu where you can define a cdma2000 (Revision 8) signal for the current link. With the **Multicarrier Off On** softkey set to **On**, the **CDMA2000 Define** softkey is replaced with the **Multicarrier Define** softkey (see “[Multicarrier Define](#)” on page 3-23).

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define**

CDMA2000 Off On

Enables the cdma2000 baseband signal generation. Turning cdma2000 on sets up the internal hardware to generate the currently selected cdma2000 signal. The **CDMA2K** and **I/Q** annunciators appear on the display. The cdma2000 signal modulates the RF carrier *only* after you have set the front panel **Mod On/Off** key to **On**.

Default Value: Off

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Off On**

CDMA2000 Select

The function of this softkey changes, depending on whether the multicarrier mode is off (default) or on. (Refer to “[Multicarrier Off On](#)” on page 3-24.)

Multicarrier Off

Displays the CDMA2000 Select menu for the current link, where you can select a predefined channel setup or a stored custom state.

Default Value: 9 Channel

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Select**

Multicarrier On

Displays the multicarrier CDMA2000 Select menu, where you can select a predefined multicarrier setup or a stored custom multicarrier setup.

NOTE

The **Multicarrier Off On** softkey and related functions are accessed *only* when using the cdma2000 forward link setup.

Default Value: 2 SR3 Carriers

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Multicarrier Off On** (until **On** highlights) > **CDMA2000 Select**

Channels

Enters the number of duplicate channels that you want to set up and insert into the current channel setup table editor. Press the softkey **Enter** to terminate the entry.

After you have set the channel parameters, and how many times you want the channel duplicated, press **Done** to insert the information into the table editor.

Default Value: 1

Range: 0 through 247

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Insert Row** > **Traffic** (or **Supplemental1 Traffic** or **Supplemental2 Traffic**) > **Channels**

Clip | I+jQ | To

Use this softkey to make the modulation level of the combined I and Q waveform the active function. You can then clip (limit) the level to a percentage of full scale. A level of 100.0% equates to no clipping.

Default Value: 100.0%

Range: 10.0 through 100.0%, in 0.1% increments

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Clipping** > **Clip |I+jQ| To**

Clip | I | To

Use this softkey to make the modulation level of the I component the active function. You can then clip (limit) the level to a percentage of full scale. A level of 100.0% equates to no clipping.

Default Value: 100.0%

Range: 10.0 through 100.0%, in 0.1% increments

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Clipping** > **Clip |I| To**

Clip | Q | To

Use this softkey to make the modulation level of the Q component the active function. You can then clip (limit) the level to a percentage of full scale. A level of 100.0% equates to no clipping.

Default Value: 100.0%

Range: 10.0 through 100.0% in 0.1% increments

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Clipping** > **Clip |Q| To**

Clip At PRE POST FIR Filter

Use this softkey to select whether you want the waveform clipped before (PRE) or after (POST) FIR filtering. In forward link, when the spreading type is set to multicarrier, this softkey is inactive (grayed out) and automatically sets to POST FIR filter clipping.

Default Value: PRE

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Clipping** > **Clip At PRE POST FIR Filter**

Clipping

Press this softkey to access a menu of options for limiting the modulation level.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Clipping**

Clipping Type |I+jQ| |I|,|Q|

Use this softkey to select either |I+jQ| or |I|,|Q| as the clipping type. If you select |I+jQ|, the combined I and Q waveform is clipped (*circular clipping*). If you select |I|,|Q|, the I and Q components of the waveform are clipped independently (*rectangular clipping*). In this case, you can clip I and Q to different levels.

Default Value: |I+jQ|

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Clipping** > **Clipping Type |I+jQ| |I|,|Q|**

Config

Selects the channel configuration as a column by which the table will be sorted.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Edit Channel Setup** > **Sort Table** > **Primary Key (or Secondary Key)** > **Config**

Continuous

Sets the cdma2000 trigger to continuous. In continuous trigger mode, the waveform repeats itself indefinitely.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Trigger** >
Continuous

Custom CDMA2000 Carrier

Displays the forward cdma2000 (FCDMA) memory catalog. From this catalog listing, you can choose a previously stored custom carrier setup.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
Custom CDMA2000 Carrier

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
Custom CDMA2000 Carrier

Custom CDMA2000 Multicarrier

Displays the multicarrier forward cdma2000 (MFCDMA) memory catalog. From this catalog listing, you can choose a previously stored custom multicarrier setup.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **CDMA2000 Select** >
Custom CDMA2000 Multicarrier

Custom CDMA2000 State

Displays the cdma2000 (Revision 8) catalog where you can choose a previously stored custom cdma2000 (Revision 8) setup.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Select > **Custom CDMA2000 State**

Data Rate

Opens a submenu of data rates for the traffic, supplemental1 traffic, or supplemental2 traffic channel.

Traffic Default Value: 9600 Bps

Supplemental1 Traffic Default Value: 307,200 Bps

Supplemental2 Traffic Default Value: 307,200 Bps

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Edit Channel Setup** > **Insert Row** >
Traffic (or Supplemental1 Traffic or Supplemental2 Traffic) > **Data Rate**

Dedicated Control

Inserts a reverse link dedicated control channel.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Edit Channel Setup** > **Insert Row** > **Dedicated Control**

Define User FIR

Opens a table editor for creating and modifying FIR filters. The FIR table editor allows a maximum filter length of 1024 coefficients with a maximum oversampling ratio of 32. An FIR filter selected for use in cdma2000, however, cannot have more than 512 coefficients, so the number of symbols and the oversample ratio should be selected accordingly. An example of using the FIR table editor is provided in Chapter 2, "Using Functions".

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Filter** > **Define User FIR**

Delete All Rows

Deletes all rows in the current table editor.

CAUTION

Deletions cannot be recovered.

Delete All Rows is located in some table editors.

Delete File

Deletes the highlighted file from the displayed catalog. You will be prompted for confirmation.

Delete File is located in catalogs of files.

Delete Row

Deletes the highlighted row in a table.

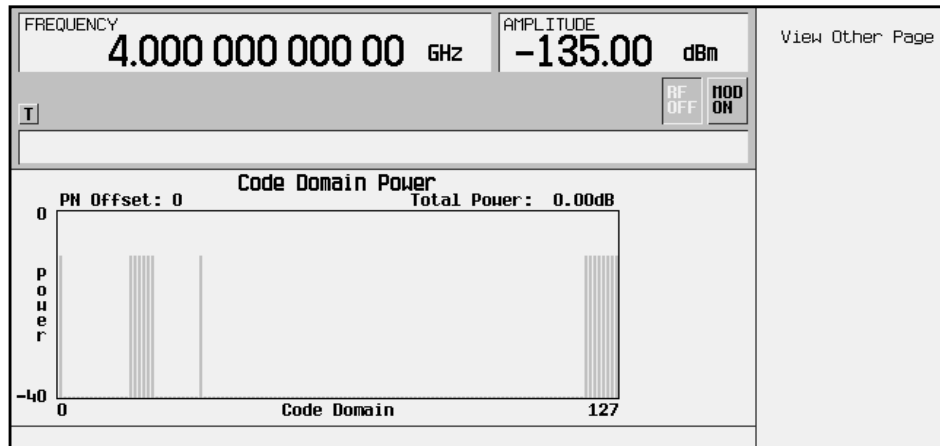
CAUTION

Deletions cannot be recovered.

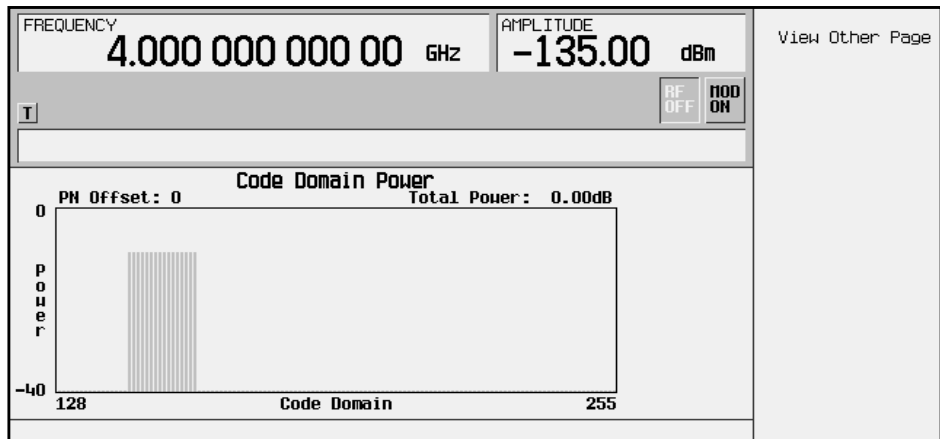
Delete Row is located in some table editors.

Display Code Domain Power

Displays a graphical representation of the relationship between power in each channel (-40 to 0 dB on the y-axis) and code domain (0 to the highest code used in the setup, on the x-axis). The value for total code domain power is displayed directly above the graph. The following illustration shows the first page of a cdma2000 code domain graph.



To access the second page, press **View Other Page**. The following illustration shows the second page of a code domain graph.



To return to channel setup table editor, press **Return** from either page.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Off On (until On highlights) > CDMA2000 Define > Edit Channel Setup > Display Code Domain Power**

Display FFT

Displays a graphical representation of the frequency response of the filter loaded into the FIR table editor (calculated using a fast Fourier transform). The following is an example of the frequency response of a root Nyquist filter with an oversample ratio of 4.

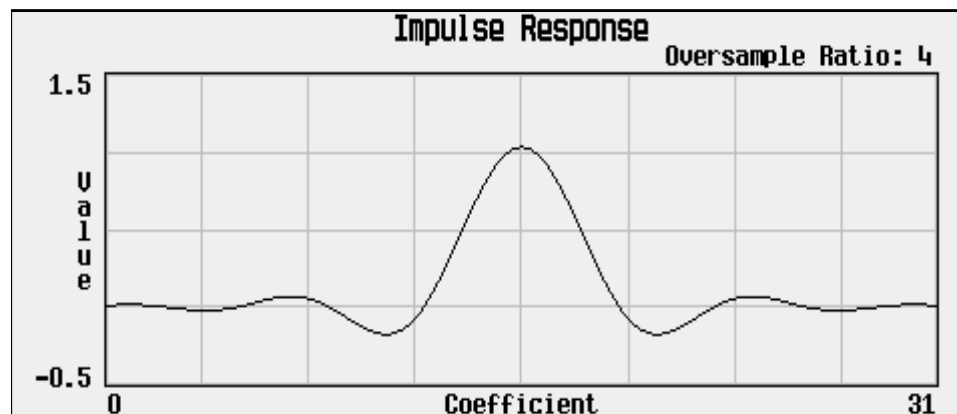


To return to the FIR table editor and the menu keys, press Return.

Softkey Location: Mode > CDMA Formats > CDMA2000 (Rev 8) >
CDMA2000 Define > Filter > Define User FIR > Display FFT

Display Impulse Response

Displays a graphical representation of impulse response in time of the filter loaded into the FIR 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 the menu keys, press Return.

Softkey Location: Mode > CDMA Formats > CDMA2000 (Rev 8) >
CDMA2000 Define > Filter > Define User FIR > Display Impulse Response

Edit Channel Setup

Opens a table editor where you can define the channel parameters of the current cdma2000 (Revision 8) signal.

You can move quickly through a large table using the keys found beneath the **Goto Row** softkey.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup**

Edit Item

Changes the highlighted item in the displayed table. Note that some fields are not editable.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Edit Item**

Or: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Edit Item**

Or: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Multicarrier Off On (until On highlights) > Multicarrier Define > Edit Item**

Equal Powers

Sets all channel powers to the same value with all channels summed to 0 dB.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Adjust Code Domain Power > Equal Powers**

Ext

Sets the trigger source to external triggering. When the trigger source is set to external, the signal generator will trigger an event when it receives the appropriate signal via the PATTERN TRIG IN connector.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Ext**

Ext Delay Off On

Arms (On) or disarms (Off) the external trigger delay. To use external trigger delay, press **Ext Delay Off On** softkey until **On** highlights, and then set the external delay time by pressing the **Ext Delay Time** softkey.

Default Value: Off

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Ext Delay Off On**

Ext Delay Time

Sets the time for the external trigger delay. External trigger delay may be adjusted to trigger a waveform at a specified length of time after an external trigger signal has been received at the PATTERN TRIG IN connector. Enter a new value and press the **Enter** terminator softkey.

To use external trigger delay, press **Ext Delay Off On** until **On** highlights, and then set the external delay time by pressing the **Ext Delay Time** softkey.

Default Value: 2.000 milliseconds

Range: 2 microseconds through 3600 seconds

Resolution: 1 microsecond

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Ext Delay Time**

Ext Polarity Neg Pos

Sets the external trigger source polarity to either a positive change or a negative change in signal level at the PATTERN TRIG IN connector.

Default Value: Neg

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Ext Polarity Neg Pos**

Filter

Opens menus for selecting a filter type, restoring the default filter, and for defining a unique FIR filter. The Filter menu also lets you adjust the filter alpha (when Nyquist or root Nyquist filters are selected) or bandwidth-multiplied-by-bit-time (for Gaussian filters).

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter**

Filter Alpha

Changes the FIR filter's alpha parameter in either the Filter menu or the Load Default FIR menus.

In the Filter menu

Changes the alpha parameter of the selected root Nyquist or Nyquist filter.

This key appears only *after* choosing a root Nyquist or Nyquist filter. If a Gaussian filter is in use, you will see **Filter BbT**. If any other filter is in use, you will see a grayed-out softkey: **Filter Factor N/A**.

Default Value: 0.500

Range: 0.000 through 1.000.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Filter Alpha**

In the Load Default FIR Menu

Changes the alpha parameter of the root Nyquist or Nyquist filter coefficients loaded into the FIR table editor. After entering the alpha value, press **Generate** to modify the filter coefficients in the table editor.

Default Value: 0.350

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Root Nyquist (or Nyquist) > Filter Alpha**

Filter BbT

Changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter in either the Filter menu or the Load Default FIR menu.

In the Filter menu

In the Filter menu, **Filter BbT** changes the BbT parameter of the selected Gaussian filter.

NOTE

This key appears only *after* choosing a Gaussian filter. If a root Nyquist or Nyquist filter is in use, you will see **Filter Alpha**. If any other filter is in use, you will see a **Filter Factor N/A** softkey (grayed-out).

Default Value: 0.500

Range: 0.000 through 1.000.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > Gaussian > Filter BbT**

In the Load Default FIR Menu

In the Load Default FIR menu, **Filter BbT** changes the BbT parameter of the Gaussian filter coefficients loaded into the FIR table editor. After entering the BbT value, press **Generate** to modify the filter coefficients in the table editor.

Default Value: 0.300

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Gaussian > Filter BbT**

Filter Factor

This grayed-out softkey is displayed when using a filter that does not have an adjustable alpha or BbT parameter (such as the IS-95 filter selections or a user-defined FIR filter). This softkey changes to either **Filter Alpha** or **Filter BbT** if the appropriate root Nyquist, Nyquist, or Gaussian filter is selected for use.

Nyquist, or Gaussian filter is selected.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Filter Factor**

Filter Symbols

Defines the number of symbols for the filter to be loaded into the FIR table editor. The FIR table editor allows a maximum filter length of 1024 coefficients with a maximum oversample ratio of 32 and a maximum of 32 symbols. Because an FIR filter selected for use in cdma2000 cannot have more than 512 coefficients, select the number of symbols and the oversample ratio accordingly.

Default Value: 8

Range: 1 through 32.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Root Nyquist (or Nyquist, Gaussian, or Rectangle) > Filter Symbols**

Gate Active

This softkey remains grayed-out until the trigger is set to Gated. Once the trigger has been set to Gated, press **Gate Active Low High** to toggle the polarity of the “through” or active state of a gated trigger signal. **Gate Active Low** outputs the signal while the gate is low at the PATTERN TRIG IN connector. **Gate Active High** has the opposite effect, outputting the signal while the signal level at the PATTERN TRIG IN connector is in a high state.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Gate Active**

Gated

Sets the trigger type to gated. Using a gated trigger, you can set the signal to output when a TTL high or low is present at the PATTERN TRIG IN connector. To set the gate to trigger on either high or low, press **Gated** and then press **Trigger Setup > Gate Active Low High**.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Gated**

Gaussian

Selects the Gaussian pre-modulation filter in either the Select (filter) menu or the Load Default FIR menu.

In the Select (Filter) Menu

Press the **Gaussian** softkey to select this FIR filter for use in the filter setup. Use the **Filter BbT** softkey to change the filter bandwidth-multiplied-by-bit time product value.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > Gaussian**

In the Load Default FIR Menu

Press the **Gaussian** softkey followed by **Generate** to load the FIR 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 **Generate** again to reload the FIR table.

The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter as it is currently defined in the FIR table editor.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Gaussian**

Goto Bottom Row

Moves the selection bar to the bottom row in the current table editor or list of items.

Goto Bottom Row is located in table editor menus and in catalogs of files.

Goto Middle Row

Moves the selection bar to the middle row in the current table editor or list of items.

Goto Middle Row is located in table editor menus and in catalogs of files.

Goto Row

Displays softkeys that enable you to select a row or page in a table or list of items.

Goto Row is located in table editor menus and in catalogs of files.

Goto Top Row

Moves the selection bar to the top row in the current table or list of items.

Goto Top Row is located in table editor menus and in catalogs of files.

Insert Row

Displays a menu that enables you to select the type of row you wish to insert into the current table editor.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row**

Or: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Multicarrier Off On (until On highlights) > Multicarrier Define > Insert Row**

I/Q Mapping Normal Invert

Selects whether the I/Q outputs will be normal or inverted.

Default Value: Normal

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > I/Q Mapping Normal Invert**

IS-2000 SR3 DS

Press this softkey to select the standard IS-2000 spreading rate 3 direct spread filter. This softkey is only available when **Multicarrier Off On** is toggled to **Off**.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > IS-95 and IS-2000 > IS-2000 SR3 DS**

IS-95

Press this softkey to select the standard IS-95 baseband filter.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > IS-95 and IS-2000 > IS-95**

IS-95 and IS-2000

Press this softkey to access a menu of IS-95 and IS-2000 filters in the **Select Filter** menu. This menu displays the following IS-95 and IS-2000 filter choices: IS-95, IS-95 w/EQ, IS-95 Mod, IS-95 Mod w/EQ and IS-2000 SR3 DS. This softkey is only available when **Multicarrier Off On** is toggled to **Off**.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > IS-95 and IS-2000**

IS-95 Mod

Selects a modified version of the standard IS-95 baseband filter. This filter is modified for improved adjacent channel performance. The modification is done in a manner that still meets the IS-95 error function criterion.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Select** > **IS-95 and IS-2000** > **IS-95 Mod**

IS-95 Mod w/EQ

Selects a modified version of the standard IS-95 baseband filter. This filter is modified for improved adjacent channel performance, and includes the equalizer specified by IS-95. The filter modification is done in a manner that still meets the IS-95 error function criterion.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Select** > **IS-95 and IS-2000** > **IS-95 Mod w/EQ**

IS-95 w/EQ

Selects the standard IS-95 baseband filter with an equalizer provided for phase compensation required by the base station.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Select** > **IS-95 and IS-2000** > **IS-95 w/EQ**

Link Forward Reverse

Selects the cdma2000 (revision 8) forward or reverse link channel setup. Forward link is for base to mobile. Reverse link is for mobile to base.

Default Value: Forward

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Link Forward Reverse**

Load Default FIR

Opens a menu for automatically filling the FIR table editor with coefficient values from pre-defined filters such as root Nyquist, Nyquist, Gaussian, and Rectangle. The default filter parameters can also be selected in this menu allowing you to choose the filter alpha or BbT and the number of filter symbols.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Define User FIR** > **Load Default FIR**

Load From Selected File

Replaces the current information in a table editor with the information stored in the highlighted file.

Load From Selected File is located in catalogs of files.

Load/Store

Opens a menu for loading a table editor with values from files previously stored in the signal generator memory, and for saving to memory a user-defined signal from the table editor.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Define User FIR** > **Load/Store**

Mcarrier Spacing

Opens a submenu of choices for multicarrier frequency spacing. (Cellular band uses 1.23 MHz and PCS band uses 1.25 MHz.)

Default Value: 1.25 MHz

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Mcarrier Spacing**

Mirror Table

Mirrors the FIR table entries such that the table doubles in size, and the values in the top half of the table are duplicated in the bottom half of the table in reverse order.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Define User FIR** > **Mirror Table**

Multicarrier Define

Accesses the Multicarrier cdma2000 setup table, where you can define a multicarrier cdma2000 signal. This softkey is not present in the softkey menu until multicarrier mode is enabled (see [“Multicarrier Off On”](#) on page 3-24).

For information on using cdma2000 multicarrier, refer to [“Creating, Storing, & Recalling a Custom Multicarrier cdma2000 Waveform”](#) on page 2-23.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Multicarrier Off On** (until On highlights) > **Multicarrier Define**

Multicarrier Off On

Toggles the multicarrier mode off and on.

When Multicarrier is on, the **Spread Rate** and **Spreading Type Direct Mcarrier** softkeys become inactive (text is grayed-out), and options under the **CDMA2000 Select** softkey change (see “[CDMA2000 Select](#)” on page 3-8).

For information on using multicarrier cdma2000, refer to “[Creating, Storing, & Recalling a Custom Multicarrier cdma2000 Waveform](#)” on page 2-23.

NOTE

The **Multicarrier Off On** softkey and related functions are accessible *only* when using the cdma2000 forward link setup.

Default Value: Off

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Multicarrier Off On**

Nyquist

Selects the Nyquist (raised cosine) pre-modulation filter in either the **Select (filter)** menu or the **Load Default FIR** menu.

In the Select (Filter) Menu

Press the **Nyquist** softkey to select this FIR filter for the filter setup.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > Nyquist**

In the Load Default FIR Menu

Press the **Nyquist** softkey followed by **Generate** to load the FIR table editor with the coefficient values for the 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 to reload the FIR table.

The **Display Impulse Response** and **Display FFT** softkeys in this menu graphically display the filter as it is currently defined in the FIR table editor.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Nyquist**

Optimize FIR For EVM ACP

Optimizes the filter for minimized error vector magnitude (select EVM) or to minimized adjacent channel power (select ACP). The EVM selection provides the most ideal passband while ACP selection improves stopband rejection. This feature applies only to root Nyquist, Nyquist, and Gaussian filters.

Default Value: EVM

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Filter** > **Optimize For EVM ACP**

Oversample Ratio

Sets the oversampling ratio to be applied to a custom FIR filter design in the Define User FIR menu. The maximum combination of symbols and oversampling ratio is 1024. Since an FIR filter selected for use in cdma2000 cannot have more than 512 coefficients, select accordingly.

Default Value: 4

Range: 1 through 32

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Filter** > **Define User FIR** > **Oversample Ratio**

Page Down

Views the next page of listings in a table editor or catalog of files. **Page Down** is located in table editor menus and in catalogs of files.

Page Up

Views the previous page of listings in a table editor or catalog of files. **Page Down** is located in table editor menus and in catalogs of files.

Paging

Inserts a Paging channel into the current table editor.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
CDMA2000 Define > **Edit Channel Setup** > **Insert Row** > **Paging**

Pilot

Selects pilot channel as the current cdma2000 channel configuration or to insert a pilot channel into the channel setup table editor.

In the CDMA2000 Select Menu

Selects a pilot channel as the current cdma2000 state.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Select** > **Pilot**

In the Edit Channel Setup Menu

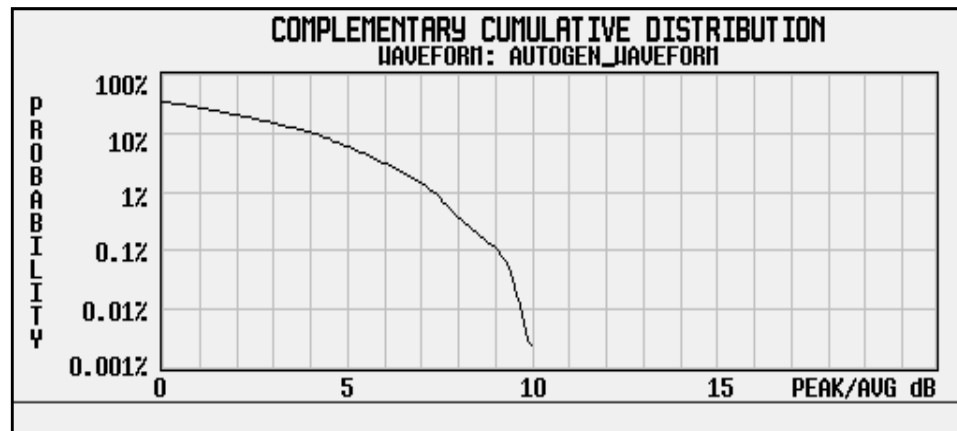
Inserts a pilot channel into the current table editor.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Insert Row** > **Pilot**

Plot CCDF

Displays a plot of the Complementary Cumulative Distribution Function for the selected waveform. The plot displays the probability that the instantaneous envelope power is x dB above the average power, where x is the number on the horizontal axis.

Note that this function is only available after a waveform has been generated.



Softkey Location: **Mode** > **CDMA Formats** > **CDMA200 (Rev 8)** > **Waveform Statistics** > **Plot CCDF**

PN Offset

Selects the PN offset as a column by which the table will be sorted.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Sort Table** > **Primary Key (or Secondary Key)** > **PN Offset**

Power

This softkey appears in the traffic, supplemental1 traffic and supplemental2 traffic channel insertion menus where you define a forward link traffic or supplemental traffic channel and then insert a single entry or multiple entries of that channel into the current cdma2000 (Revision 8) Edit Channel Setup table editor.

Press the **Power** softkey, then enter the power level value for the current channel. Press the softkey **Enter** to terminate the entry.

After you have set the channel parameters, and the number of times you want the channel duplicated, press **Done** to insert the information into the table editor.

Default Value: 0.00 dB

Range: -40.00 through 0.00 dB

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Insert Row** > **Traffic (or Supplemental1 Traffic or Supplemental2 Traffic)** > **Power**

Primary Key

Selects the primary column by which the table will be sorted. The choices for the forward link are Config, Rate, Walsh code, or PN offset.

The reverse link sorts by rate only.

NOTE

Primary and secondary key choices must be different.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Sort Table** > **Primary Key**

Radio Config

Sets the radio configuration for a new forward link (traffic, supplemental1 traffic, or supplemental2 traffic channel) or the radio configuration for the entire reverse link channel setup. Note that changing the radio configuration results in changes to the channel data rate.

Forward Link Default Value: 6

Forward Link Range: 1 to 5 for Spread Rate 1, 6 to 9 for Spread Rate 3

Softkey Location: For forward link, press **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Insert Row** > **Traffic** (or **Supplemental1 Traffic** or **Supplemental2 Traffic**) > **Radio Config**

Reverse Link Default Value: 5

Reverse Link Range: 5 or 6

Softkey Location: For reverse link, press: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Radio Config**

Rate

Selects the symbol rate as a column by which the table will be sorted.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Sort Table** > **Primary Key** (or **Secondary Key**) > **Rate**

Reconstruction Filter

Displays a menu for selecting a reconstruction filter. You can choose a filter with a cutoff frequency of 250.0 kHz, 2.500 MHz, 8.000 MHz, or no filter (Through).

Default Value: 2.500 MHz

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Reconstruction Filter**

Rectangle

Selects a rectangle pre-modulation filter in either the Select (filter) menu or the Load Default FIR menu.

In the Select (Filter) Menu

Press the **Rectangle** softkey to select this FIR filter for use in filter setup.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Select** > **Rectangle**

In the Load Default FIR Menu

Press the **Rectangle** softkey followed by **Generate** to load the FIR table editor with the coefficient values for a rectangle filter.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Rectangle**

Reference Frequency

Sets the reference frequency of the external clock. The external clock is only accessible when you are using an external ARB reference applied to the BASEBAND GEN REF IN connector.

Default Value: 10.0000000 MHz

Range: 250.0000 kHz to 20.0000000 MHz.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Reference Freq**

Restore Default Filter

Replaces the current FIR filter with the default filter (IS-95 Mod w/EQ).

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Restore Default Filter**

Retrigger Mode Off On

Toggles the operating state of the retrigger mode. With **Retrigger Mode Off On** set to **On**, if a trigger occurs while a waveform is playing, the waveform will retrigger at the end and play one more time. Retriggers do not accumulate; if several triggers are received during a waveform, it will only be replayed once.

When **Retrigger Mode Off On** is set to **Off**, if a trigger occurs while a waveform is playing, it is ignored.

Default Value: Off

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Retrigger Mode Off On**

Root Nyquist

Selects the root Nyquist (root raised cosine) pre-modulation filter in either the Select (filter) menu or the Load Default FIR menu.

In the Select (Filter) Menu

Press the **Root Nyquist** softkey to select this FIR filter and return the Filter menu.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > Root Nyquist**

In the Load Default FIR Menu

Press the **Root Nyquist** softkey followed by **Generate** to load the FIR table editor with the coefficient values for the 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 **Generate** again to reload the FIR table.

The [Display Impulse Response](#) (see [page 3-14](#)) and [Display FFT](#) (see [page 3-14](#)) softkeys in this menu graphically display the filter as it is currently defined in the FIR table editor.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Define User FIR > Load Default FIR > Root Nyquist**

Scale To 0dB

Scales all of the current channel powers so that the total power equals 0 dB while keeping the previous power ratios between the individual channels.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Adjust Code Domain Power > Scale To 0dB**

Secondary Key

Selects the secondary column by which the table will be sorted. The choices for the forward link are Config, Rate, Walsh code, or PN offset.

The reverse link sorts by rate only.

NOTE

Primary and secondary key choices must be different.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Sort Table > Secondary Key**

Select

Opens a menu for selecting the pre-modulation filter type. You can choose from:

- Pre-defined filters, such as root Nyquist, Nyquist, Gaussian, several IS-95 baseband filters, WCDMA, and Rectangle.

The standard IS-95 filter is available as well as a modified version of this filter that meets the IS-95 error function for improved adjacent channel performance. These two filters are also provided with an equalizer for phase compensation required by the base station.

- A catalog of files stored in the signal generator memory. You can select any filter that you have either created externally and downloaded into memory, or that you have created internally in the Define User FIR menu and subsequently stored.

Default Value: IS-95 w/EQ

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Filter** > **Select**

Select File

Selects a stored file.

Select File is located in catalogs of files.

Single

Sets the trigger type to single. After receiving a trigger, the waveform is output once.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Trigger** > **Single**

Sort

Sorts the CDMA channel table editor by the selected primary and secondary keys.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **CDMA2000 Define** > **Edit Channel Setup** > **Sort Table** > **Sort**

Sort Table

Accesses a menu where you can sort the table editor files by selecting primary and secondary keys. The keys are columns of the table. The choices for the forward link are Config, Rate, Walsh code, or PN offset. Reverse link sorts by rate only.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Sort Table**

Spread Rate

Opens a submenu that provides the available spread rate choices for the cdma2000 waveform. This softkey becomes inactive (text is grayed-out) when multicarrier mode is on, since the spread rate data is already contained in the selected multicarrier waveform setup (see also “[Multicarrier Off On](#)” on page 3-24).

The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 3 equals a 3.6864 Mcps chip rate. Higher data rates can be achieved using spread rate 3, though offset by greater bandwidth/spectrum usage.

Default Value: SR1

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Spread Rate**

Spread Rate 1

Selects spread rate 1 for the cdma2000 waveform. The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 1 equals a 1.2288 Mcps chip rate. Lower bandwidth spectrums are used with spread rate 1, but with lower available data rates.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Spread Rate > Spread Rate 1**

Spread Rate 3

Selects spread rate 3 for the cdma2000 waveform. The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 3 equals a 3.6864 Mcps chip rate. Higher data rates can be achieved using spread rate 3, though offset by greater bandwidth/spectrum usage.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Spread Rate > Spread Rate 3**

Spreading Type Direct Mcarrier

Selects the spreading type for a cdma2000 waveform. You can choose from either direct or multicarrier for forward link (the spread rate must be 3).

This softkey becomes inactive (grayed-out) when Multicarrier is on (see also “[Multicarrier Off On](#)” on page 3-24).

NOTE

Multicarrier is not available in the reverse link setup.

Default Value: Direct

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Spreading Type Direct Mcarrier

SR1 9 Channel

Inserts a spread rate 1 (SR1), 9 channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR1 9 Channel

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR1 9 Channel

SR1 Pilot

Inserts a spread rate 1 (SR1), single-pilot channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR1 Pilot

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR1 Pilot

SR3 Direct 9 Channel

Inserts a spread rate 3 (SR3), direct spread, 9 channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR3 Direct 9 Channel

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR3 Direct 9 Channel

SR3 Direct Pilot

Inserts a spread rate 3 (SR3), direct spread, single-pilot channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR3 Direct Pilot

Or: **Mode** > **CDMA Formats** > **CDMA 2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR3 Direct Pilot

SR3 Mcarrier 9 Channel

Inserts an spread rate 3 (SR3), multicarrier spread, 9 channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR3 Mcarrier 9 Channel

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR3 Mcarrier 9 Channel

SR3 Mcarrier Pilot

Inserts a spread rate 3 (SR3), multicarrier spread, single-pilot channel, cdma2000 setup into the multicarrier table.

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Edit Item** >
SR3 Mcarrier Pilot

Or: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** >
Multicarrier Off On (until On highlights) > **Multicarrier Define** > **Insert Row** >
SR3 Mcarrier Pilot

Store Custom Multicarrier

Accesses a menu where you can store the contents of the multicarrier table editor into a file.

This softkey stores the following information for each carrier:

- type of carrier
- frequency offset
- power level

Softkey Location: **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Multicarrier Off On (until On highlights)** > **Multicarrier Define** > **Store Custom Multicarrier**

NOTE

To recall a file, press **Mode** > **CDMA Formats** > **CDMA2000 (Rev 8)** > **Multicarrier Off On (until On highlights)** > **CDMA2000 Select** > **Custom CDMA2000 Multicarrier**, and select the desired file.

Store Custom CDMA2000 State

Opens a menu that enables you to store the current custom cdma2000 state into the file you enter. Afterward, you can recall this custom state from the signal generator's memory (as described under the softkey [Custom CDMA2000 State](#), see [page 3-11](#)).

Along with the contents of the cdma2000 channel table editor, this softkey stores the following signal generator state information to the memory catalog:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- I/Q mapping
- link
- spread type
- spread rate
- ARB reconstruction filter
- ARB reference clock source (internal or external)
- ARB reference clock frequency
- clipping

- multicarrier spacing
- radio configuration

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Store Custom CDMA2000 State**

Store To File

Displays a menu where you can store the current table editor information for later use.

Store To File is located in catalogs of files.

Supplemental1 Traffic

Opens a submenu where you can define and insert one or more supplemental1 traffic channels into the cdma2000 setup.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row > Supplemental1 Traffic**

Supplemental2 Traffic

Opens a submenu where you can define and insert one or more supplemental2 traffic channels into the cdma2000 setup.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row > Supplemental2 Traffic**

Sync

Inserts a synchronization channel into the Edit Channel Setup table editor.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row > Sync**

Through

Bypasses all reconstruction filtering. This is useful for using external reconstruction filters at frequencies different than those supplied internally.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Reconstruction Filter > Through**

Traffic

Opens a submenu where you can define and insert one or more fundamental traffic channels into the cdma2000 setup.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Insert Row > Traffic**

Trigger

Displays the trigger menu, where you can select types of triggering: continuous, single, or gate. The menu also contains a **Trigger Setup** softkey that enables you to adjust the trigger source, the retrigger mode, and the gate active polarity.

Default Value: Continuous

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger**

Trigger Key

Sets the trigger source to the signal generator's front panel **Trigger** key. When the trigger source is set to **Trigger Key**, the signal generator triggers an event when you press the front panel **Trigger** key.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup > Trigger Source > Trigger Key**

Trigger Setup

Displays the trigger setup menu where you can adjust the trigger source, the retrigger mode and the gate active polarity.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Setup**

Trigger Source

Displays the trigger source menu. This menu enables you to select the trigger source from among the front panel **Trigger** key, a trigger command sent over the GPIB bus, or an external trigger applied to the PATTERN TRIG IN connector.

Default Value: Ext

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Trigger > Trigger Source**

User FIR

Displays the catalog of FIR filter files stored in the signal generator's memory. You can select a custom filter from this catalog for your pre-modulation filter. Scroll through the listed files, highlight the desired selection, then press **Select File**. Notice that **User Filter** is shown in the **Filter** field of the display, and the filename is shown in the second line of the **Select** softkey.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > User FIR**

Walsh Code

Selects the Walsh code as a column by which the table will be sorted.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Edit Channel Setup > Sort Table > Primary Key (or Secondary Key) > Walsh Code**

Waveform Statistics

Displays the Waveform Statistics Menu. When this softkey is active, statistics are available for the selected waveform.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > Waveform Statistics**

WCDMA

Selects the WCDMA pre-modulation filter in the **Select (filter)** menu. Pressing the **WCDMA** softkey selects this FIR filter and returns the **Filter** menu.

Softkey Location: **Mode > CDMA Formats > CDMA2000 (Rev 8) > CDMA2000 Define > Filter > Select > WCDMA**

4 Operation

This chapter contains detailed information that will help you understand the operation of your Option 101 signal generator's cdma2000 (Revision 8) personality.

Understanding Baseband Clipping

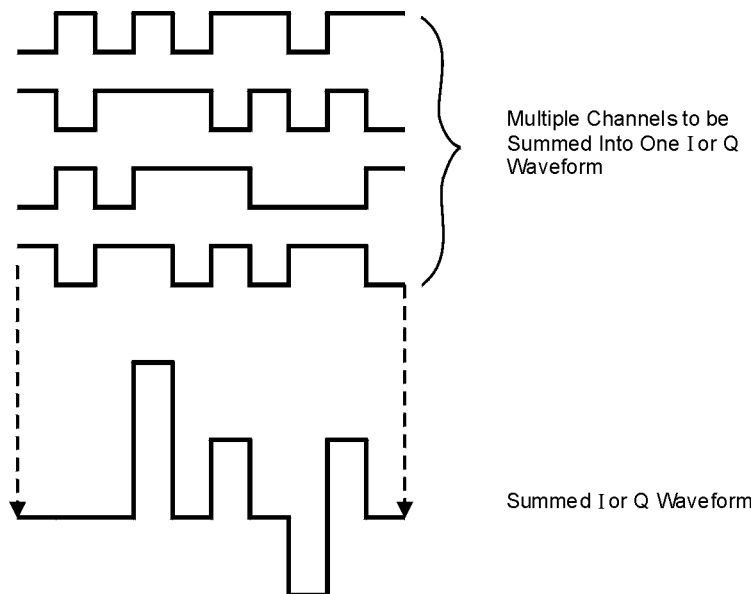
In a cdma2000 waveform, high power peaks can cause intermodulation distortion, which generates spectral regrowth (a condition that interferes with signals in adjacent frequency bands). The clipping function allows you to reduce high power peaks.

How Power Peaks Develop

To understand how clipping reduces high power peaks in a cdma2000 signal, it is important to know how the peaks develop as the signal is constructed.

A cdma2000 waveform is composed of an I waveform and a Q waveform. Often, these waveforms are the summation of multiple channels (refer to [Figure 4-1](#)). Whenever most or all of the individual channel waveforms simultaneously contain a bit in the same state (high or low), an unusually high power peak (negative or positive) occurs in the summed waveform. This does *not* happen frequently because the high and low states of the bits on these channel waveforms are random, which causes a cancelling effect.

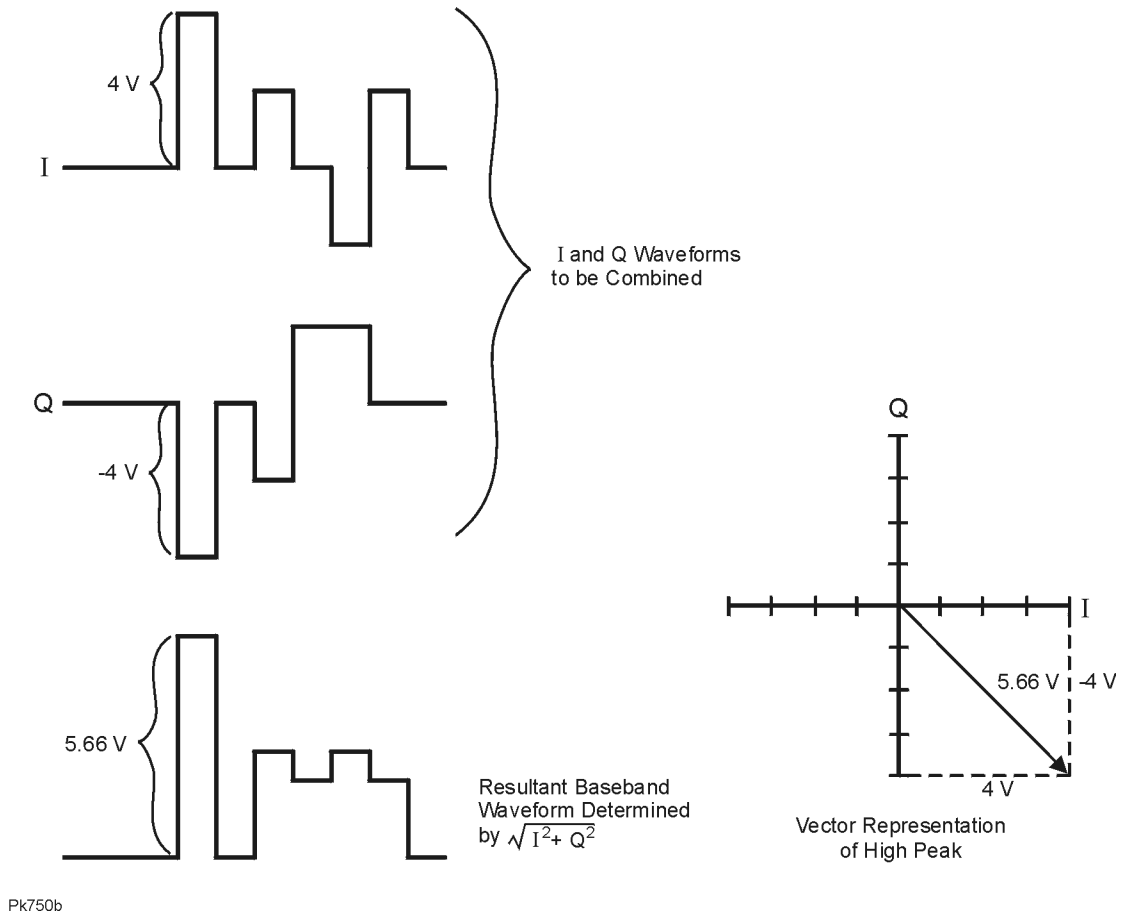
Figure 4-1 Multiple Channel Summing



pk722b

The I and Q waveforms combine in the I/Q modulator to create an RF waveform. The magnitude of the RF envelope is determined by the equation $\sqrt{I^2+Q^2}$, where the squaring of I and Q always results in a positive value. Notice how simultaneous positive and negative peaks in the I and Q waveforms do not cancel each other, but combine to create an even greater peak (refer to [Figure 4-2](#)).

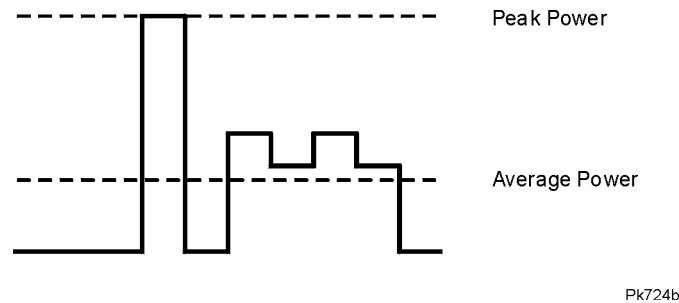
Figure 4-2 Combining the I and Q Waveforms



How Peaks Cause Spectral Regrowth

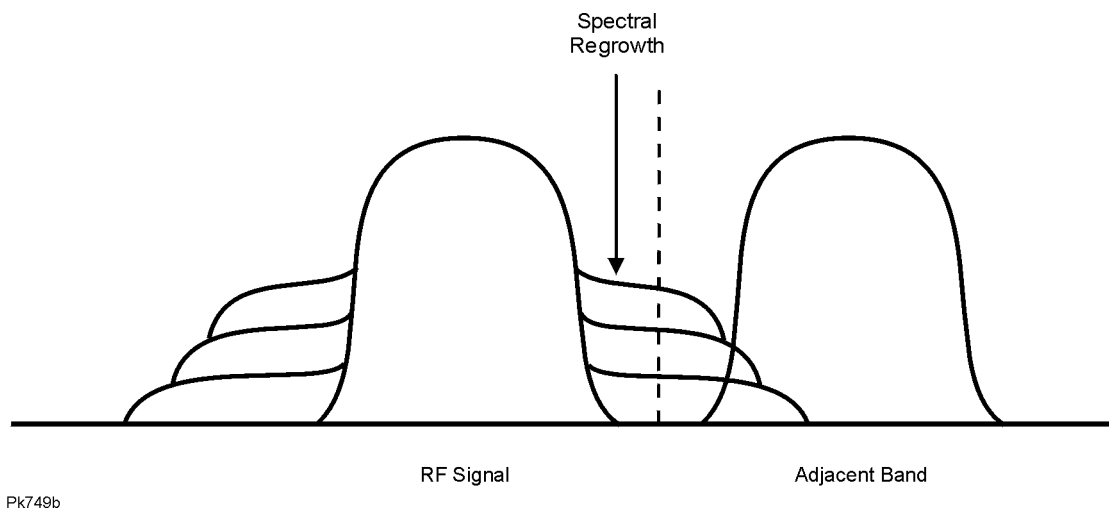
Because of the relative infrequency of high power peaks, a waveform will have a high peak-to-average power ratio (refer to [Figure 4-3](#)). Because a transmitter's power amplifier gain is set to provide a specific average power, high peaks can cause the power amplifier to move toward saturation. This causes intermodulation distortion, which generates spectral regrowth.

Figure 4-3 Peak-to-Average Power in the cdma2000 Waveform



Spectral regrowth is a range of frequencies that develops on each side of the carrier (similar to sidebands) and extends into the adjacent frequency bands (refer to [Figure 4-4](#)). Consequently, spectral regrowth interferes with communication in the adjacent bands. Clipping can provide a solution to this problem.

Figure 4-4 Spectral Regrowth Interfering with Adjacent Band



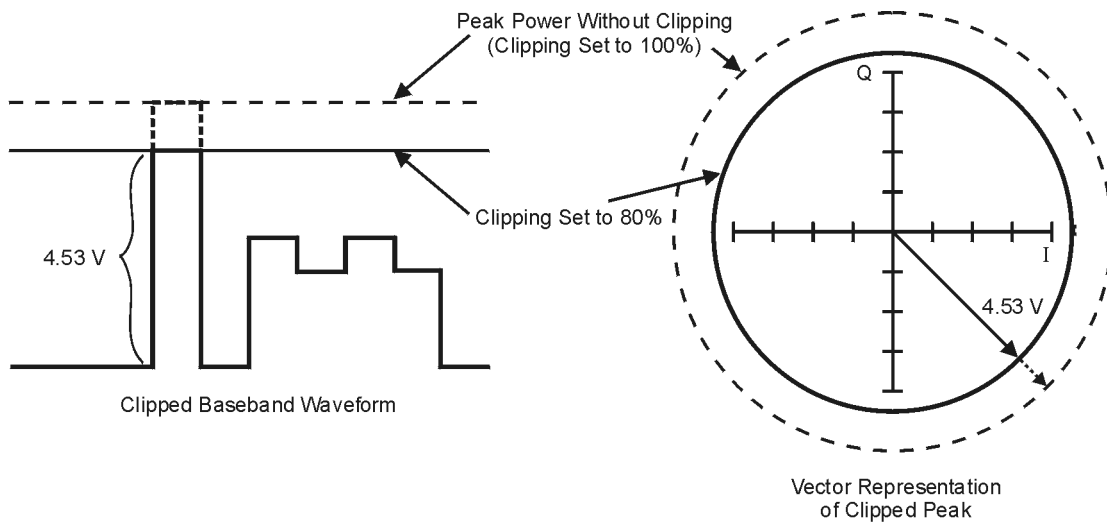
How Clipping Reduces Peak-to-Average Power

You can reduce peak-to-average power, and consequently spectral regrowth, by clipping the waveform to a selected percentage of its peak power. The ESG signal generator provides two different methods of clipping: circular and rectangular.

During *circular* clipping, clipping is applied to the combined I and Q RF waveform ($|I + jQ|$). Notice in [Figure 4-5](#) that the clipping level is constant for all phases of the vector representation and appears as a circle. During *rectangular* clipping, clipping is applied to the I and Q waveforms separately ($|I|$, $|Q|$). Notice in [Figure 4-6](#) that the clipping level is different for I and Q; therefore, it appears as a rectangle in the vector representation. With either method, the objective is to clip the waveform to a level that effectively reduces spectral regrowth, but does *not* compromise the integrity of the signal. [Figure 4-7](#) uses two complementary cumulative distribution plots to show the reduction in peak-to-average power that occurs after applying circular clipping to an RF waveform.

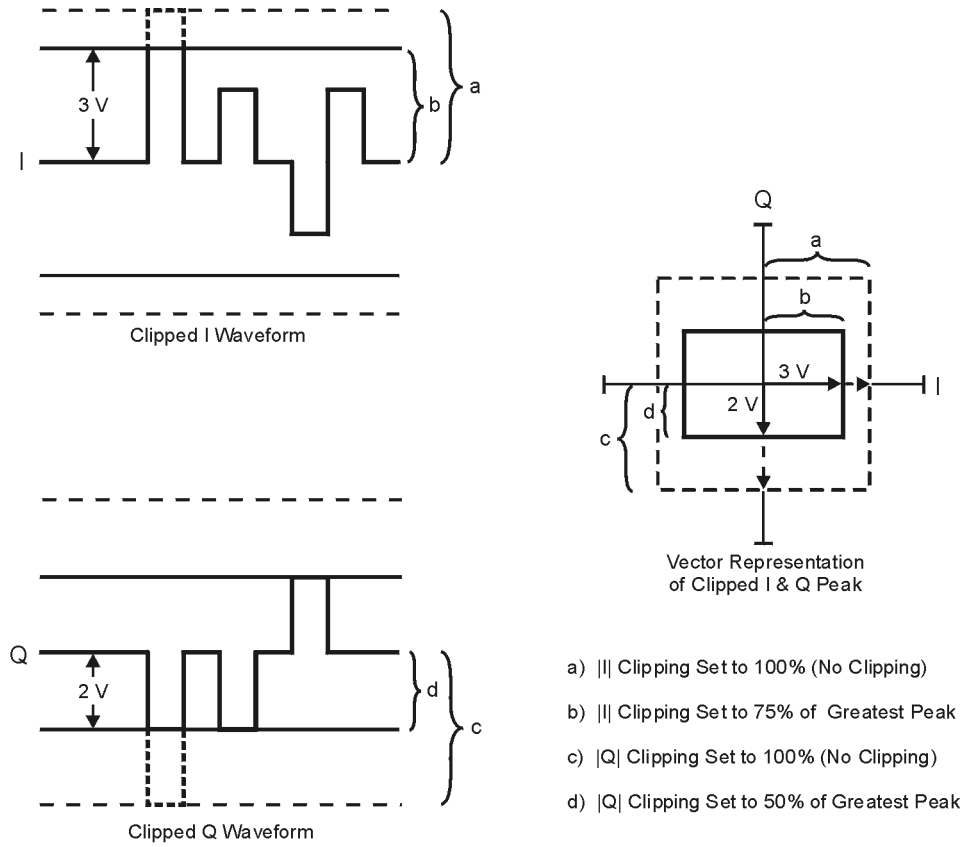
The lower you set the clipping value, the lower the peak power that is passed (or the more the signal is clipped). Often, the peaks can be clipped successfully without substantially interfering with the rest of the waveform. Data that might be lost in the clipping process is salvaged because of the error correction inherent in the coded systems. If you clip too much of the waveform, however, lost data is irrecoverable. You may have to try several clipping settings to find a percentage that works well.

Figure 4-5 Circular Clipping



Pk748b

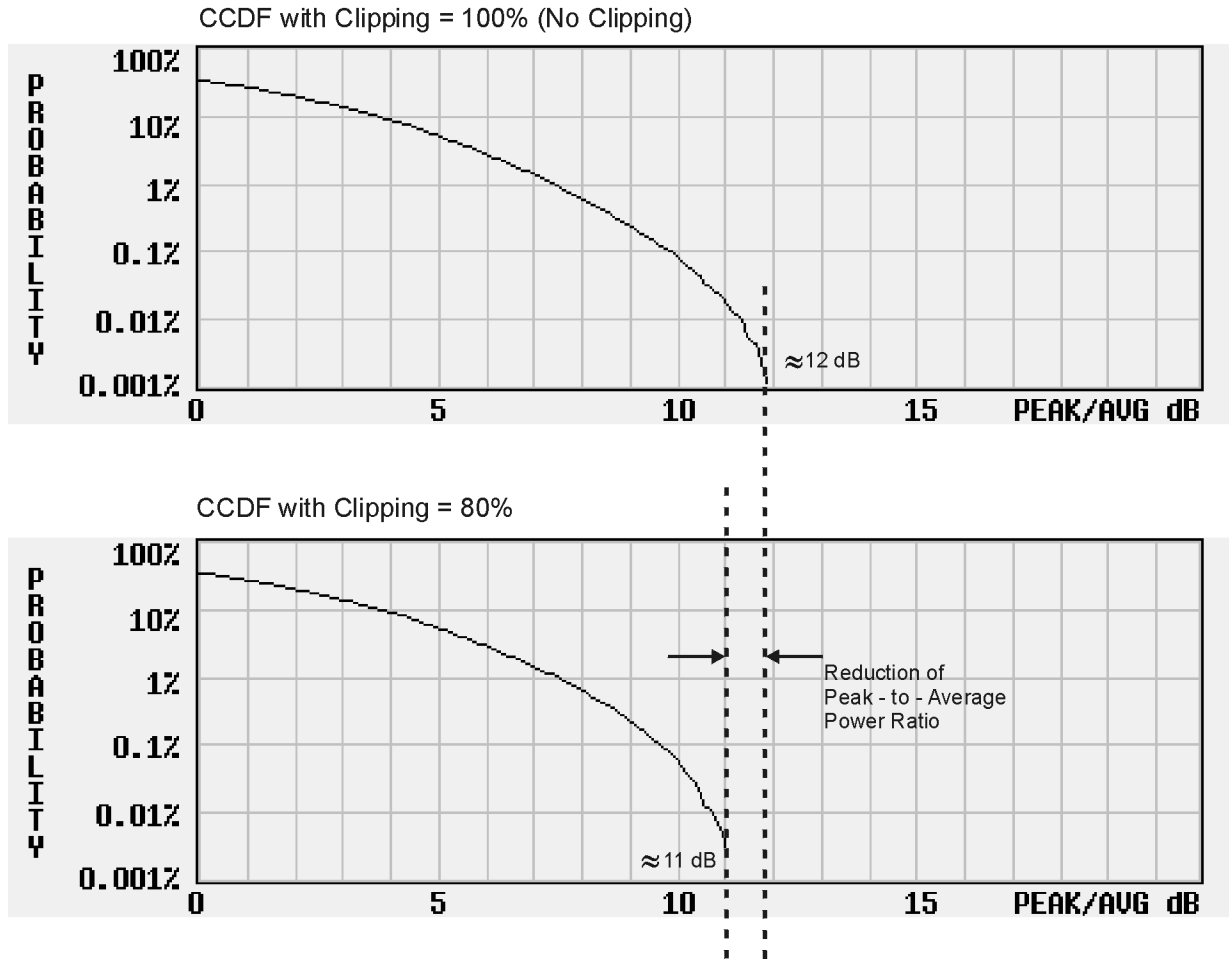
Figure 4-6 Rectangular Clipping



pk751b

Figure 4-7 Reduction of Peak-to-Average Power

Complementary Cumulative Distribution



Pk734b

FIR Filtering Options

The ESG signal generator allows you to choose whether clipping occurs prior to, or after, FIR filtering. Because clipped waveforms have abrupt discontinuities which can generate noise, you can select *pre*-FIR filter clipping. The FIR filter smooths any discontinuities in the clipped waveform and prevents noise. If desired, however, you can also select *post*-FIR filter clipping.

5 Remote Programming

This chapter describes CDMA2000 subsystem SCPI commands. The descriptions include syntax requirements, ranges, restrictions, query responses, and status after a *RST.

CDMA2000 Subsystem SCPI Command Reference

Use the following commands to remotely set the controls and parameters associated with the cdma2000 communications standard. These commands are only for signal generators with both Options UND and 101.

Apply Waveform

```
[ :SOURce ] :RADio :CDMA2000 :ARB :LINK :FORWard :SETup :TABLe :APPLy
```

```
[ :SOURce ] :RADio :CDMA2000 :ARB :LINK :REVerse :SETup :TABLe :APPLy
```

Execute this command to generate a cdma2000 signal based on the current value in the cdma2000 channel setup table editor.

ARB Reference Internal External

```
[ :SOURce ] :RADio :ARB :CLOCK :REFerence [ :SOURce ] INTernal | EXTernal
```

```
[ :SOURce ] :RADio :ARB :CLOCK :REFerence [ :SOURce ] ?
```

Execute this command to select either an internal or external reference for the waveform clock. If external is selected, the external frequency *must* be entered (see the Reference Frequency command) and the signal must be applied to the BASEBAND GEN REF IN connector.

*RST Value: Internal

cdma2000 Link Setup

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup S1Pilot|S3DPilot|S3MPilot|  
S19Chan|S3D9chan|S3M9chan|MCARrier| "<file name>"
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup?
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:  
SETup S1Pilot|S3Pilot|S15Chan|S35Chan|S18Cha| "<file name>"
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?
```

Execute this command to select a previously defined channel configuration for the cdma2000 forward or reverse links. You can select a predefined channel setup, or select a stored custom cdma2000 state. The command is also used to activate multicarrier mode (see also [“Multicarrier, Select Setup”](#) on page 5-13).

Forward link setup selections:

- S1Pilot - selects a spread rate 1, pilot-channel setup
- S3DPilot - selects a spread rate 3, direct spread, pilot-channel setup
- S3MPilot - selects a spread rate 3, multicarrier spread, pilot-channel setup
- S19Chan - selects a spread rate 1, 9-channel setup
- S3D9Chan - selects a spread rate 3, direct spread, 9-channel setup
- S3M9Chan - selects a spread rate 3, multicarrier spread, 9-channel setup
- MCARrier - activates multicarrier mode
- "<file name>" - selects a stored custom cdma2000 state

Reverse link setup selections:

- S1Pilot - selects a spread rate 1, pilot-channel setup
- S3Pilot - selects a spread rate 3, pilot-channel setup
- S15Chan - selects a spread rate 1, 5-channel setup
- S35Chan - selects a spread rate 3, 5-channel setup
- S18Chan - selects a spread rate 1, 8-channel setup
- "<file name>" - selects a stored custom cdma2000 state

*RST Value: spread rate 1, 9-channel, forward link setup (S19Chan)

cdma2000 State, On/Off

```
[ :SOURce ]:RADio:CDMA2000:ARB[ :STATe ] ON|OFF|1|0
```

```
[ :SOURce ]:RADio:CDMA2000:ARB[ :STATe ]?
```

Execute this command to enable or disable the cdma2000 baseband signal. The choices are ON (1) or OFF (0). Executing the command `[:SOURce]:RADio:CDMA2000:ARB[:STATe] ON` sets up the internal hardware to generate the currently selected cdma2000 signal selection. The CDMA2K and I/Q annunciators are turned on in the display. Although the digital modulation is enabled with this softkey, the enabled modulation is not present on RF carrier until you have activated the modulation by executing the following command: `OUTPut:MODulation[:STATe] ON`.

Executing the command `[:SOURce]:RADio:CDMA2000:ARB[:STATe] ON` activates the I/Q state and sets the I/Q source to internal. You can override these selections in the I/Q menu.

*RST Value: Off

Channel Setup

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE:CHANnel INIT|APPend|  
<chan_num>,<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,  
RANDom|<data_val>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE:  
CHANnel? <chan_num>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:  
CHANnel  
INIT|APPend|<chan_num>,<chan_type>,<data_rate>,<power>,<walsh>,<pn_offset>,<data_val>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:  
CHANnel? <chan_num>
```

Execute this command to define the channel parameters of the cdma2000 signal. These parameters include:

- **INIT|APPend** - to set up or insert channels
 - INIT** - to clear the current table and create channel 1 using the parameters below
 - APPend** - to insert the next channel with the parameters below
 - <chan_num>** - to modify an existing channel
- **<chan_type>** - the channel type
 - PAGing** - a paging channel
 - PILot** - a pilot channel
 - SYNC** - a sync channel
 - TRAFfic** - a traffic channel
 - S1TRAffic** - a supplemental1 traffic channel
 - S2TRAffic** - a supplemental2 traffic channel
- **<config>** - radio configuration, *RST value: 6 for Forward, 5 for Reverse
- **<data_rate>** - the data rate in Bps, *RST value: 9600 Bps
- **<walsh_code>** - the walsh code assigned to the channel (0 to 127 for spread rate 1 or 0 to 255 for spread rate 3), *RST value: 0
- **<power>** - the channel power in dB (-40 to 0 dB), *RST value: 0.00 dB
- **<pn_offset>** - the PN offset value (0 to 511), *RST value: 0
- **RANDom|<data_val>** - the transmitted data
 - RANDom** - random data
 - <data_val>** - user-defined data (0 to 255)

Clipping Level, |I+jQ|

```
[ :SOURCE]:RADio:CDMA2000:ARB:CLIPping[:IJQ] <10-100%>  
[:SOURCE]:RADio:CDMA2000:ARB:CLIPping[:IJQ]?
```

Execute this command to clip (limit) the modulation level of the combined I and Q waveform to a percentage of full scale. A level of 100.0% equates to no clipping.

*RST Value: 100.0%

Clipping Level, |I|

```
[ :SOURCE]:RADio:CDMA2000:ARB:CLIPping:I <10-100%>  
[:SOURCE]:RADio:CDMA2000:ARB:CLIPping:I?
```

Execute this command to clip (limit) the modulation level of the waveform's I component to a percentage of full scale. A level of 100.0% equates to no clipping.

*RST Value: 100.0%

Clipping Level, |Q|

```
[ :SOURCE]:RADio:CDMA2000:ARB:CLIPping:Q <10-100%>  
[:SOURCE]:RADio:CDMA2000:ARB:CLIPping:Q?
```

Execute this command to clip (limit) the modulation level of the waveform's Q component to a percentage of full scale. A level of 100.0% equates to no clipping.

*RST Value: 100.0%

Clipping, Pre/Post FIR Filter

```
[ :SOURCE]:RADio:CDMA2000:ARB:CLIPping:POSition PRE|POST  
[:SOURCE]:RADio:CDMA2000:ARB:CLIPping:POSition?
```

Execute this command to select whether you want the waveform to be clipped before (PRE) or after (POST) FIR filtering.

*RST Value: PRE

Clipping, Type

```
[ :SOURCE]:RADio:CDMA2000:ARB:CLIPping:TYPE IJQ|IORQ  
[:SOURCE]:RADio:CDMA2000:ARB:CLIPping:TYPE?
```

Execute this command to select either IJQ or IORQ as the clipping type. If you select IJQ, the combined I and Q waveform will be clipped (*circular* clipping). If you select IORQ, the I and Q components of the waveform are clipped independently (*rectangular* clipping). In this case, you can clip I and Q to different levels.

*RST Value: IJQ

Code Domain Power

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:  
TABLE:PADJust EQUal|SCALE
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:  
TABLE:PADJust EQUal|SCALE
```

Execute this command to adjust the code domain power (the relative power in each of the channels) to either Equal Powers or Scale to 0 dB.

EQUal|SCALE - the relative power

EQUal - sets all channels to equal power, and the total power to 0 dB.

SCALE - scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Custom cdma2000 State, Store

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:STORe "<file name>"
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:STORe "<file name>"
```

Execute this command to store the current custom cdma2000 state into a designated file name. Afterward, you can recall this custom state from the signal generator memory by executing the following commands.

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup "<file name>"
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup "<file name>"
```

Along with the contents of the cdma2000 channel table editor (channel types, Walsh code, power levels, PN offset, and data), this softkey stores the following instrument state information to the memory catalog:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- I/Q mapping
- link
- spread type
- spread rate
- ARB reconstruction filter
- ARB reference clock source (internal or external)
- ARB reference clock frequency
- clipping
- multicarrier spacing
- radio configuration

External Trigger Delay State

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DElay:  
STATe ON|OFF|1|0
```

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DElay:STATe?
```

Execute this command to set the operating state for the external trigger delay. The choices are On or Off.

*RST Value: Off

External Trigger Delay Time

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DElay <value>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DElay?
```

Execute this command to set the time for the external trigger delay. The range of values allowed for the variable <value> is 2.000 microseconds through 3600 seconds.

*RST Value: 2.000 msec

External Trigger Polarity

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:  
SLOPe POSitive|NEGative
```

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

Execute this command to set the polarity of the external trigger. The choices are Positive or Negative.

*RST Value: Negative

Filter Alpha

```
[ :SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa <value>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa?
```

Execute this command to change the Nyquist or root Nyquist filter alpha value. The acceptable range for the variable <value> is 0.000 through 1.000.

This command is effective only *after* choosing a Root Nyquist or Nyquist filter. It does not have an effect on other types of filters.

*RST Value: 0.500

Filter BbT

```
[ :SOURce ]:RADio:CDMA2000:ARB:FILTer:BBT <value>
```

```
[ :SOURce ]:RADio:CDMA2000:ARB:FILTer:BBT?
```

Execute this command to change the bandwidth-multiplied-by-bit-time (BbT) filter parameter. The acceptable range for the variable <value> is 0.000 through 1.000.

This command is effective only *after* choosing a Gaussian filter. It does not have an effect on other types of filters.

*RST Value: 0.500

Filter Optimization

```
[ :SOURce ]:RADio:CDMA2000:ARB:FILTer:CHANnel EVM|ACP
```

```
[ :SOURce ]:RADio:CDMA2000:ARB:FILTer:CHANnel?
```

Execute this command to optimize the filter for minimized error vector magnitude (select EVM) or for minimized adjacent channel power (select ACP). The EVM selection provides the most ideal passband. The ACP selection improves stopband rejection.

*RST Value: EVM

Filter Selection

```
[ :SOURCE]:RADIO:CDMA2000:ARB:FILTer RNYQuist|NYQuist|GAUSSian|RECTangle|  
WCDMa|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|IS2000SR3DS|AC4Fm| "<file name>"  
  
[ :SOURCE]:RADIO:CDMA2000:ARB:FILTer?
```

Execute this command to select the pre-modulation filter type. The choices are:

- RNYQuist - root Nyquist filter
- NYQuist - Nyquist filter
- GAUSSian - Gaussian filter
- RECTangle - Rectangle filter
- WCDMA - 0.22 Nyquist filter optimized for ACP
- IS95 - Standard IS-95 filter
- IS95_MOD - a modified version of an IS-95 filter which meets the IS-95 error function for improved adjacent channel performance.
- IS95_EQ - a modified version of an IS-95 filter with an equalizer which provides base station phase equalization for the transmit signal path.
- IS95_MOD_EQ - a modified version of an IS-95 filter which meets the IS-95 error function for improved adjacent channel performance with an equalizer which provides base station phase equalization for the transmit signal path.
- IS2000SR3DS - a modified IS-2000 spreading rate 3 direct spread filter
- AC4Fm - APCO 25 specified C4FM filter
- "<file name>" - any filter file that you have either created externally and downloaded into memory, or that you have created internally in the Define User FIR menu and then subsequently stored.

*RST Value: IS-95 Modified with Equalization

Gate Active

```
[ :SOURCE]:RADIO:CDMA2000:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH  
  
[ :SOURCE]:RADIO:CDMA2000:ARB:TRIGger:TYPE:GATE:ACTive?
```

Execute this command to toggle the polarity of the “through” or active state of a gated trigger signal. The choices are low or high. Gate active low will output the signal while the gate is low at the PATTERN TRIG IN connector. Gate active high has the opposite effect, outputting the signal while the signal level at the PATTERN TRIG IN connector is in a high state.

*RST Value: N/A

I/Q Mapping

```
[ :SOURce]:RADio:CDMA2000:ARB:IQMap NORMal|INVert|INVerted
```

```
[ :SOURce]:RADio:CDMA2000:ARB:IQMap?
```

Execute this command to select whether the I/Q outputs will be normal or inverted.

*RST Value: Normal

Link Direction

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK FORWard|REVerse
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK?
```

Execute this command to select the cdma2000 (revision 8) forward or reverse link channel setup. Forward link is for base to mobile. Reverse link is for mobile to base. Note that changing the link will result in the setup changing to a setup for the current link (see “[cdma2000 Link Setup](#)” on page 5-3).

*RST Value: Forward

Multicarrier, Define

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:  
TABLE INIT|APPend|<car_num>,S1Pilot|S3DPilot|S3MPilot|S19Chan|S3D9chan|  
S3M9chan|"<file name>",<freq_offset>,<power>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:  
TABLE? <car_num>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:TABLE:  
NCARriers?
```

This command defines the multicarrier cdma2000 waveform. Use `INIT` to clear the table editor and define the parameters for the first carrier. Use `APPEND` to add up to four new carriers.

- `<car_num>` - specifies the carrier number to modify
- `S1Pilot` - selects a spread rate 1, pilot-channel setup
- `S3DPilot` - selects a spread rate 3, direct spread, pilot-channel setup
- `S3MPilot` - selects a spread rate 3, multicarrier, pilot-channel setup
- `S19Chan` - selects a spread rate 1, 9-channel setup
- `S3D9chan` - selects a spread rate 3, direct spread, 9-channel setup
- `S3M9chan` - selects a spread rate 3, multicarrier, 9-channel setup
- `"<file name>"` - a custom multicarrier cdma2000 waveform stored in the signal generator's memory. This value is entered only for a custom carrier.
- `<freq_offset>` - the frequency offset in hertz.
- `<power>` - the power level in dB

Multicarrier, Select Setup

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:  
MCArrier CAR2|CAR3|CAR4| "<file name>"
```

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCArrier?
```

This command defines the type of multicarrier cdma2000 setup. The choices include:

CAR2 - a standard 2-carrier setup with the following settings:

Carrier 1: spread rate 3, direct spread, 9 channel; -2.5 MHz frequency offset; 0 dB power

Carrier 2: spread rate 3, direct spread, 9 channel; 2.5 MHz frequency offset; 0 dB power

CAR3 - a standard 3-carrier setup with the following settings:

Carrier 1: spread rate 1, 9 channel; -1.25 MHz frequency offset; 0 dB power

Carrier 2: spread rate 1, 9 channel; 0 kHz frequency offset; 0 dB power

Carrier 3: spread rate 1, 9 channel; 1.25 MHz frequency offset; 0 dB power

CAR4 - a standard 4-carrier setup with the following settings:

Carrier 1: spread rate 1, 9 channel; -1.875 MHz frequency offset; 0 dB power

Carrier 2: spread rate 1, 9 channel; -625 kHz frequency offset; 0 dB power

Carrier 3: spread rate 1, 9 channel; 625 kHz frequency offset; 0 dB power

Carrier 4: spread rate 1, 9 channel; 1.875 MHz frequency offset; 0 dB power

"<file name>" - a user-defined multicarrier cdma2000 state file stored in non-volatile memory.

*RST Value: 2 SR3 Carriers

Multicarrier Spacing

```
[ :SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCArrier:  
SPACing <1.23MHz|1.25MHz>
```

```
[ :SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCArrier:SPACing?
```

Execute this command to select the multicarrier frequency spacing. (Cellular band uses 1.23 MHz and PCS band uses 1.25 MHz.)

*RST Value: 1.25 MHz

Multicarrier, Store Custom

Stores the changes made to the cdma2000 multicarrier setup.

The following command stores the current multicarrier setup information into the memory catalog under the file name you entered:

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:  
STORE "<file name>"
```

The following instrument state information is stored into the memory catalog:

- type of carriers
- frequency offset for each carrier
- power level for each carrier

NOTE To recall these custom multicarrier settings from memory, execute this command:

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:  
MCARrier "<file name>"
```

Oversample Ratio

```
:MEMory:DATA:FIR "<file name>",osr,coefficient{,coefficient}
```

```
:MEMory:DATA:FIR? "<file name>"
```

Execute this command to set the oversampling ratio to be applied to a custom FIR filter design. The maximum combination of symbols and oversampling ratio is 1024. Because an FIR filter selected for use in cdma2000 cannot have more than 256 coefficients, select the number of symbols and the oversample ratio accordingly.

Range: 1 through 32

*RST Value: 4

Radio Configuration

```
[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:
CHANnel INIT|APPend| <chan_num>, <chan_type>, <config>,
<data_rate>, <walsh>, <power>, <pn_offset>, RANDom| <data_val>

[ :SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:
CHANnel? <chan_num>

[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:RCONfig <value>

[ :SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:RCONfig?
```

Execute this command to set the radio configuration for a new forward link (traffic, supplemental1 traffic, or supplemental2 traffic channel) or the radio configuration for the entire reverse link channel setup. Note that changing the radio configuration results in changes to the channel data rate.

*RST Value:

Forward Link: 6

Forward Link Range: 1 to 5 for Spread Rate 1, 6 to 9 for Spread Rate 3

Reverse Link: 5

Reverse Link Range: 5 or 6

Reconstruction Filter

```
[ :SOURce]:RADio:ARB:RFILter <value>|THROUGH
[ :SOURce]:RADio:ARB:RFILter?
```

Execute this command to modify the reconstruction filter. You may choose a filter with a cutoff frequency of 250.0 kHz, 2.500 MHz, 8.000 MHz or no filter (THROUGH). Acceptable values for the variable <value> are 250.0 kHz, 2.500 MHz, or 8.000 MHz.

*RST Value: 2.500 MHz

Reference Frequency

```
[ :SOURce]:RADio:ARB:CLOCK:REFERENCE:EXTERNAL:FREQUENCY <value>
[ :SOURce]:RADio:ARB:CLOCK:REFERENCE:EXTERNAL:FREQUENCY?
```

Execute this command to set the reference frequency of the external clock. It is only effective when you are using an external ARB reference applied to the BASEBAND GEN REF IN connector. The acceptable range for the variable <value> is 250.0000 kHz to 20.000000 MHz.

*RST Value: 10.000000 MHz

Retrigger Mode State

```
[ :SOURce ] :RADio :CDMA2000 :ARB :RETRigger ON | OFF | 1 | 0
```

```
[ :SOURce ] :RADio :CDMA2000 :ARB :RETRigger ?
```

Execute this command to set the operating state of the retrigger mode. The choices are On or Off.

*RST Value: On

Spread Rate

```
[ :SOURce ] :RADio :CDMA2000 :ARB :SPReading :RATE 1 | 3
```

```
[ :SOURce ] :RADio :CDMA2000 :ARB :SPReading :RATE ?
```

Execute this command to open a submenu that provides the available spread rate choices for the cdma2000 waveform. The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 3 equals a 3.6864 Mcps chip rate. Higher data rates can be achieved using spread rate 3, though offset by greater bandwidth/spectrum usage. Note that changing the spread rate will result in the setup changing to a setup for the current spread rate (see “[cdma2000 Link Setup](#)” on page 5-3).

*RST Value: SR1

Spreading Type

```
[ :SOURce ] :RADio :CDMA2000 :ARB :SPReading :TYPE DIRECT | MCARRIER
```

```
[ :SOURce ] :RADio :CDMA2000 :ARB :SPReading :TYPE ?
```

Execute this command to select the spreading type for a cdma2000 waveform. You can choose from either Direct or Multicarrier for forward link setups. Multicarrier is not available in the reverse link setup. Note that changing the spreading type will result in the setup changing to a setup for the current spreading type (see “[cdma2000 Link Setup](#)” on page 5-3).

*RST Value: Direct

Trigger Source

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] KEY | EXT | BUS
```

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] ?
```

Execute this command to set the trigger source. The choices include the front panel Trigger key, a trigger command sent over the GPIB bus, or an external trigger applied to the PATTERN TRIG IN connector.

*RST Value: External

Trigger Type

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE CONTInuous|SINGle|GATE
```

```
[ :SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE?
```

Execute this command to set the trigger type. The choices are continuous, single, gated, and when a waveform sequence is active, segment advance.

*RST Value; Continuous

User FIR Definition

```
MEMory:DATA:FIR "<file name>",osr,coefficient{,coefficient}
```

```
MEMory:DATA:FIR? "<file name>"
```

Execute this command to define User FIR filters. A maximum filter length of 1024 taps is allowed with a maximum oversampling ratio of 32. An FIR filter selected for use in CDMA, however, cannot have more than 256 taps so the number of symbols and the oversample ratio should be selected accordingly. Examples of using the FIR table editor are provided in [Chapter 2, "Using Functions."](#)

6 Programming Command Cross-Reference

This section lists the cdma2000 softkeys and 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 – CDMA2000 Softkeys

Key	SCPI Command
1.23 MHz	[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing <1.23MHz> [:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing?
1.25 MHz	[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing <1.25MHz> [:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing?
2 SR3 Carriers	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier CAR2 [:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier?
2.500 MHz	[:SOURce]:RADio:ARB:RFILter 2.5 MHz [:SOURce]:RADio:ARB:RFILter?
3 Carriers	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier CAR3 [:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier?
4 Carriers	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier CAR4 [:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup:MCARrier?
5 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup S15Chan S35Chan [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?
8.000 MHz	[:SOURce]:RADio:ARB:RFILter 8.0 MHz [:SOURce]:RADio:ARB:RFILter?
8 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup S18Chan [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?
9 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup S19Chan S3D9Chan S3M9Chan [:SOURce]:RADio:CDMA2000:ARB:LINK:FORward:SETup?
250.0 kHz	[:SOURce]:RADio:ARB:RFILter 250 kHz [:SOURce]:RADio:ARB:RFILter?

Key	SCPI Command
<p>1200 Bps 1500 Bps 1800 Bps 2700 Bps 3600 Bps 4800 Bps 7200 Bps 9600 Bps 14400 Bps 19200 Bps 28800 Bps 38400 Bps 57600 Bps 76800 Bps 115200 Bps 153600 Bps 230400 Bps 307200 Bps 460800 Bps 614400 Bps 1036800 Bps</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,RANDOM <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<data_rate>,<power>,RANDOM <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:TABLE: CHANnel? <chan_num></pre>
<p>Adjust Code Domain Power</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: PADJust EQUal SCALE [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: PADJust? [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:TABLE: PADJust EQUal SCALE [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:TABLE: PADJust?</pre>
<p>APCO 25 C4FM</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB:FILTer AC4Fm [:SOURce]:RADio:CDMA2000:ARB:FILTer?</pre>
<p>Apply Channel Setup</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE:APPLy</pre>
<p>ARB Reference Ext Int</p>	<pre>[:SOURce]:RADio:ARB:CLOCK:REFerence[:SOURce] INTernal EXTernal [:SOURce]:RADio:ARB:CLOCK:REFerence[:SOURce]?</pre>
<p>Bus</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce] BUS [:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]?</pre>
<p>CDMA2000 Off On</p>	<pre>[:SOURce]:RADio:CDMA2000:ARB[:STATE] ON OFF 1 0 [:SOURce]:RADio:CDMA2000:ARB[:STATE]?</pre>

Key	SCPI Command
CDMA2000 Select	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard: SETup S1Pilot S3DPilot S3MPilot S19Chan S3D9chan S3M9chan MCARrier "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup? [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup: MCARrier 2CAR 3CAR 4CAR "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup: MCARrier? [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse: SETup S1Pilot S3Pilot S15Chan S35Chan S18Cha "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?</pre>
Channels	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>, <data_rate>,<walsh>,<power>,<pn_offset>,RANDOM <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<data_rate>, <power>,RANDOM <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel? <chan_num></pre>
Clip I+JQ To	<pre>[:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ] <10-100%> [:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ]?</pre>
Clip I To	<pre>[:SOURce]:RADio:CDMA2000:ARB:CLIPping:I <10-100%> [:SOURce]:RADio:CDMA2000:ARB:CLIPping:I?</pre>
Clip Q To	<pre>[:SOURce]:RADio:CDMA2000:ARB:CLIPping:Q <10-100%> [:SOURce]:RADio:CDMA2000:ARB:CLIPping:Q?</pre>
Clip At PRE POST FIR Filter	<pre>[:SOURce]:RADio:CDMA2000:ARB:CLIPping:POSition PRE POST [:SOURce]:RADio:CDMA2000:ARB:CLIPping:POSition?</pre>
Clipping Type I+JQ I , Q 	<pre>[:SOURce]:RADio:CDMA2000:ARB:CLIPping:TYPE IJQ IORQ [:SOURce]:RADio:CDMA2000:ARB:CLIPping:TYPE?</pre>
Continuous	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE CONT [:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE?</pre>

Key	SCPI Command
Custom CDMA2000 State	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard: SETup "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup? [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse: SETup "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?</pre>
Custom CDMA2000 Carrier	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup: MCArrier "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCArrier?</pre>
Custom CDMA2000 Multicarrier	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup: MCArrier "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCArrier?</pre>
Data Rate	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>, <data_rate>,<walsh>,<power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<data_rate>, <power>,RANDom <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel? <chan_num></pre>
Dedicated Control	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel INIT APPend <chan_num>,<DControl>,<data_rate>, <power>,RANDom <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel? <chan_num></pre>
Define User FIR	<pre>MEMory:DATA:FIR "<file name>",<osr>, coefficient{,<coefficient>} MEMory:DATA:FIR? "<file name>"</pre>

Key	SCPI Command
Edit Channel Setup	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETUp:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETUp:TABLE: CHANnel? <chan_num> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETUp:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<data_rate>,<power>,<RANDOM> <data_val> [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETUp:TABLE: CHANnel? <chan_num></pre>
Equal Powers	<pre>[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETUp:TABLE: PADJust EQUal [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETUp:TABLE: PADJust EQUal</pre>
Ext	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce] EXT [:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]?</pre>
Ext Delay Off On	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: DELay:STATe ON OFF 1 0 [:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: DELay:STATe?</pre>
Ext Delay Time	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: DELay <value> [:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: DELay?</pre>
Ext Polarity Neg Pos	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: SLOPe POSitive NEGative [:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal: SLOPe?</pre>
Filter Alpha	<pre>[:SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa <value> [:SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa?</pre>
Filter Bbt	<pre>[:SOURce]:RADio:CDMA2000:ARB:FILTer:BBT <value> [:SOURce]:RADio:CDMA2000:ARB:FILTer:BBT?</pre>
Gate Active	<pre>[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:GATE: ACTive LOW HIGH [:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:GATE:ACTive?</pre>

Key	SCPI Command
Gated	[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE GATE [:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE?
Gaussian	[:SOURce]:RADio:CDMA2000:ARB:FILTer GAUSSian [:SOURce]:RADio:CDMA2000:ARB:FILTer?
I/Q Mapping Normal Invert	[:SOURce]:RADio:CDMA2000:ARB:IQMap NORMAL INVert INVerted [:SOURce]:RADio:CDMA2000:ARB:IQMap?
IS-2000 SR3 DS	[:SOURce]:RADio:CDMA2000:ARB:FILTer IS2000SR3DS [:SOURce]:RADio:CDMA2000:ARB:FILTer?
IS-95	[:SOURce]:RADio:CDMA2000:ARB:FILTer IS95 [:SOURce]:RADio:CDMA2000:ARB:FILTer?
IS-95 Mod	[:SOURce]:RADio:CDMA2000:ARB:FILTer IS95_MOD [:SOURce]:RADio:CDMA2000:ARB:FILTer?
IS-95 Mod w/EQ	[:SOURce]:RADio:CDMA2000:ARB:FILTer IS95_MOD_EQ [:SOURce]:RADio:CDMA2000:ARB:FILTer?
IS-95 w/EQ	[:SOURce]:RADio:CDMA2000:ARB:FILTer IS95_EQ [:SOURce]:RADio:CDMA2000:ARB:FILTer?
Link Forward Reverse	[:SOURce]:RADio:CDMA2000:ARB:LINK FORWard REVerse [:SOURce]:RADio:CDMA2000:ARB:LINK?
Mcarrier Spacing	[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier: SPACing <1.23MHz 1.25MHz> [:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier: SPACing?
Multicarrier Define	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier: TABLe INIT APPend <car_num>,S1Pilot S3DPilot S3MPilot S19Chan S3D9chan S3M9chan "<file name>",<freq_offset>, <power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier: TABLe? <car_num>
Nyquist	[:SOURce]:RADio:CDMA2000:ARB:FILTer NYQuist [:SOURce]:RADio:CDMA2000:ARB:FILTer?
Optimize FIR For EVM ACP	[:SOURce]:RADio:CDMA2000:ARB:FILTer:CHANnel EVM ACP [:SOURce]:RADio:CDMA2000:ARB:FILTer:CHANnel?

Key	SCPI Command
Oversample Ratio	<pre>:MEMory:DATA:FIR "<file name>",osr,coefficient {,coefficient} :MEMory:DATA:FIR? "<file name>"</pre>
Paging	<pre>[:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel <chan_num>,<PAGing>,<config>,<data_rate>,<walsh>, <power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num></pre>
Pilot	<pre>[:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard: SETup S1Pilot S3DPilot S3MPilot [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup? :SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse: SETup S1Pilot S3Pilot [:SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse:SETup? [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel <chan_num>,<PIlot>,<config>,<data_rate>,<walsh>, <power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num> [:SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel<chan_num>,<PIlot>,<data_rate>,<power>,RANDom <data_val> [:SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse:SETup:TABLE: CHANnel? <chan_num></pre>
Power	<pre>[:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>, <data_rate>,<walsh>,<power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num></pre>
Radio Config	<pre>[:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel INIT APPend <chan_num>,<chan_type>,<config>, <data_rate>,<walsh>,<power>,<pn_offset>,RANDom <data_val> [:SOURce]:RADIo:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num> [:SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse:RCONfig <value> [:SOURce]:RADIo:CDMA2000:ARB:LINK:REVerse:RCONfig?</pre>

Key	SCPI Command
Reconstruction Filter	[:SOURCE]:RADio:ARB:RFILter 250 kHz 2.5 MHz 8.0 MHz THROUGH [:SOURCE]:RADio:ARB:RFILter?
Rectangle	[:SOURCE]:RADio:CDMA2000:ARB:FILTer RECTangle [:SOURCE]:RADio:CDMA2000:ARB:FILTer?
Reference Frequency	[:SOURCE]:RADio:ARB:CLOCK:REFerence:EXTernal:FREQuency <value> [:SOURCE]:RADio:ARB:CLOCK:REFerence:EXTernal:FREQuency?
Retrigger Mode Off On	[:SOURCE]:RADio:CDMA2000:ARB:RETRigger ON OFF 1 0 [:SOURCE]:RADio:CDMA2000:ARB:RETRigger?
Root Nyquist	[:SOURCE]:RADio:CDMA2000:ARB:FILTer RNYQuist [:SOURCE]:RADio:CDMA2000:ARB:FILTer?
Scale to OdB	[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:PADJust SCALE [:SOURCE]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:TABLE:PADJust?
Select	[:SOURCE]:RADio:CDMA2000:ARB:FILTer RNYQuist NYQuist GAUSSian RECTangle WCDMA IS95 IS95_EQ IS95_MOD IS95_MOD_EQ IS2000SR3DS AC4Fm "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:FILTer?
Select File	[:SOURCE]:RADio:CDMA2000:ARB:FILTer "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:FILTer? [:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup? [:SOURCE]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup?
Single	[:SOURCE]:RADio:CDMA2000:ARB:TRIGger:TYPE SINGLE [:SOURCE]:RADio:CDMA2000:ARB:TRIGger:TYPE?
Spread Rate	[:SOURCE]:RADio:CDMA2000:ARB:SPReading:RATE 1 3 [:SOURCE]:RADio:CDMA2000:ARB:SPReading:RATE?
Spread Rate 1	[:SOURCE]:RADio:CDMA2000:ARB:SPReading:RATE 1 [:SOURCE]:RADio:CDMA2000:ARB:SPReading:RATE?

Key	SCPI Command
Spread Rate 3	[:SOURce]:RADio:CDMA2000:ARB:SPReading:RATE 3 [:SOURce]:RADio:CDMA2000:ARB:SPReading:RATE?
Spreading Type	[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE DIRect MCARrier [:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE?
SR1 9 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S19Chan,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
SR1 Pilot	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S1Pilot,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
SR3 Direct 9 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S3D9chan,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
SR3 Direct Pilot	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S3DPilot,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
SR3 Mcarrier Pilot	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S3MPilot,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
SR3 Mcarrier 9 Channel	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE INIT APPend <car_num>,S3M9chan,<freq_offset>,<power> [:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: TABLE? <car_num>
Store Custom CDMA2000 State	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup: STORe "<file name>" [:SOURce]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup: STORe "<file name>"
Store Custom Multicarrier	[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:MCARrier: STORe "<file name>"

Key	SCPI Command
Store to File	<pre>[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWard:SETup: STORE "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:STORE? [:SOURCE]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup: STORE "<file name>" [:SOURCE]:RADio:CDMA2000:ARB:LINK:REVERSE:SETup:STORE? MEMory:DATA:FIR "<file name>" MEMory:DATA:FIR? "<file name>"</pre>
Sync	<pre>[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel <chan_num>,<SYNC>,<config>,<data_rate>,<walsh>, <power>,<pn_offset>,RANDOM <data_val> [:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE: CHANnel? <chan_num></pre>
Through	<pre>[:SOURCE]:RADio:ARB:RFILter THROUGH [:SOURCE]:RADio:ARB:RFILter?</pre>
Trigger	<pre>[:SOURCE]:RADio:CDMA2000:ARB:TRIGger:TYPE CONT SINGLE GATE [:SOURCE]:RADio:CDMA2000:ARB:TRIGger:TYPE?</pre>
Trigger Key	<pre>[:SOURCE]:RADio:CDMA2000:ARB:TRIGger[:SOURCE] KEY [:SOURCE]:RADio:CDMA2000:ARB:TRIGger[:SOURCE]?</pre>
Trigger Source	<pre>[:SOURCE]:RADio:CDMA2000:ARB:TRIGger[:SOURCE] KEY EXT BUS [:SOURCE]:RADio:CDMA2000:ARB:TRIGger[:SOURCE]?</pre>
WCDMA	<pre>[:SOURCE]:RADio:CDMA2000:ARB:FILTer WCDMA [:SOURCE]:RADio:CDMA2000:ARB:FILTer?</pre>

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