User Manual

Tektronix

RSA3408A Option 25
cdma2000 Analysis Software

071-1677-00

This document supports firmware version 1.0 and above.

www.tektronix.com

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Table of Contents

List of Figures

List of Tables

Preface

This manual provides operating instructions for the RSA3408A Portable Wireless Communication Analyzers Option 25 cdma2000 analysis software.

About This Manual

This manual is composed of the following sections:

- *Getting Started* provides a product description.
- *Operating Basics* describes the measurement functions added by the option and explains how to set up the analyzer for each measurement mode.
- Appendices provide additional information about scale setting ranges.

The analyzer uses Microsoft Windows XP as the operating system. This manual does not describe common usage of Windows XP. Refer to your Windows manuals as necessary.

Related Manuals

The following documents are also available for the analyzer.

- *RSA3408A User Manual*
  (Standard accessory; Tektronix part number 071-1617-XX)
  Describes how to install the analyzer and how to work with the menus, and details the standard functions. Also shows the specifications.
- *RSA3408A Programmer Manual*
  (Standard accessory; PDF, Tektronix part number 077-0003-XX)
  Contains an alphabetical listing of the programming commands and other information related to controlling the analyzer over the GPIB interface.

PDF Manual

The programmer manual described above is a PDF document (the file size is about 5 MB). The file is stored in this directory on the analyzer hard disk:

C:\Program Files\Tektronix\wca200a\Manuals

Use the USB or LAN interface to copy the file onto your PC. Refer to the *RSA3408A User Manual* for using the interface.

Contacting Tektronix

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Service support	1-800-833-9200, select option 2*
Technical support	www.tektronix.com/support 1-800-833-9200, select option 3* 6:00 a.m. - 5:00 p.m. Pacific time

* **This phone number is toll free in North America. After office hours, please leave a voice mail message.**
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Getting Started

Getting Started

This section provides an overview of the product capabilities.

Product Description

The RSA3408A Real-Time Spectrum Analyzer Option 25 is an analysis software option that adds transmitter measurements capability for cdma2000 forward link (3GPP2 C.S0010) and reverse link (3GPP2 C.S0011) to the analyzers.

You can perform the following cdma2000 measurements:

- Modulation accuracy
- Code domain power
- Channel power
- OBW (occupied bandwidth)
- ACPR (Adjacent channel power ratio)
- Spectrum emission mask
- Gated output power (reverse link only)
- Intermodulation
- CCDF
- Pilot to code channel

In addition, the option provides pre-defined measurement limits for the ACPR, spectrum emission mask, and gated output power measurements. Using these measurement limits, you can easily check that the input signal meets the specification.

Operating Basics

Functional Overview

This section provides an overview of the Option 25 measurement functions.

Figure 2-1 shows the measurement functions and how to access each measurement function from the front-panel menu key.

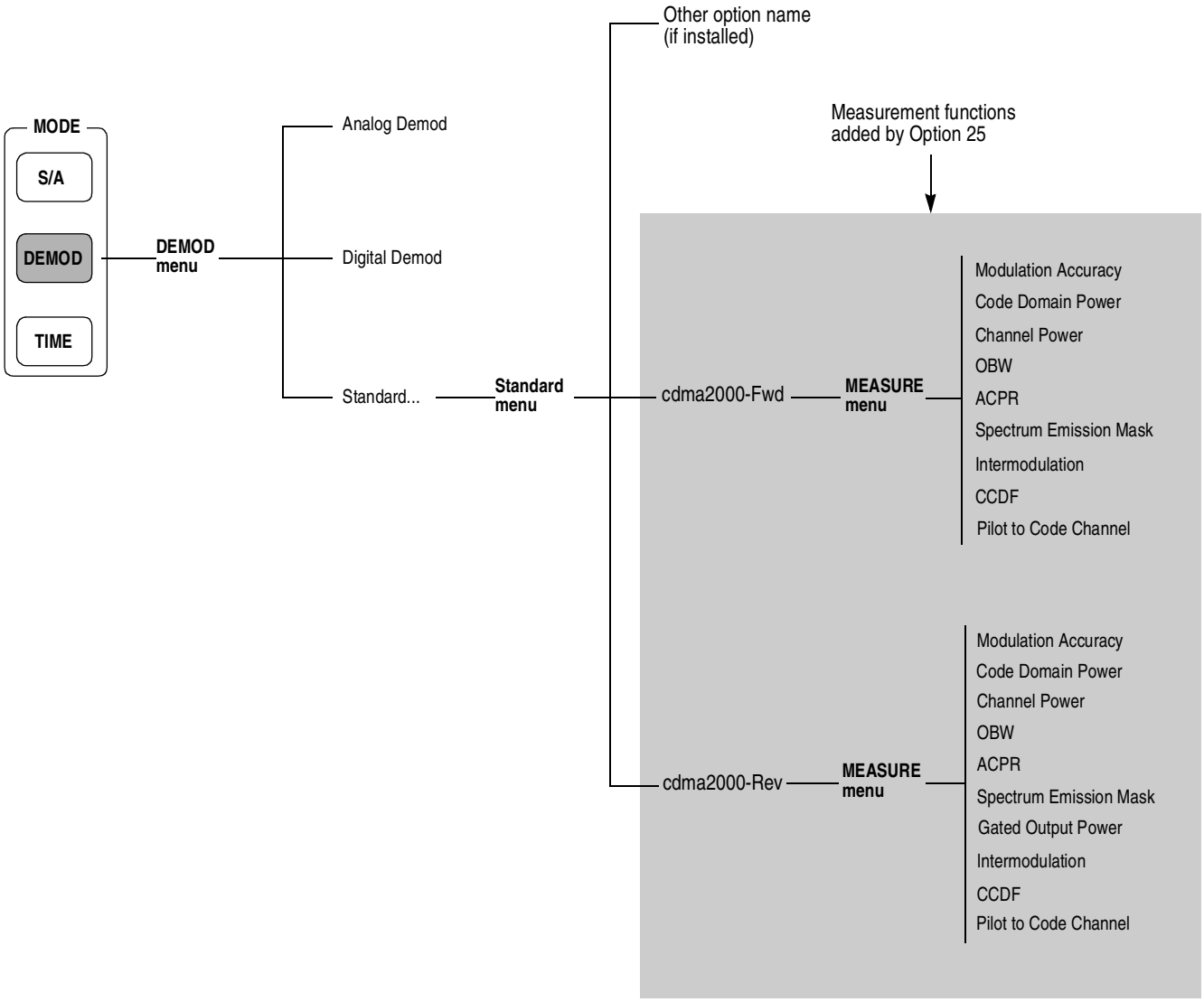

Figure 2-1: Menu diagram showing measurement functions available in Option 25

Accessing a Measurement Function

All of the measurement functions available in Option 25 can be selected from the DEMOD (demodulation) mode.

Perform the following procedure to access any of the measurement functions:

1. Press the **DEMOD** menu key to open the DEMOD menu.
2. Press the **Standard...** side key to open the Standard menu.
3. Press the **cdma2000**-**Fwd** or **cdma2000**-**Rev** side key to open the MEASURE menu for the standard.
4. Press one of the side keys to select the measurement that you want to perform. If the desired measurement is not displayed on the current MEASURE menu, press the **Go to page 2 (of 2)** side key to open the next page.
5. If needed, set frequency, span, and amplitude of the input signal.

   Refer to the *RSA3408A Real-Time Spectrum Analyzer User Manual* for information on how to set frequency, span, and amplitude.

cdma2000 Forward Link Measurements

This section describes the functions and features of the cdma2000 forward link measurements. Each measurement description contains general information about the measurement, descriptions of the measurement displays and functions available through menu selections.

The information is divided into the following subsections:

- Modulation accuracy measurement
- Code domain power measurement
- Channel power measurement
- OBW measurement
- ACPR measurement
- Spectrum emission mask measurement
- Intermodulation measurement
- CCDF measurement
- Pilot to code channel measurement

NOTE. *If you are not familiar with the operation of the analyzer, refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *before reading this section.*

Modulation Accuracy Measurement

The modulation accuracy measurement measures Rho (ratio of the correlated power to the total power), EVM (Error Vector Magnitude), magnitude error, phase error, frequency error, and origin offset. Figure 2-2 shows an example of the modulation accuracy measurement.

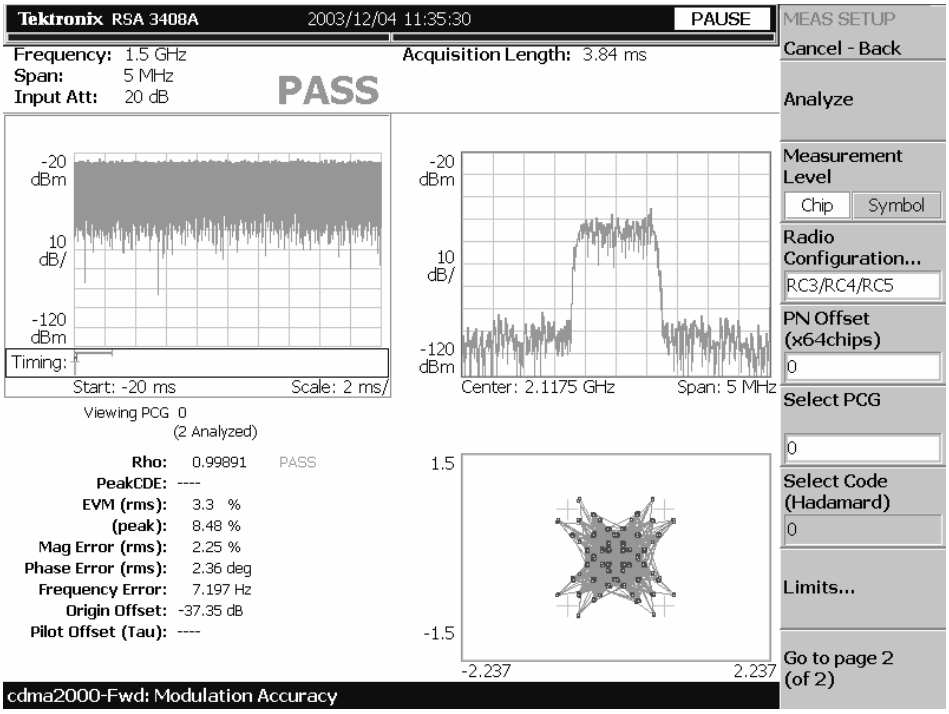

Figure 2-2: Modulation accuracy measurement

Display Elements

The following information is shown in the modulation accuracy measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, IQ power graph, and constellation.
- **Main view:** This view can contain modulation accuracy, EVM, magnitude error, phase error, and symbol table.

The display contents in each view can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-7 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Measurement Level:** Selects the measurement level for the measurement. You can select Chip (chip level) or Symbol (symbol level).
- **Radio Configuration...:** Selects the radio configuration for the measurement. You can select RC1/RC2 or RC3/RC4/RC5.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select PCG:** Sets the PCG (power control group) for the measurement.
- **Select Code:** Sets the code in the PCG for the measurement. This setting is only available when Measurement Level is set to Symbol.
- **Limits...:** Sets the pass/fail limits for the modulation accuracy measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -50 dB to 50 dB.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating EVM and other modulation accuracy results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Measurement Level is set to Symbol and Radio Configuration is set to RC3/RC4/RC5. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.
- **QOF:** Sets the Walsh code quasi-orthogonal function. The choices are 0, 1, 2, or 3. This setting is only available when Measurement Level is set to Symbol and Radio Configuration is set to RC3/RC4/RC5.

Changing the View Contents

You can change the view contents in the overview, subview, and main view using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Selects the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the measured signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **IQ Power Graph:** Displays the code domain power for each symbol. Refer to *IQ Power Graph Display* on page 2-21.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Mainview Content...:** Selects a view to display in the main view. You can select Modulation Accuracy, EVM, MagErr, PhaseErr, or Symbol Table. Refer to *Scale and Format in the Main View* on page 2-8 for more information about the views.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Scale and Format in the Main View

This subsection describes the scale settings and display format in the main view.

Modulation Accuracy Display. When you select Mainview Content from the VIEW DEFINE menu and then select Modulation Accuracy from the Mainview Content submenu, an IQ rectangular graph and the measured value for Rho, peak code domain error, rms and peak EVM, magnitude error, phase error, frequency error, IQ origin offset, and Tau are displayed (see Figure 2-3). The peak code domain error is displayed only when the Measurement Level menu item is set to Symbol, and Tau is displayed only when an external trigger signal is applied.

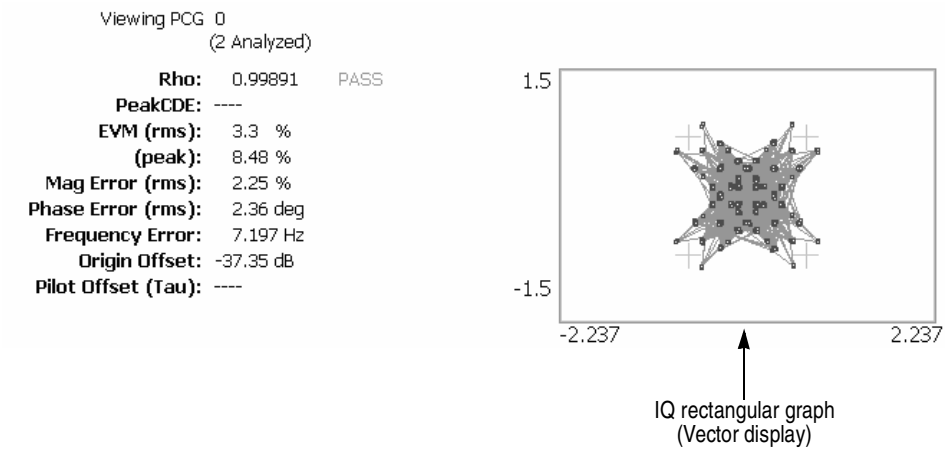

Figure 2-3: Modulation accuracy display

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Measurement Content...:** Selects vector or constellation display.

  Vector: Selects vector display. A signal represented with phase and amplitude is displayed in rectangular (I and Q) coordinates. The red point indicates the symbol position on the measured signal and the yellow trace indicates the locus of the signal between symbols.

  Constellation: Selects constellation display. It is the same as the vector display, except that only symbols of the measured signal are indicated in red, and the locus between symbols is not shown. The cross marks indicate symbol positions of an ideal signal.

NOTE. *I and Q signals are normalized to prevent the scale from changing when signal attenuation changes.*

EVM Display. When you select Mainview Content from the VIEW DEFINE menu and then select EVM from the Mainview Content submenu, changes of EVM (Error Vector Magnitude) over time are displayed for each chip or symbol (see Figure 2-4).

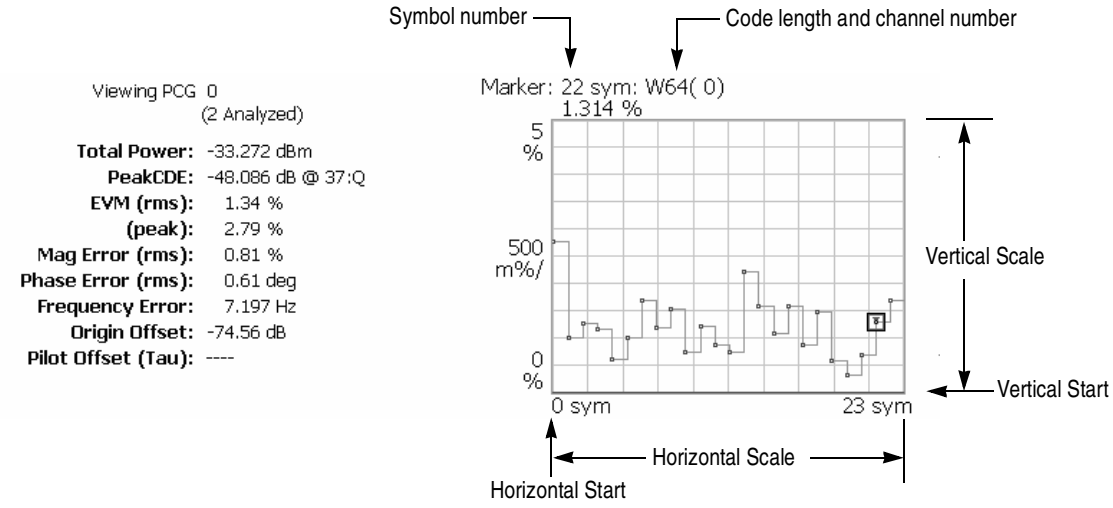

Figure 2-4: EVM display

You can set the scale of the display using the VIEW SCALE menu. Press the SCALE key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Start:** Sets the minimum (bottom) value of the vertical axis.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

MagErr Display. When you select Mainview Content from the VIEW DEFINE menu and then select MagErr from the Mainview Content submenu, changes of magnitude error over time are displayed for each chip or symbol (see Figure 2-5).

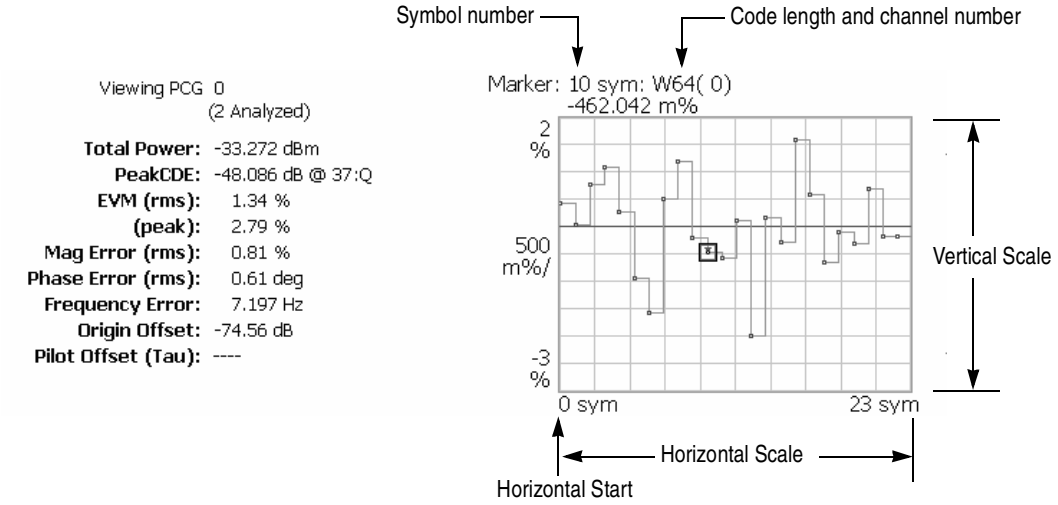

Figure 2-5: MagErr display

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Offset:** Sets the offset value of the vertical axis. You can set the value from -200% to 200%.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

PhaseErr Display. When you select Mainview Content from the VIEW DEFINE menu and then select PhaseErr from the Mainview Content submenu, changes of phase error over time are displayed for each chip or symbol (see Figure 2-6).

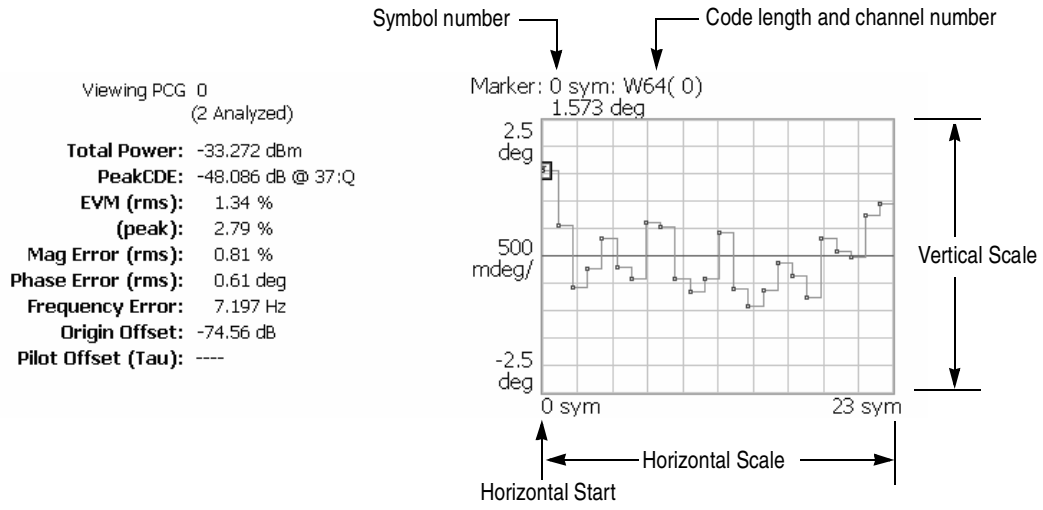

Figure 2-6: PhaseErr display

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Offset:** Sets the offset value of the vertical axis. You can set the value from -450 to 450 degrees.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

Symbol Table Display. When you select Mainview Content from the VIEW DEFINE menu and then select Symbol Table from the Mainview Content submenu, the symbol table is displayed (see Figure 2-7). This display is only available when the Measurement Level menu item is set to Symbol.

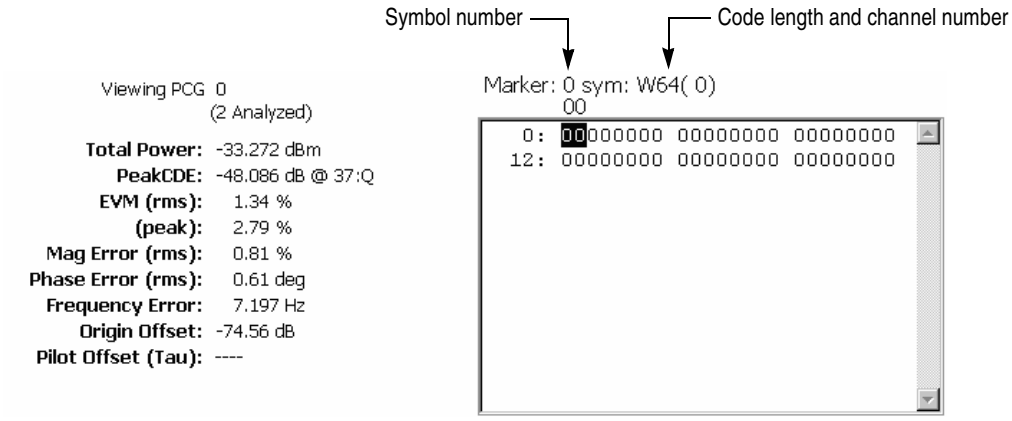

Figure 2-7: Symbol table display

You can set the radix for the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Radix...:** Sets the radix for displaying the table. You can select Hex (hexadecimal), Oct (octal), or Bin (binary).

Code Domain Power Measurement

The code domain power measurement measures the distribution of signal power across the set of code channels, normalized to the total signal power. This measurement allows you to verify that each code channel is operating at its proper level. Figure 2-8 shows an example of the code domain power measurement.

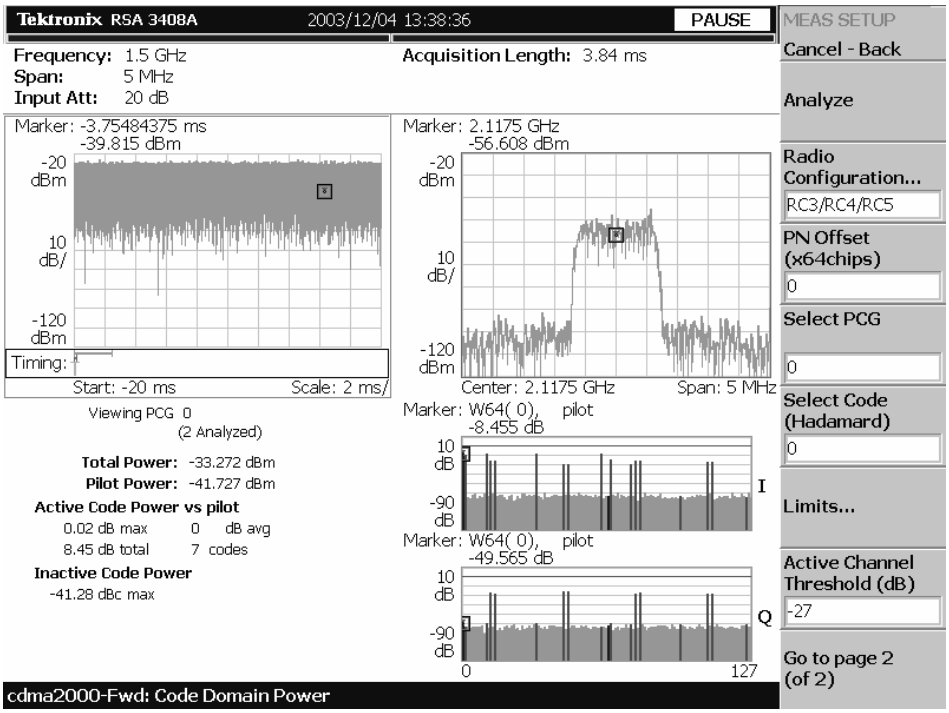

Figure 2-8: Code domain power measurement

Display Elements

The following information is shown in the code domain power measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, IQ power graph, and constellation.
- **Main view:** This view can contain code domain power, power codogram, and IQ power graph. The view also lists the following measurement results:

  Total power
  Pilot power
  Active code power versus pilot
  Active/inactive code power

The display contents in each view can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-16 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Measurement Level:** Selects the measurement level for the measurement. You can select Chip (chip level) or Symbol (symbol level). This setting is only available when Mainview Content in the VIEW DEFINE menu is set to IQ Power Graph.
- **Radio Configuration...:** Selects the radio configuration for the measurement. You can select RC1/RC2 or RC3/RC4/RC5.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select PCG:** Sets the PCG (power control groups) for the measurement.
- **Select Code:** Sets the code in the PCG for the measurement.
- **Limits...:** Sets the pass/fail limits for the code domain power measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -50 dB to 50 dB.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating code domain power results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Radio Configuration is set to RC3/RC4/RC5. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.
- **QOF:** Sets the Walsh code quasi-orthogonal function. The choices are 0, 1, 2, or 3. This setting is only available when Radio Configuration is set to RC3/RC4/RC5.

Changing the View Contents

You can change the contents in the overview, subview, and main view using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Selects the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the input signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **IQ Power Graph:** Displays the code domain power for each symbol. Refer to *IQ Power Graph Display* on page 2-21.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Mainview Content...:** Selects a view to display in the main view. You can select Code Domain Power, Power Codogram, or IQ Power Graph. Refer to *Scale and Format in the Main View* on page 2-17 for more information about the views.
- **Code Order...:** Sets the way that code channels are arranged on the display. You can select Hadamard or BitReverse.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Scale and Format in the Main View

This subsection describes the scale settings and display format in the main view.

Code Domain Power Display. When you select Mainview Content from the VIEW DEFINE menu and then select Code Domain Power from the Mainview Content submenu, the code domain power for code channels is displayed (see Figure 2-9).

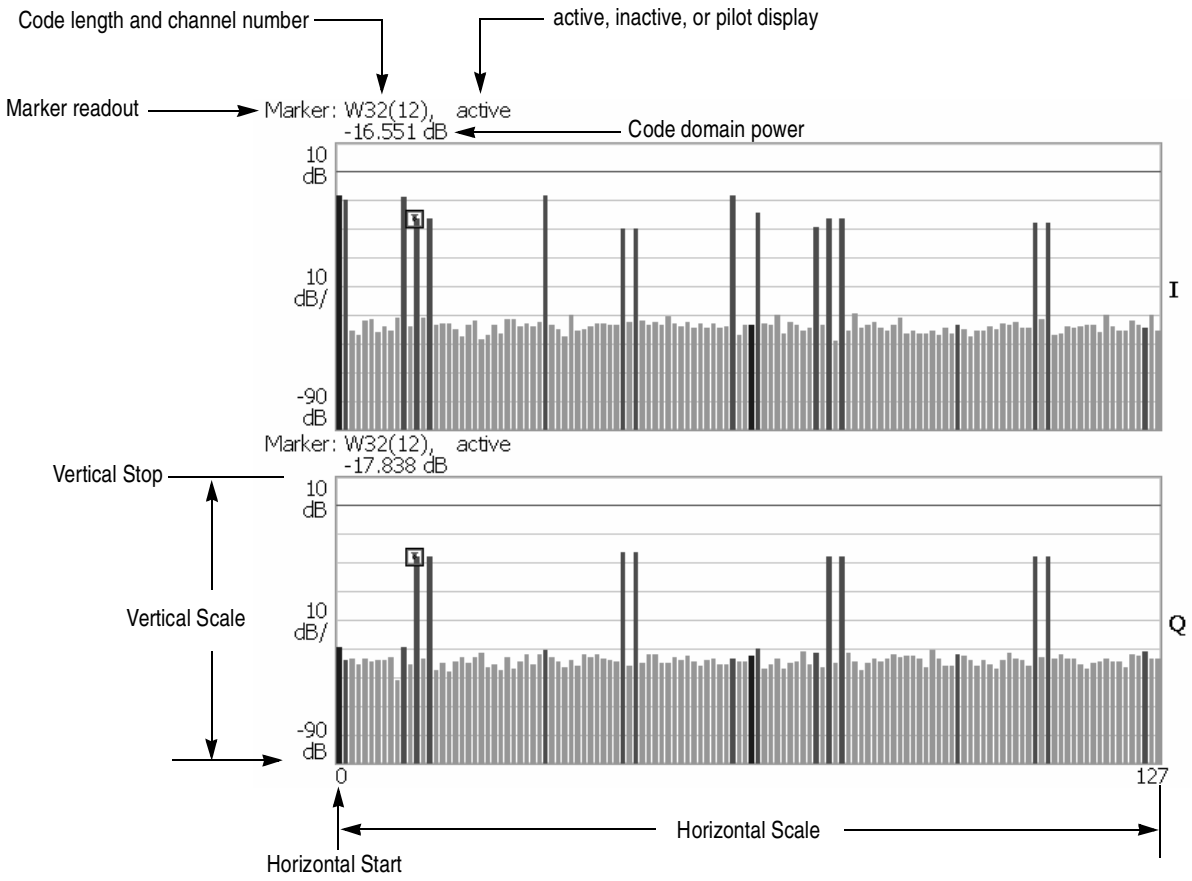

Figure 2-9: Code domain power display

In the code domain power display, the I and Q power bars are distinguished by using different colors as follows:

- Blue: pilot channel
- Red: active channel
- Yellow: inactive channel

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis. The range is dependent on the Radio Configuration setting.
- **Horizontal Start:** Sets the channel number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis. You can set the value from 100 μdB to 100 dB.
- **Vertical Stop:** Sets the maximum (top) value of the vertical axis. You can set the value from -100 dB to 100 dB.
- **Full Scale:** Sets the scale of the vertical axis to the default full-scale value.
- **Y Axis...:** Selects whether to represent the vertical (amplitude) axis with relative values or absolute values. When you select Relative, the vertical axis represents the power relative to the total power of all channels. When you select Absolute, the vertical axis represents the absolute power of each channel.
- **Graph Number:** Selects the number of graphs to be displayed in the screen. You can select 1 or 2.
- **View Data...:** Sets which channels to display when 1 is selected in the Graph Number menu item. You can select I, Q, or IandQ.

Power Codogram Display. When you select Mainview Content from the VIEW DEFINE menu and then select Power Codogram from the Mainview Content submenu, the code domain power is displayed in spectrogram (see Figure 2-10).

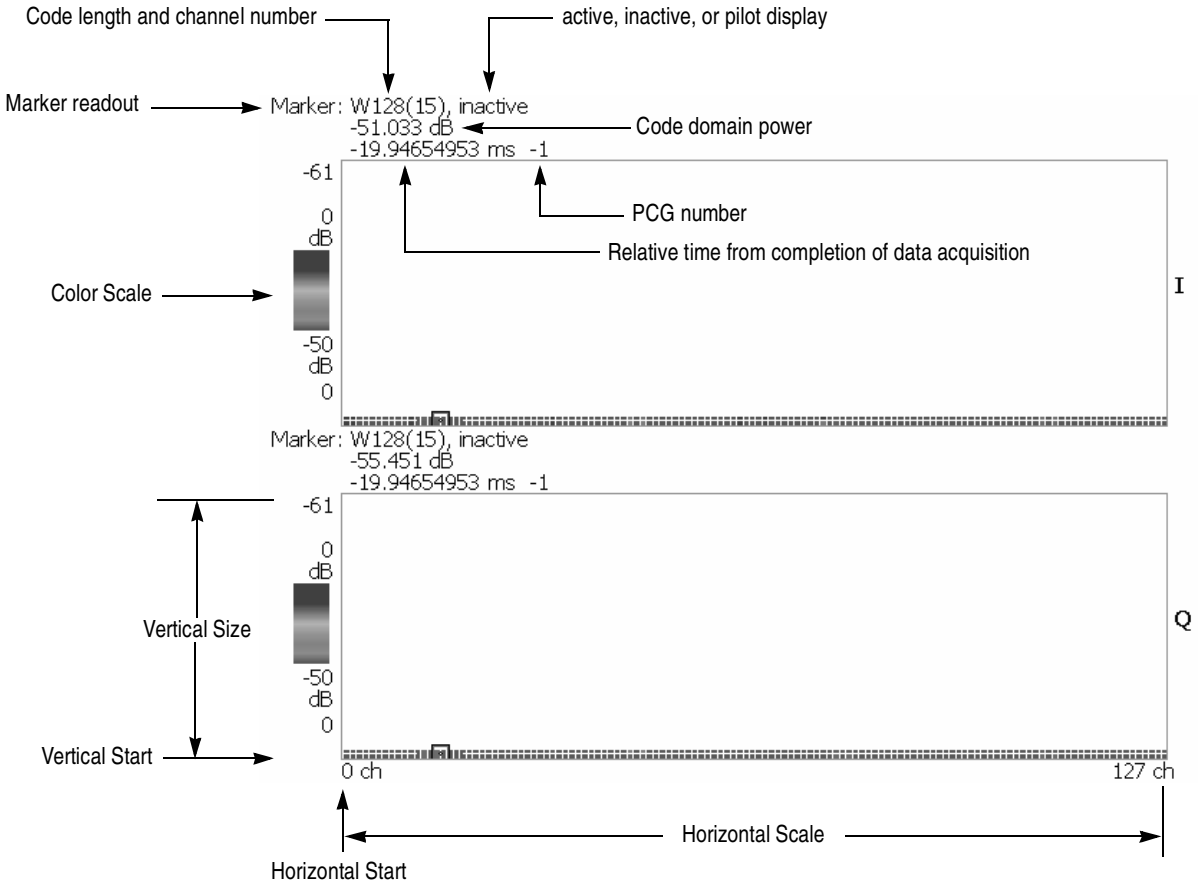

Figure 2-10: Power codogram display

You can set the scale of the display using the VIEW SCALE menu. Press the SCALE key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis. The range is dependent on the Radio Configuration setting.
- **Horizontal Start:** Sets the channel number of the first (left) value of the horizontal axis.
- **Vertical Size:** Sets the scale of the vertical axis.
- **Vertical Start:** Sets the frame value at the bottom of the vertical axis.
- **Color Scale:** Sets the scale (the value separating the minimum power value from the maximum power value) of the color axis. The choices are 5, 10, 20, and 50 dB.
- **Color Stop:** Sets the stop value of the color axis.
- **Full Scale:** Sets the maximum value of the color axis to the reference level.
- **Y Axis...:** Selects whether to represent the Y (color) axis with relative values or absolute values. When you select Relative, the Y axis represents the power relative to the total power of all channels. When you select Absolute, the Y axis represents the absolute power of each channel.
- **Graph Number:** Selects the number of graphs to be displayed in the screen. You can select 1 or 2.
- **View Data...:** Sets which channels to display when 1 is selected in the Graph Number menu item. You can select I, Q, or IandQ.

IQ Power Graph Display. When you select Mainview Content from the VIEW DEFINE menu and then select IQ Power Graph from the Mainview Content submenu, I and Q powers over time is displayed for each chip or symbol (see Figure 2-11).

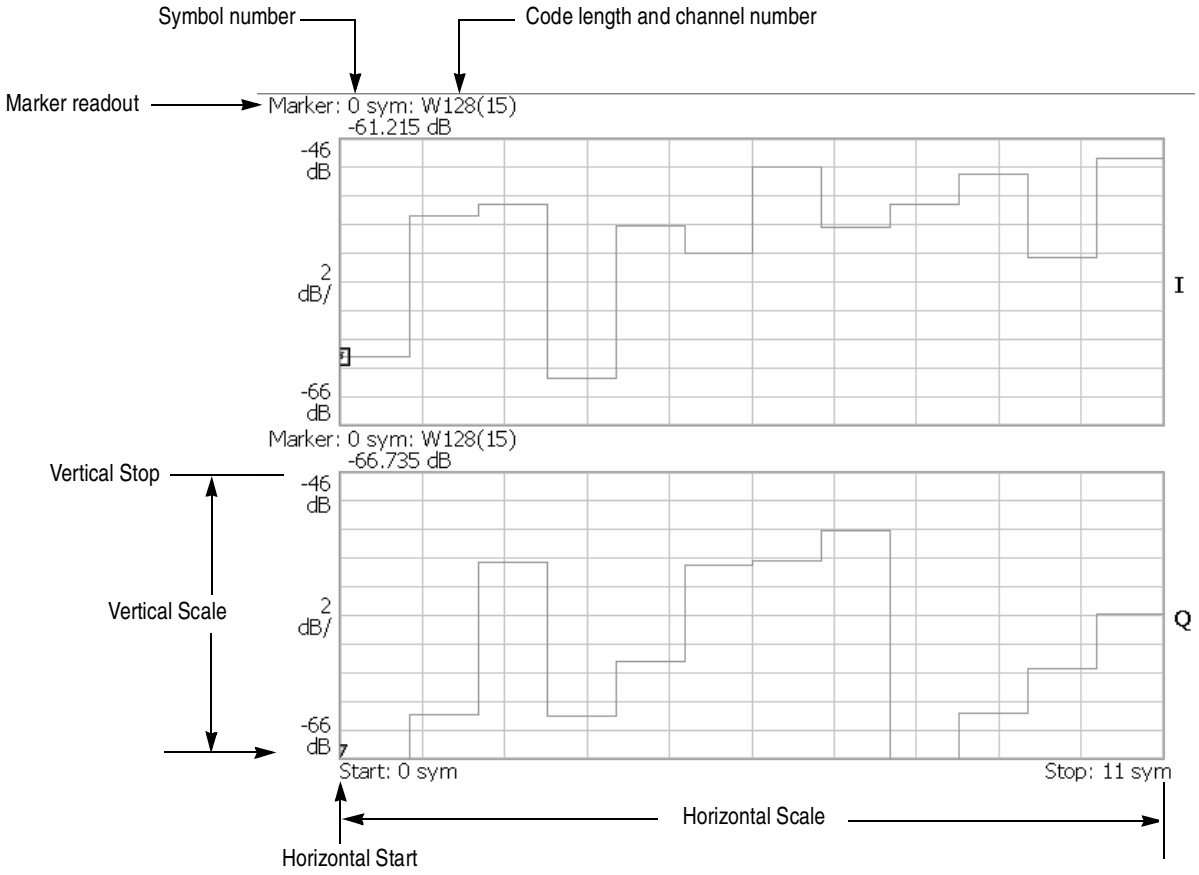

Figure 2-11: IQ power graph display

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis. You can set the value from 100 µdB to 100 dB.
- **Vertical Stop:** Sets the maximum (top) value of the vertical axis. You can set the value from -100 dB to 100 dB.
- **Full Scale:** Sets the scale of the vertical axis to the default full scale value.
- **Y Axis...:** Selects whether to represent the vertical (amplitude) axis with relative values or absolute values. When you select Relative, the vertical axis represents the power relative to the total power of all channels. When you select Absolute, the vertical axis represents the absolute power of each channel.
- **Graph Number:** Selects the number of graphs to be displayed in the screen. You can select 1 or 2.
- **View Data...:** Sets which channels to display when 1 is selected in the Graph Number menu item. You can select I, Q, or IandQ.

Channel Power Measurement

The channel power measurement measures the channel power within a specified bandwidth and the power spectral density in dBm/Hz. Figure 2-12 shows an example of the channel power measurement.

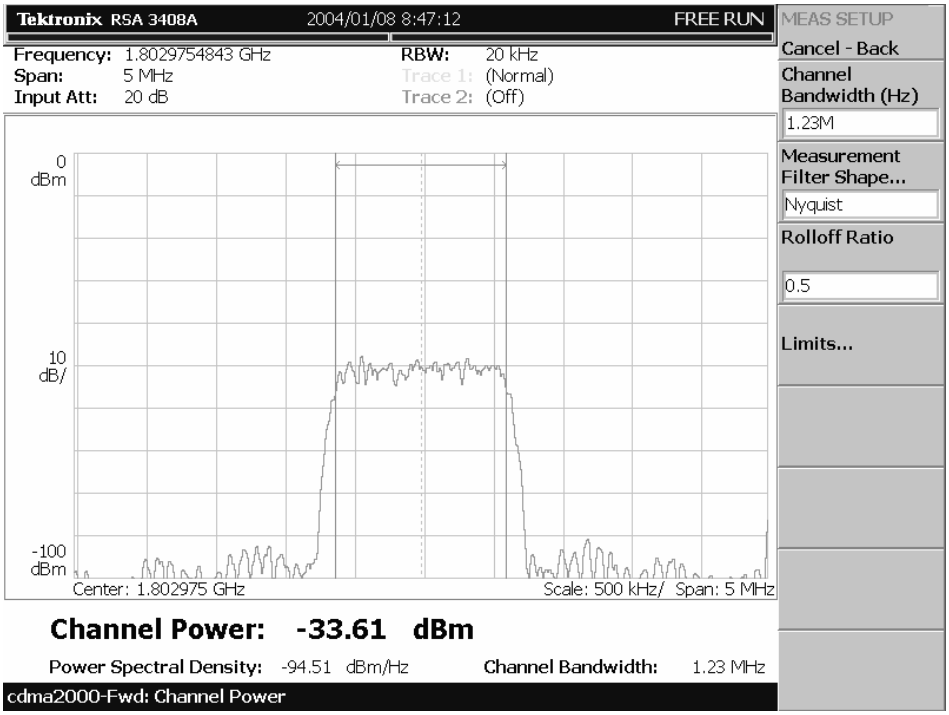

Figure 2-12: Channel power measurement

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Channel Bandwidth**: Sets the frequency range for the measurement.
- **Measurement Filter Shape**: Sets the filter to be used for the measurement. You can select Rect (Rectangular), Gaussian, Nyquist, or Root Nyquist.
- **Rolloff Ratio:** Enters the rolloff ratio when the Nyquist or Root Nyquist filter is selected. You can set the value from 0.0001 to 1. The default value is 0.5.
- **Limits...**: Sets the pass/fail limit for the channel power measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for information about the scale settings for the display.*

OBW Measurement

The OBW (Occupied Bandwidth) measurement measures the frequency bandwidth, using the ratio you specify for carrier signal power/power within the span setting. Figure 2-13 shows an example of the OBW measurement.

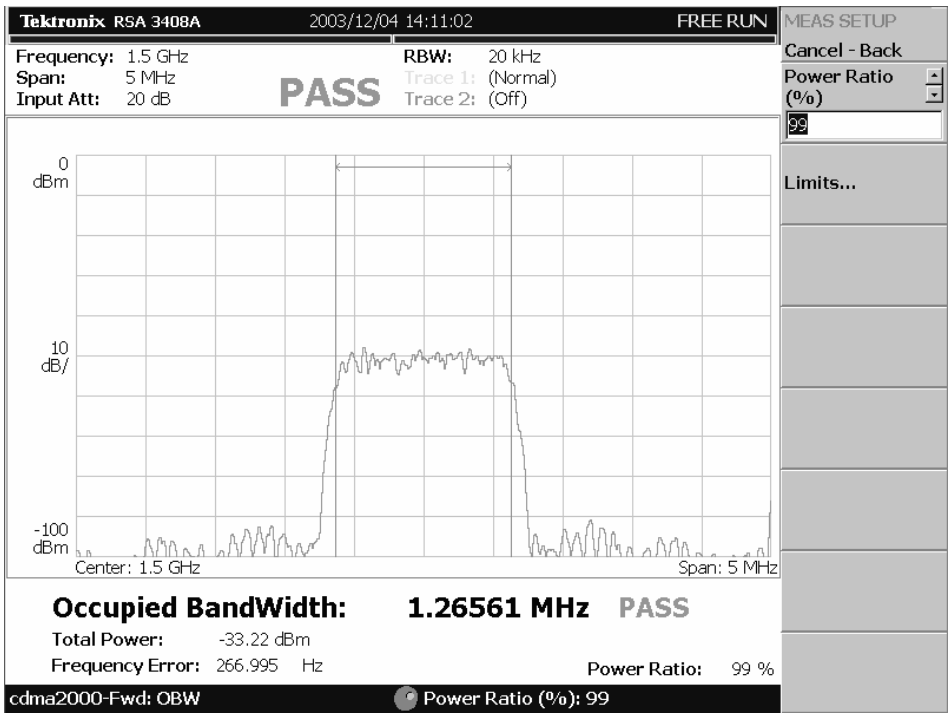

Figure 2-13: OBW measurement

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Power Ratio**: Specifies the power ratio of the carrier and span regions for calculating OBW. You can set the value from 80 to 99.99%. The default value is 99%.
- **Limits...**: Sets the pass/fail limits for the OBW measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for information about the scale settings for the display.*

ACPR Measurement

The ACPR (Adjacent Channel Power Ratio) measurement measures the ratio of carrier signal power to the signal power in an adjacent channel (leakage signal). Figure 2-14 shows an example of the ACPR measurement.

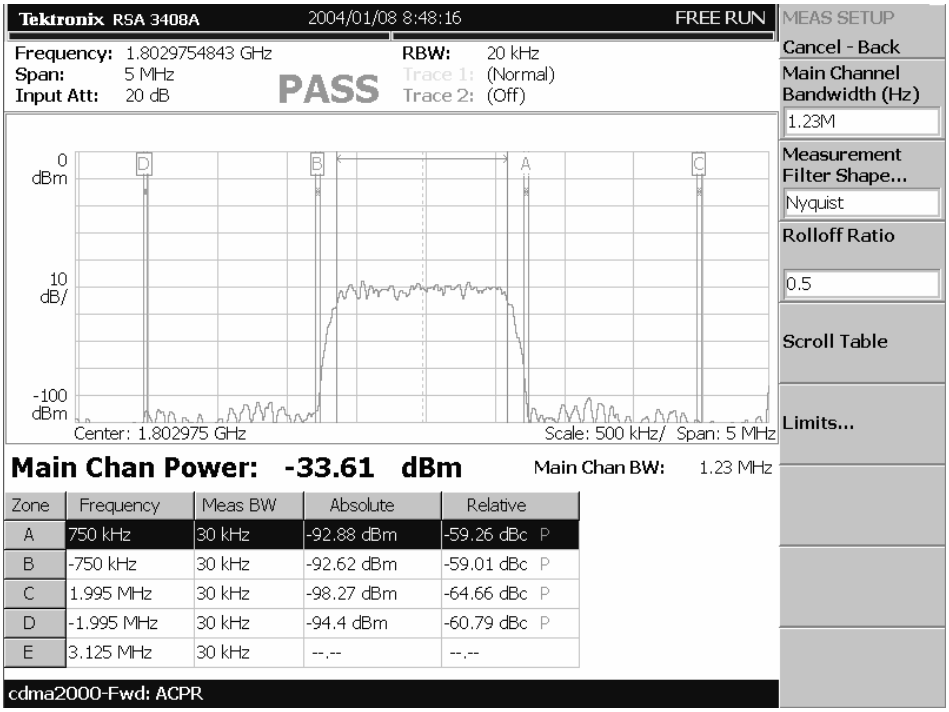

Figure 2-14: ACPR measurement

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Main Channel Bandwidth**: Sets the bandwidth of the main channel.
- **Measurement Filter Shape...:** Sets the filter to be used for the measurement. You can select Rect (Rectangular), Gaussian, Nyquist, or Root Nyquist.
- **Rolloff Ratio:** Enters the rolloff ratio when the Nyquist or Root Nyquist filter is selected. You can set the value from 0.0001 to 1. The default value is 0.5.
- **Scroll Table:** Scrolls the table displayed in the view.
- **Limits:** Sets the pass/fail limit for the ACPR measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for information about the scale settings for the display.*

Spectrum Emission Mask Measurement

The spectrum emission mask measurement verifies that the base station is not transmitting excessive power outside of its designated channel. Figure 2-15 shows an example of the spectrum emission mask measurement.

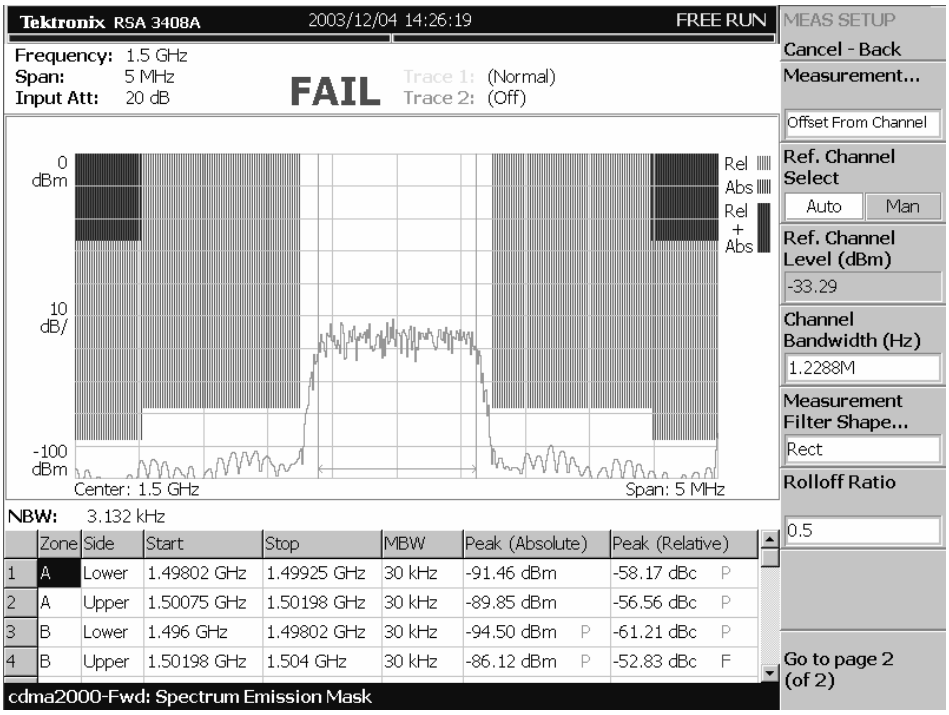

Figure 2-15: Spectrum emission mask measurement

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Measurement...:** Sets the limit table used for limit testing. You can select Offset From Channel or Inband Spurious. For Offset From Channel, frequency zones are specified by the difference from the center frequency. For Inband Spurious, frequency zones are specified by the absolute frequency values.
- **Ref. Channel Select:** Selects the reference mode used to measure the spectrum emission level. You can select Auto or Man (manual). For Auto, the reference level is measured from the input signal for the specified channel bandwidth. For Man, you can set the reference level in the Ref. Channel Level menu item.
- **Ref. Channel Level:** Sets the reference level used to measure the spectrum emission level. You can set the value from -150 dBm to 30 dBm. This setting is only available when Ref. Channel Select is set to Man (manual).
- **Channel Bandwidth:** Sets the channel bandwidth for the measurement.
- **Measurement Filter Shape...:** Sets the filter to be used for the measurement. You can select Rect (Rectangular), Gaussian, Nyquist, or Root Nyquist. This setting is only available when Ref. Channel Select is set to Auto.
- **Rolloff Ratio:** Enters the rolloff ratio when the Nyquist or Root Nyquist filter is selected. You can set the value from 0.0001 to 1. The default value is 0.5. This setting is only available when Ref. Channel Select is set to Auto.
- **Limits...:** Sets the pass/fail limits for the intermodulation measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for information about the scale settings for the display.*

Changing the View Contents

You can change the contents in the view using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Grid Style:** Sets the grid style in the view. You can select Off, Fix, or Flex. For Flex, the grid is changed depending on frequency or span setting.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW: DEFINE** key.

Intermodulation Measurement

The intermodulation measurement measures the third-order and fifth-order harmonic distortion components of a modulated signal. Figure 2-16 shows an example of the intermodulation measurement.

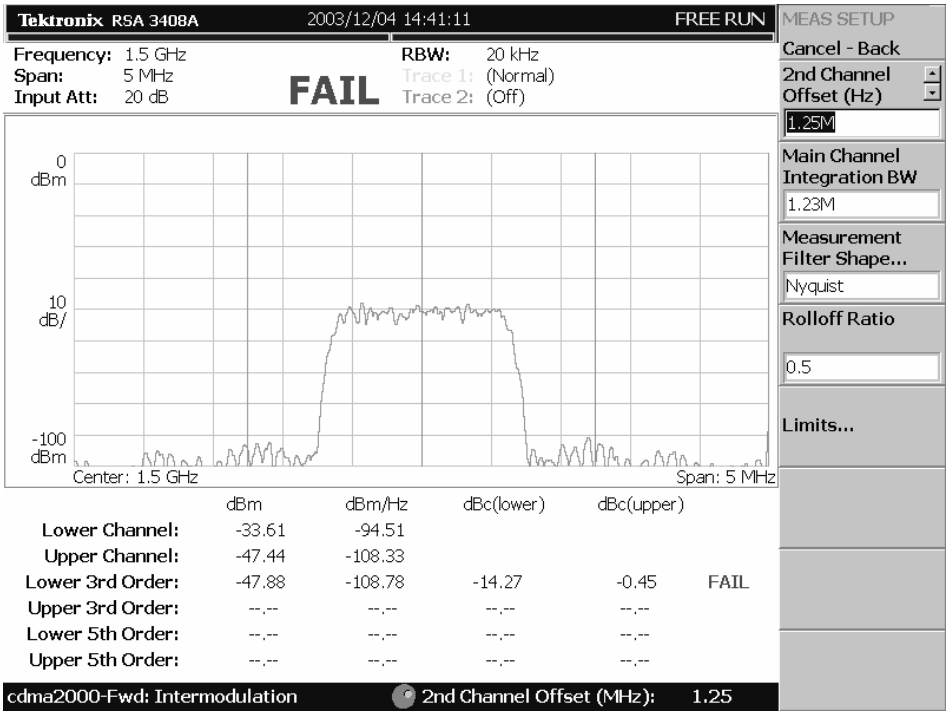

Figure 2-16: Intermodulation measurement

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **2nd Channel Offset:** Sets the center frequency of the second channel. Use this menu item when the interfering carrier may be outside of the analysis span.
- **Main Channel Integration BW:** Sets the integration bandwidth. You can set the value from 500 kHz to 5 MHz.
- **Measurement Filter Shape...:** Sets the filter to be used for the measurement. You can select Rect (Rectangular), Gaussian, Nyquist, or Root Nyquist.
- **Rolloff Ratio:** Enters the rolloff ratio when the Nyquist or Root Nyquist filter is selected. You can set the value from 0.0001 to 1. The default value is 0.5.
- **Limits:** Sets the pass/fail limits for the intermodulation measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for information about the scale settings for the display.*

CCDF Measurement

The CCDF (Complementary Cumulative Distribution Function) measurement displays the peak-to-average power ratio along the horizontal axis, and the probability that the ratio is exceeded along the vertical axis. This display is useful in designing digital communications systems. Figure 2-17 shows an example of the CCDF measurement.

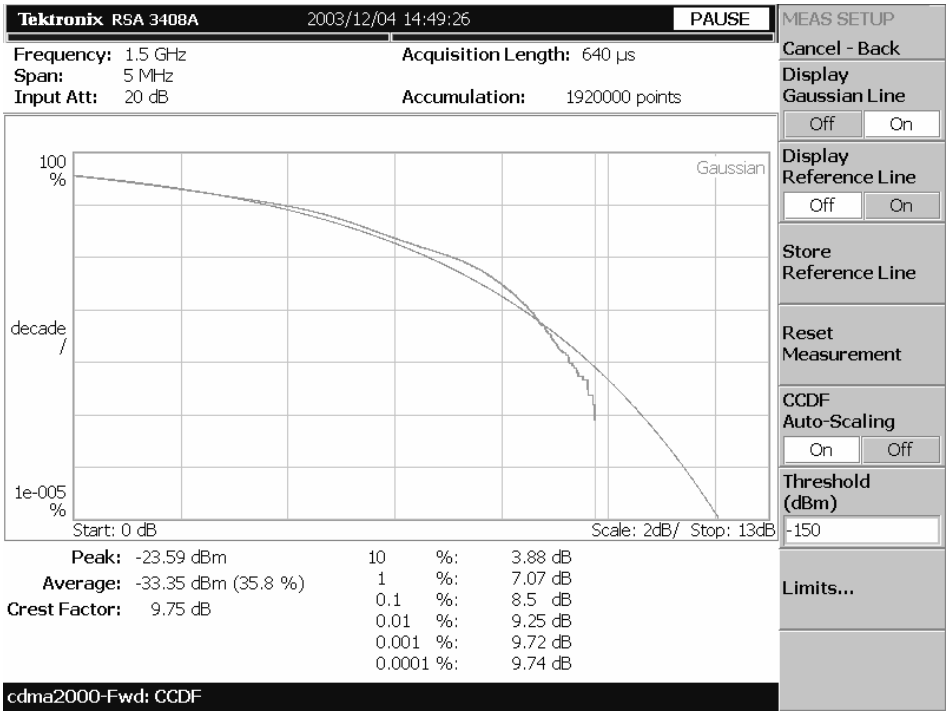

Figure 2-17: CCDF measurement (single view)

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (s):** Sets the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Spectrum Length:** Display the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.
- **Output Trigger Indicator:** Selects whether to enable the output trigger indicator.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the time parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Display Gaussian Line:** Selects whether to display the Gaussian line on the graticule.
- **Display Reference Line:** Selects whether to display the most recently stored reference line on the graticule.
- **Store Reference Line:** Stores a new reference line.
- **Reset Measurement:** Restart the CCDF measurement. When you press this key, the CCDF accumulation counter on the upper right side of the display is reset to 0.
- **CCDF Auto-Scaling:** Selects whether to automatically set the scaling of the horizontal axis. When you set it to On, the signal peak value is displayed as the maximum value on the right edge of the graticule. When you set it to Off, the scaling of the horizontal axis can be set manually with CCDF Scale. The default value is Off.
- **CCDF Scale:** Sets the full-scale value of the horizontal axis of the CCDF display when CCDF Auto-Scaling is set to Off. You can set the value from 1dB to 100 dB.
- **Threshold:** Sets the threshold for the measurement. You can set the value from -250 dBm to 130 dBm.
- **Limits...:** When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

Changing the View Contents

You can change the contents in the overview using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Sets the view style on the screen. You can select Single or Multi. When you set it to Multi, the CCDF, spectrum, and power versus time of the measured signal are displayed simultaneously.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Scale in the Main View

You can set the scale in the main view using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis.
- **Horizontal Start:** Sets the minimum (left) value of the horizontal axis.
- **Vertical Stop:** Sets the maximum (top) value of the vertical axis. The setting ranges are twice the Vertical Start value to 100% in a 1-2-5 sequence.
- **Vertical Start:** Sets the minimum (bottom) value of the vertical axis. The setting ranges are 10^{-6} to half the Vertical Stop value in a 1-2-5 sequence.
- **Full Scale:** Sets the scale of the vertical axis to the default full scale value.
- **Sub Grid:** Selects whether to display the sub-grid on the graticule.

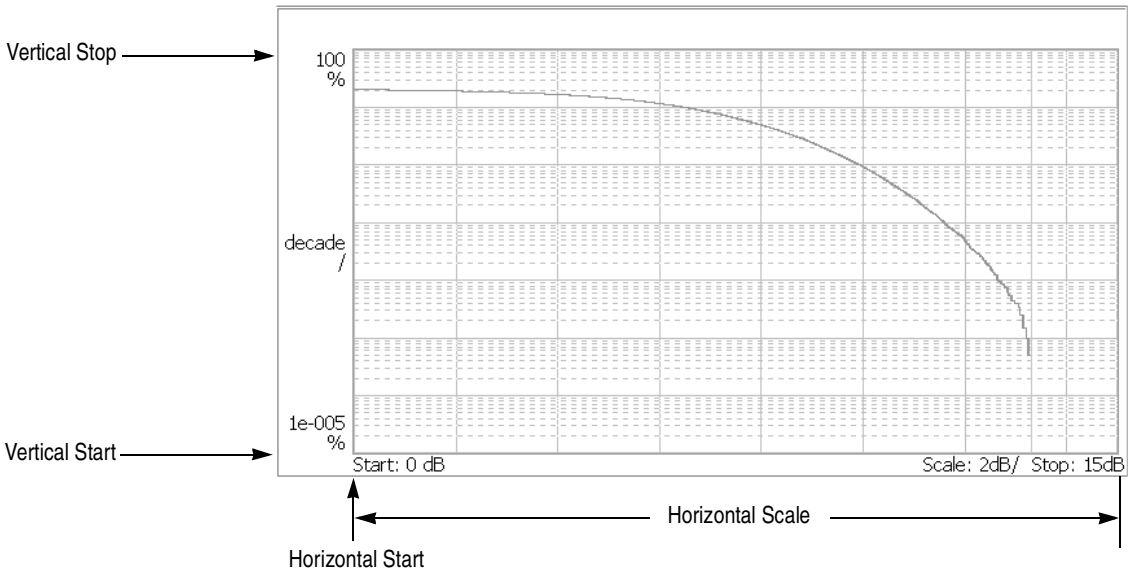

Figure 2-18: Scale settings in the CCDF display

Pilot to Code Channel Measurement

The pilot to code channel measurement measures the time difference between the pilot channel and other code channels detected in the received signal. Figure 2-19 shows an example of the pilot to code channel measurement.

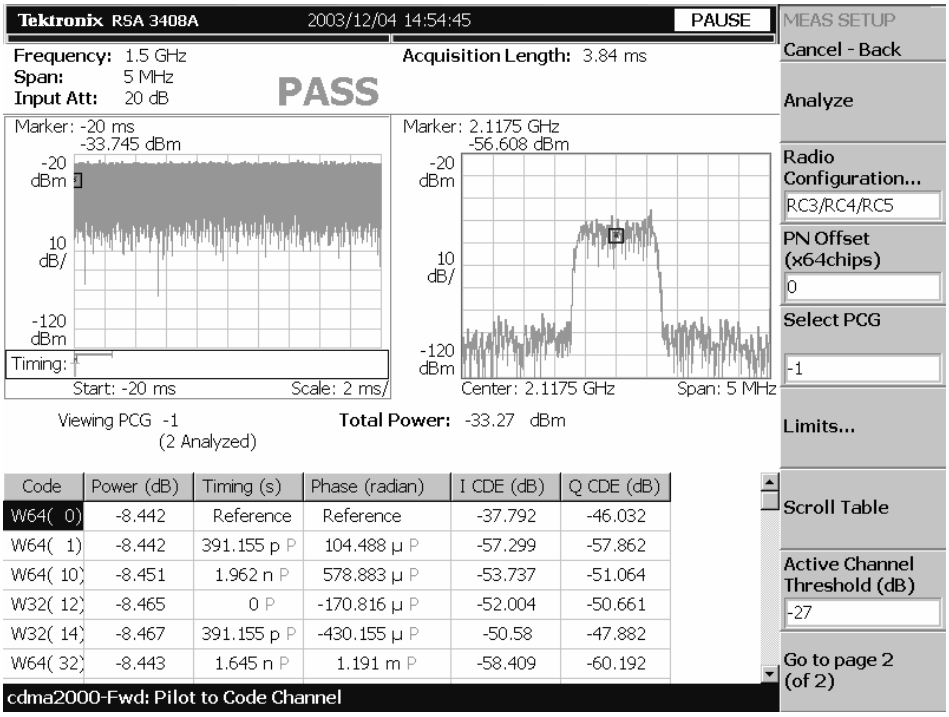

Figure 2-19: Pilot to code channel measurement

Display Elements

The following information is shown in the pilot to code channel measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, and constellation.
- **Main view:** This view lists the following measurement results:

  Power level
  Timing referred to the pilot channel
  Phase referred to the pilot channel
  Code domain error

The display content in the subview can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-36 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Radio Configuration...:** Selects the radio configuration for the measurement. You can select RC1/RC2 or RC3/RC4/RC5.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select PCG:** Sets the PCG (power control groups) for the measurement.
- **Limits...:** Sets the pass/fail limits for the pilot to code channel measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -50 dB to 50 dB.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating pilot to code channel results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Radio Configuration is set to RC3/RC4/RC5.
- **QOF:** Sets the Walsh code quasi-orthogonal function. The choices are 0, 1, 2, or 3. This setting is only available when Radio Configuration is set to RC3/RC4/RC5. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.

Changing the View Contents

You can change the contents in the overview and subview using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Sets the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (spectrum).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the input signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW: DEFINE** key.

cdma2000 Reverse Link Measurements

This section describes the functions and features of the cdma2000 reverse link measurements. Each measurement description contains general information about the measurement, descriptions of the measurement displays and functions available through menu selections.

The information is divided into the following subsections:

- Modulation accuracy measurement
- Code domain power measurement
- Pilot to code channel measurement
- Gated output power measurement

The following measurement items available in the cdma2000 reverse link measurements are the same as those in the cdma2000 forward link measurements. Refer to *cdma2000 Forward Link Measurements* beginning on page 2-3.

- Channel power measurement
- OBW measurement
- ACPR measurement
- Spectrum emission mask measurement
- Intermodulation measurement
- CCDF measurement

NOTE. *If you are not familiar with the operation of the* RSA3408A Real-Time Spectrum Analyzer User Manual *before reading this section.*

Modulation Accuracy Measurement

The modulation accuracy measurement measures Rho (ratio of the correlated power to the total power), EVM (Error Vector Magnitude), magnitude error, phase error, frequency error, and origin offset. Figure 2-20 shows an example of the modulation accuracy measurement.

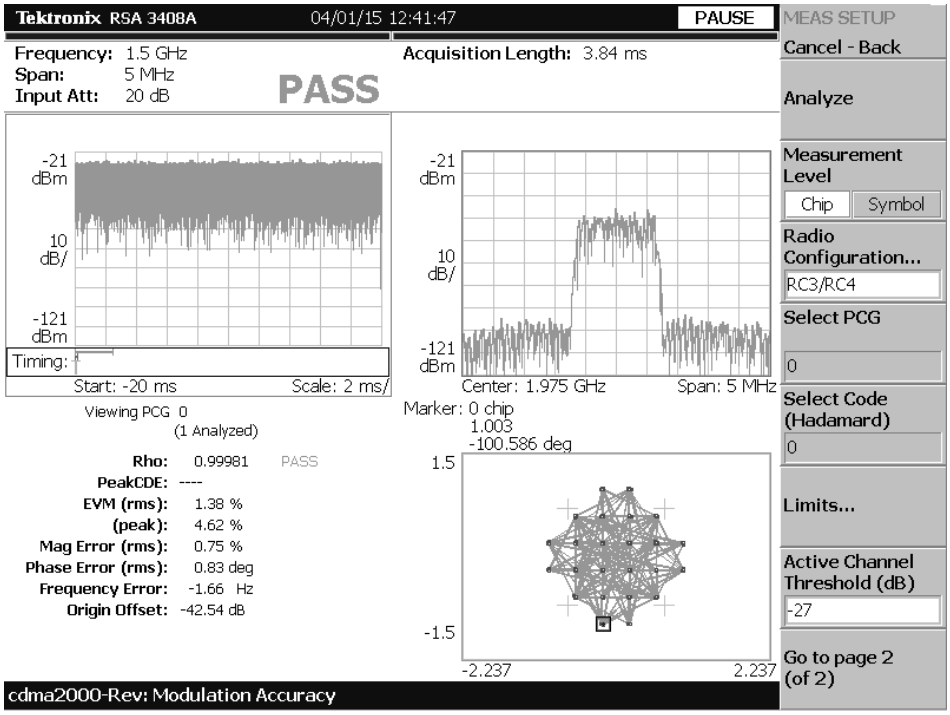

Figure 2-20: Modulation accuracy measurement-reverse link

Display Elements

The following information is shown in the modulation accuracy measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, IQ power graph, and constellation.
- **Main view:** This view can contain modulation accuracy, EVM, magnitude error, phase error, and symbol table.

The display contents in each view can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-41 for more information about the VIEW DEFINE menu.

Setting Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Measurement Level:** Selects the measurement level for the measurement. You can select Chip (chip level) or Symbol (symbol level). This setting is only available when Radio Configuration is set to RC3/RC4.
- **Radio Configuration...:** Selects the radio configuration for the measurement. You can select RC1/RC2 or RC3/RC4.

NOTE. *When you select RC1/RC2 in this measurement, you cannot access the code domain power measurement or pilot to code channel measurement.*

When you select RC1/RC2 in this measurement, you cannot perform the analysis with a span of 2 MHz.

- **Select PCG:** Sets the PCG (power control group) for the measurement.
- **Select Code:** Sets the code in the PCG for the measurement. This setting is only available when Radio Configuration is set to RC3/RC4 and Measurement Level is set to Symbol.
- **Limits...:** Sets the pass/fail limits for the modulation accuracy measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -100 dB to 0 dB. This setting is only available when Radio Configuration is set to RC3/RC4.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating EVM and other modulation accuracy results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Measurement Level is set to Symbol and Radio Configuration is set to RC3/RC4. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.

Changing the View Contents

You can change the view contents in the overview, subview, and main view using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Selects the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the measured signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **IQ Power Graph:** Displays the code domain power for each symbol. Refer to *IQ Power Graph Display* on page 2-21.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Mainview Content...:** Selects a view to display in the main view. You can select Modulation Accuracy, EVM, MagErr, PhaseErr, or Symbol Table. Refer to *Scale and Format in the Main View* on page 2-42 for more information about the views.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Scale and Format in the Main View

This subsection describes the scale settings and display format in the main view.

Modulation Accuracy Display. When you select Mainview Content from the VIEW DEFINE menu and then select Modulation Accuracy from the Mainview Content submenu, an IQ rectangular graph and the measured value for Rho, peak code domain error, rms and peak EVM, magnitude error, phase error, frequency error, and IQ origin offset are displayed (see Figure 2-21). The peak code domain error is displayed only when the Measurement Level menu item is set to Symbol.

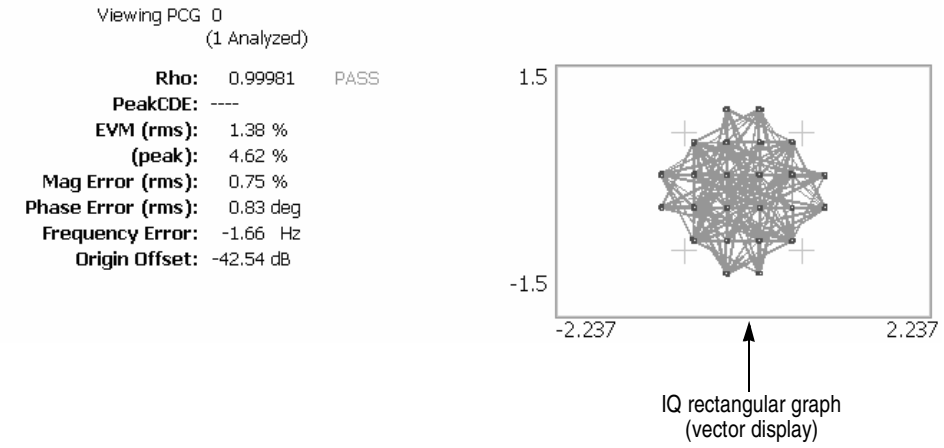

Figure 2-21: Modulation accuracy display-reverse link

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Measurement Content...:** Selects vector or constellation display.

  Vector: Selects vector display. A signal represented with phase and amplitude is displayed in rectangular (I and Q) coordinates. The red point indicates the symbol position on the measured signal, and the yellow trace indicates the locus of signal between symbols.

  Constellation: Selects constellation display. It is the same as the vector display, except that only symbols of the measured signal are indicated in red, and the locus between symbols is not shown. The cross marks indicate symbol positions of an ideal signal.

NOTE. *I and Q signals are normalized to prevent the scale from changing when signal attenuation changes.*

EVM Display. When you select Mainview Content from the VIEW DEFINE menu and then select EVM from the Mainview Content submenu, changes of EVM (Error Vector Magnitude) over time are displayed for each chip or symbol (see Figure 2-22).

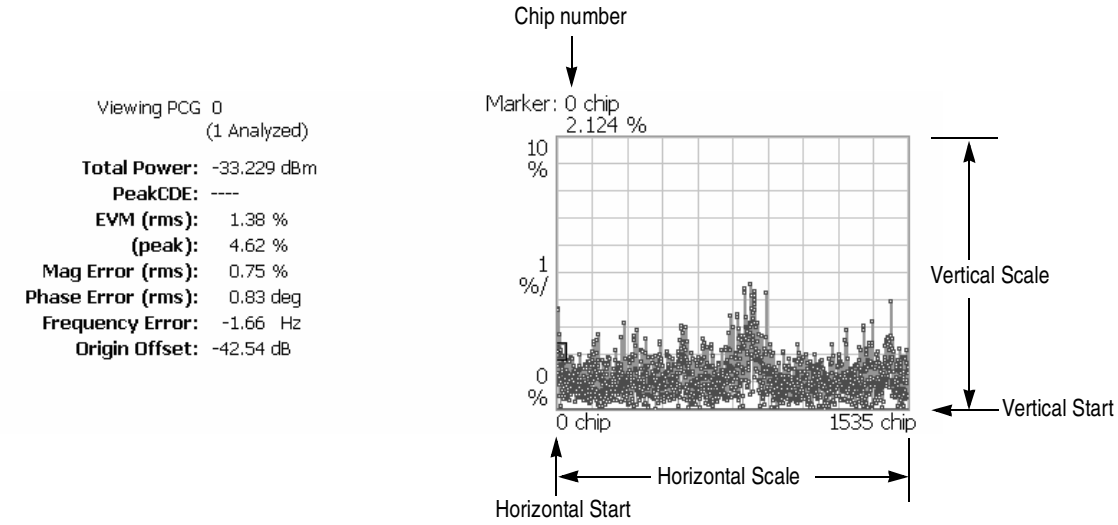

Figure 2-22: EVM display-reverse link

You can set the scale of the display using the VIEW SCALE menu. Press the SCALE key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Start:** Sets the minimum (bottom) value of the vertical axis.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

MagErr Display. When you select Mainview Content from the VIEW DEFINE menu and then select MagErr from the Mainview Content submenu, changes of magnitude error over time are displayed for each chip or symbol (see Figure 2-23).

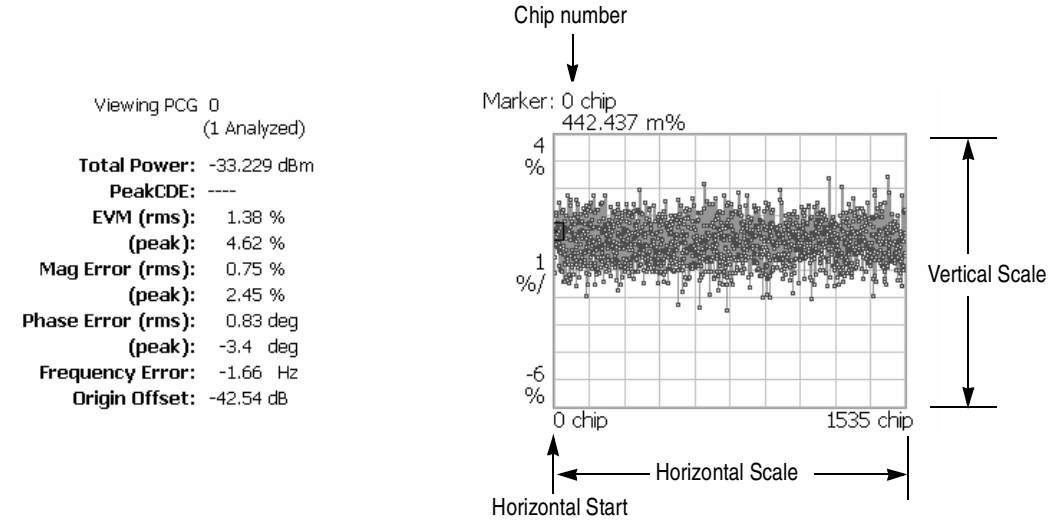

Figure 2-23: MagErr display-reverse link

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Offset:** Sets the offset value of the vertical axis. You can set the value from -200% to 200%.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

PhaseErr Display. When you select Mainview Content from the VIEW DEFINE menu and then select PhaseErr from the Mainview Content submenu, changes of phase error over time are displayed for each chip or symbol (see Figure 2-24).

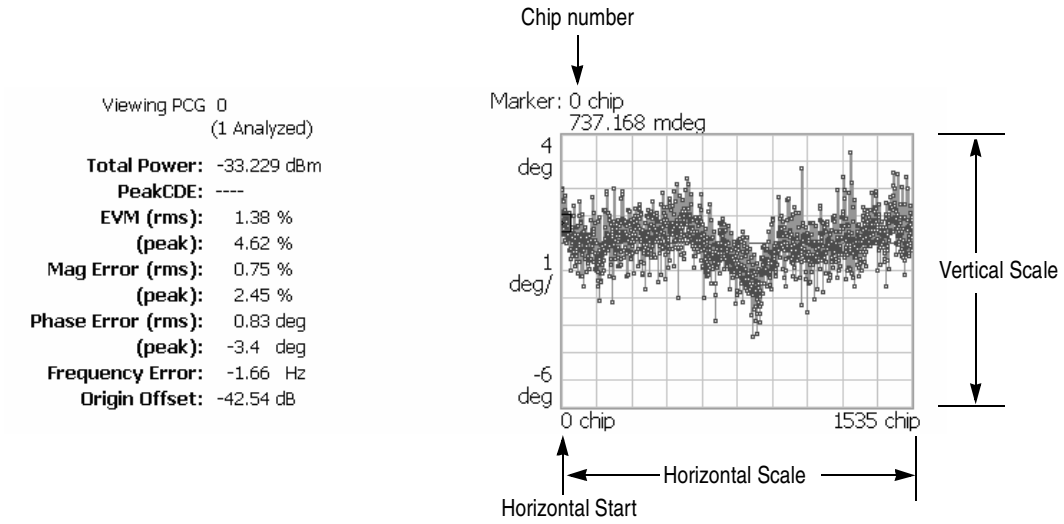

Figure 2-24: PhaseErr display-reverse link

You can set the scale of the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis automatically to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis (number of chips or symbols).
- **Horizontal Start:** Sets the chip number or symbol number of the first (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Offset:** Sets the offset value of the vertical axis. You can set the value from -450 to 450 degrees.
- **Full Scale:** Sets the scale of vertical axis to the default full-scale value.
- **Measurement Content...:** Selects the display content in the main view. You can select EVM, MagErr, or PhaseErr. This selection can also be made from Mainview Content in the VIEW DEFINE menu.

Symbol Table Display. When you select Mainview Content from the VIEW DEFINE menu and then select Symbol Table from the Mainview Content submenu, the symbol table is displayed (see Figure 2-25). This display is only available when the Measurement Level menu item is set to Symbol.

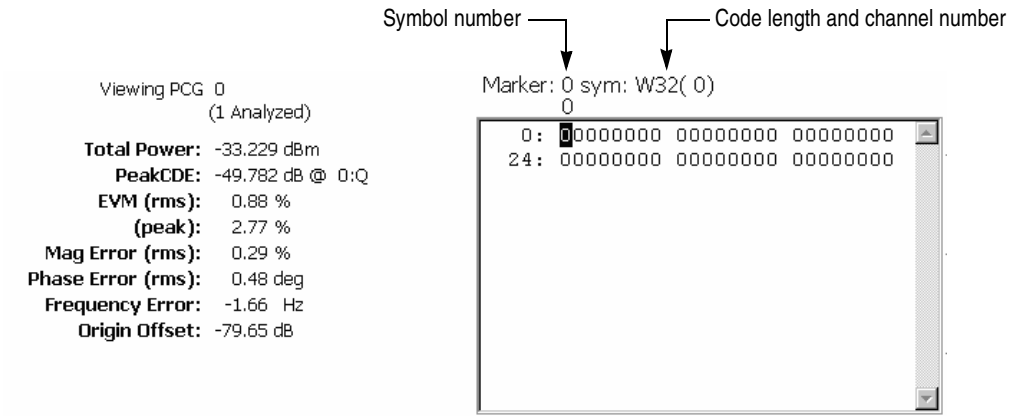

Figure 2-25: Symbol table display-reverse link

You can set the radix for the display using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Radix...:** Sets the radix for displaying the table. You can select Hex (hexadecimal), Oct (octal), or Bin (binary).

Code Domain Power Measurement

NOTE. *To access the code domain power measurement, you need to set the radio configuration setting to RC3/RC4 in the modulation accuracy measurement.*

The code domain power measurement measures the distribution of signal power across the set of code channels, normalized to the total signal power. This measurement allows you to verify that each code channel is operating at its proper level. Figure 2-26 shows an example of the code domain power measurement.

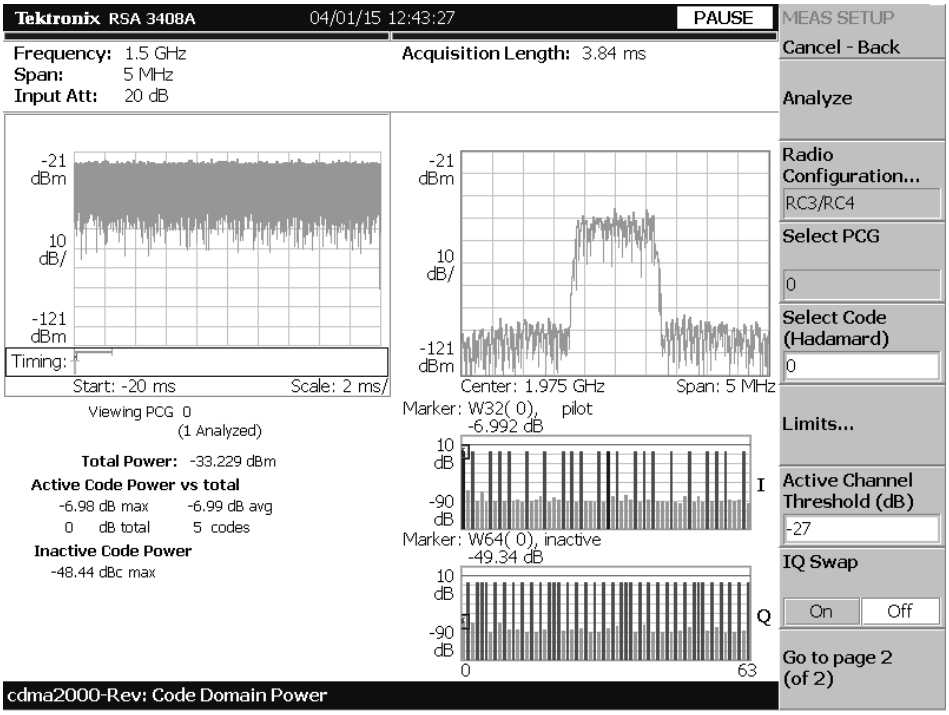

Figure 2-26: Code domain power measurement-reverse link

Display Elements

The following information is shown in the code domain power measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, IQ power graph, and constellation.
- **Main view:** This view can contain code domain power, power codogram, and IQ power graph. This view also lists the following measurement results:

  Total power
  Active code power versus total power
  Active/inactive code power

The display contents in each view can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-50 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Radio Configuration...:** Select the radio configuration for the measurement. You can select only RC3/RC4.
- **Select PCG:** Sets the PCG (power control group) for the measurement.
- **Select Code:** Sets the code in the PCG for the measurement.
- **Limits...:** Sets the pass/fail limits for the code domain power measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -50 dB to 50 dB.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating code domain power results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Measurement Level is set to Symbol and Radio Configuration is set to RC3/RC4. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.

Changing the View Contents

You can change the contents in the overview, subview, and main view using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Selects the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the input signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **IQ Power Graph:** Displays the code domain power for each symbol. Refer to *IQ Power Graph Display* on page 2-21.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Mainview Content...:** Selects a view to display in the main view. You can select Code Domain Power, Power Codogram, or IQ Power Graph. Refer to *Scale and Format in the Main View* on page 2-17 for more information about the views.
- **Code Order...:** Sets the way that code channels are arranged on the display. You can select Hadamard or BitReverse.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Pilot to Code Channel Measurement

NOTE. *To access the pilot to code channel measurement, you need to set the radio configuration setting to RC3/RC4 in the modulation accuracy measurement.*

The pilot to code channel measurement measures the time difference between the pilot channel and other code channels detected in the received signal. Figure 2-27 shows an example of the pilot to code channel measurement.

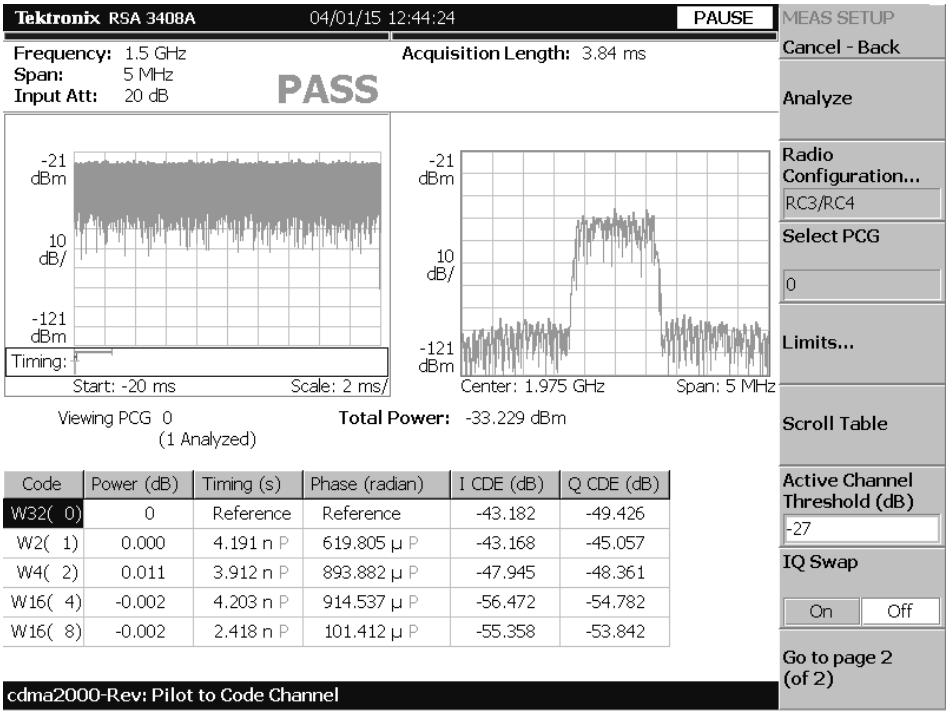

Figure 2-27: Pilot to code channel measurement-reverse link

Display Elements

The following information is shown in the pilot to code channel measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum, EVM, magnitude error, phase error, and constellation.
- **Main view:** This view lists the following measurement results for the selected PCG:

  Power level
  Timing referred to the pilot channel
  Phase referred to the pilot channel
  Code domain error

The display content in the subview can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-54 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameters using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The range depends on the acquisition memory size and the span setting.
- **Acquisition Length (s):** Displays the acquisition length in seconds.
- **Acquisition History:** Specifies the number of the block to display and analyze. The latest block is number zero. Older blocks have larger negative numbers.
- **Analysis Interval:** Sets the analysis interval in chips. The range depends on the acquisition length setting.
- **Analysis Offset:** Sets the start point of the analysis with respect to the left end of the acquisition length in chips.
- **Spectrum Length:** Displays the time length for FFT processing of the spectrum displayed in the subview. This value is equivalent to one frame acquisition length.
- **Spectrum Offset:** Sets the beginning of Spectrum Length with respect to the left end of the acquisition length.

NOTE. *Refer to the* RSA3408A Real-Time Spectrum Analyzer User Manual *for detailed information about the timing parameters.*

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Radio Configuration...:** Select the radio configuration for the measurement. You can select only RC3/RC4.
- **Select PCG:** Sets the PCG (power control groups) for the measurement.
- **Limits...:** Sets the pass/fail limits for the pilot to code channel measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.
- **Active Channel Threshold:** Sets the active channel threshold level (in dB from the pilot) used for deciding whether a code channel is active or inactive. You can set the value from -50 dB to 50 dB.
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating pilot to code channel results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **Walsh Code Length...:** Selects the Walsh code length. You can select Composite, 64, 32, 16, 8, 4, or 2. This setting is only available when Measurement Level is set to Symbol and Radio Configuration is set to RC3/RC4. When Radio Configuration is set to RC1/RC2, the Walsh code length is fixed at 64 and cannot be changed by the user.

Changing the View Contents

You can change the contents in the subview using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Selects the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Subview Content...:** Selects a view to display in the subview:
  - **Spectrum:** Displays spectrum of the input signal.
  - **EVM:** Displays changes of EVM (Error Vector Magnitude) over time.
  - **MagErr:** Displays changes of magnitude error over time.
  - **PhaseErr:** Displays changes of phase error over time.
  - **Constellation:** Displays the signal as an I-Q constellation.
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Gated Output Power Measurement

The Gated Output power measurement measures the total RF power in a selected channel. Figure 2-28 shows an example of the gated output power measurement.

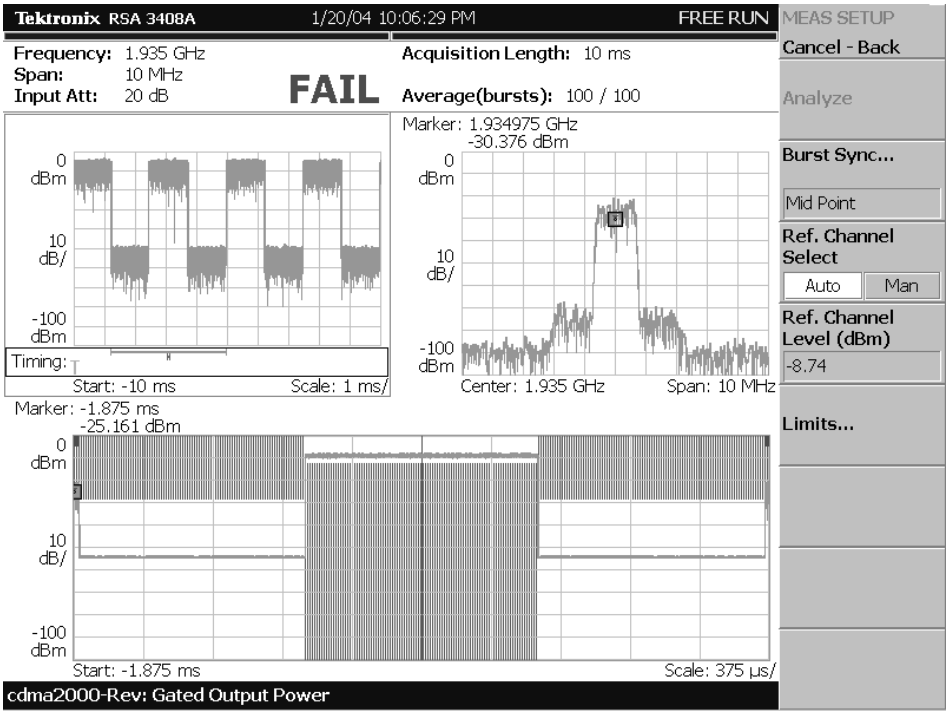

Figure 2-28: Gated output power measurement

Display Elements

The following information is shown in the gated output power measurement display:

- **Overview:** This view can contain power versus time or spectrogram.
- **Subview:** This view can contain spectrum.
- **Main view:** This view can contain power versus time.

The display content in the overview can be changed using the VIEW DEFINE menu. Refer to *Changing the View Contents* on page 2-56 for more information about the VIEW DEFINE menu.

Setting the Timing Parameters

You can set the following timing parameter using the TIMING menu. Press the **TIMING** key to open the TIMING menu.

- **Acquisition History:** Specifies the block number to be analyzed. Block number "0" corresponds to the latest block.

Setting the Measurement Parameters

You can set the following measurement parameters using the MEAS SETUP menu. Press the **MEAS SETUP** key to open the MEAS SETUP menu.

In the MEAS SETUP menu, you can set the following parameters:

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Burst Sync...:** Sets the burst point to be measured. You can select Rising Edge, Mid Point, or Trigger Position.
- **Burst Offset:** Sets the burst offset between the trigger position and the burst position for the measurement. You can set the value from -1 ms to 1ms. This setting is only available when Burst Sync is set to Trigger Position.
- **Ref. Channel Select:** Selects the reference mode used to measure the power level. You can select Auto or Man (manual). For Auto, the reference level is measured from the input signal. For Man, you can set the reference level in the Ref. Channel Level menu item.
- **Ref. Channel Level:** Sets the reference level used to measure the power level. You can set the value from -150 dBm to 30 dBm. This setting is only available when Ref.Channel Select is set to Man (manual).
- **Limits...:** Sets the pass/fail limits for the gated output power measurement. When pressing this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-57 for more information.

Changing the View Contents

You can change the contents in the overview using the VIEW DEFINE menu. Press the **DEFINE** key to display the VIEW DEFINE menu.

- **Show Views:** Sets the view style on the screen. You can select Single or Multi.
- **Overview Content...:** Selects a view to display in the overview. You can select Spectrogram or Waveform (power versus time).
- **Menu Off:** Hides the side menu. To display the menu again, press the **MENU** side key or **VIEW:DEFINE** key.

Scale in the Main View

You can set the scale of the main view using the VIEW SCALE menu. Press the **SCALE** key to open the menu.

- **Auto Scale:** Sets the start value and the scale of the vertical axis to display the entire waveform.
- **Horizontal Scale:** Sets the scale of the horizontal axis.
- **Horizontal Start:** Sets the minimum (left) value of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis.
- **Vertical Stop:** Sets the maximum (top) value of the vertical axis.
- **Full Scale:** Sets the scale of the vertical axis to the default full scale value.

Editing the Measurement Limits

This section describes how to set measurement limits that can be used to perform pass/fail testing for the cdma2000 measurements.

Refer to *Measurement Limit Defaults* on page 2-67 for information about the default settings of each measurement limit.

Using the Measurement Limits Editor

All of the measurement limits are set in the measurement limits editor, which you access from the **Limits...** side key on the MEAS SETUP menu.

Figure 2-29 shows the measurement limits editor for the cdma2000 forward link measurements.

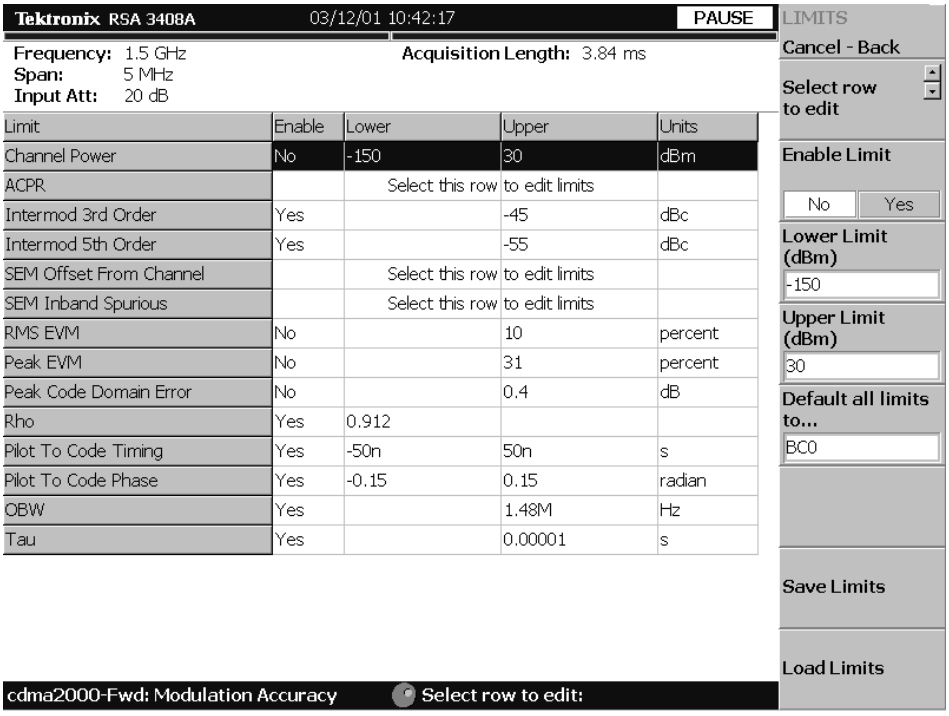

Figure 2-29: Measurement limits editor

Table 2-1 describes all of the measurement limit items available in the measurement limits editor.

Table 2-1: Measurement limits items

Limit item	Description	Lower limit range	Upper limit range
Channel power	Sets the lower and upper limits for the Channel Power measurement.	-200 to 200 dBm	-200 to 200 dBm
ACPR	Select this item to access another measurement limits editor to edit ACPR limits.	Not settable	-200 to 200 dBc
Intermod 3rd Order	Sets the upper limit of the third harmonic distortion component for the Intermodulation measurement.	Not settable	-200 to 200 dBc
Intermod 5th Order	Sets the upper limit of the fifth harmonic distortion component for the Intermodulation measurement.	Not settable	-200 to 200 dBc
SEM Offset From Channel	Select this item to access another measurement limits editor to edit SEM offset from channel limits.	----------	----------
SEM Inband Spurious	Select this item to access another measurement limits editor to edit SEM Inband spurious limits.	----------	----------
RMS EVM	Sets the upper limit for the RMS EVM measurement.	Not settable	0 to 100%
Peak EVM	Sets the upper limit for the Peak EVM measurement.	Not settable	0 to 100%
Peak Code Domain Error	Sets the upper limit for the Peak code domain error measurement.	Not settable	-200 to 200 dB
Rho	Sets the lower limit of Rho for the modulation accuracy measurement.	0 to 1	Not settable
Pilot To Code Timing	Sets the upper limit for the pilot to code timing measurement.	Not settable	0 to 10 s
Pilot To Code Phase	Sets the lower and upper limits for the pilot to code phase measurement.	Not settable	0 to 100 degree
OBW	Sets the upper and lower limits for the OBW measurement.	0 to 30 MHz	0 to 30 MHz
Tau*	Sets the lower limit of Tau for the modulation accuracy measurement.	0 to 1 s	Not settable
Gated Output Power*	Select this item to access another measurement limits editor to edit gated output power limits.	----------	----------

*** These items are only available in the cdma2000 reverse link measurements.**

Setting a Measurement Limit

Perform the following procedure to set measurement limits:

1. Press the **MEAS SETUP** menu key to open the MEAS SETUP menu.
2. Press the **Limits...** side key to open the measurement limits editor with LIMITS menu.
3. Press the **Select row to edit** side key.
4. Turn the rotary knob or press the arrow keys to select the row that you want to edit.
5. Press the **Enable Limit** side key to enable or disable the pass/fail testing for the specified limit(s).
6. Press the **Lower Limit** side key to set the lower limit for the selected measurement item, if applicable.
7. Press the **Upper Limit** side key to set the upper limit for the selected measurement item.

When you want to set limits for the spectrum emission mask or gated output power measurement, perform the following steps to open another measurement limits editor:

1. Press the **Select row to edit** side key.
2. Turn the rotary knob or press the arrow keys to select **ACPR**, **SEM Offset From Channel**, **SEM Inband Spurious**, or **Gated Output Power** row.
3. Press the **Edit ACPR Limits...**, **Edit SEM Offset Limits...**, **Edit SEM Inband Limits...**, or **Edit Gated Output Power Limits...** (reverse link measurements only) side key. This opens the limits editor to set more complex limits for the ACPR, spectrum emission mask or gated output power measurement. Figure 2-31 shows the measurement limits editor for the ACPR measurement.

Setting the ACPR Limits

When you select the ACPR row in the measurement limits editor, another measurement limits editor for the ACPR measurement is displayed. Figure 2-30 shows the measurement limits editor for the ACPR measurement.

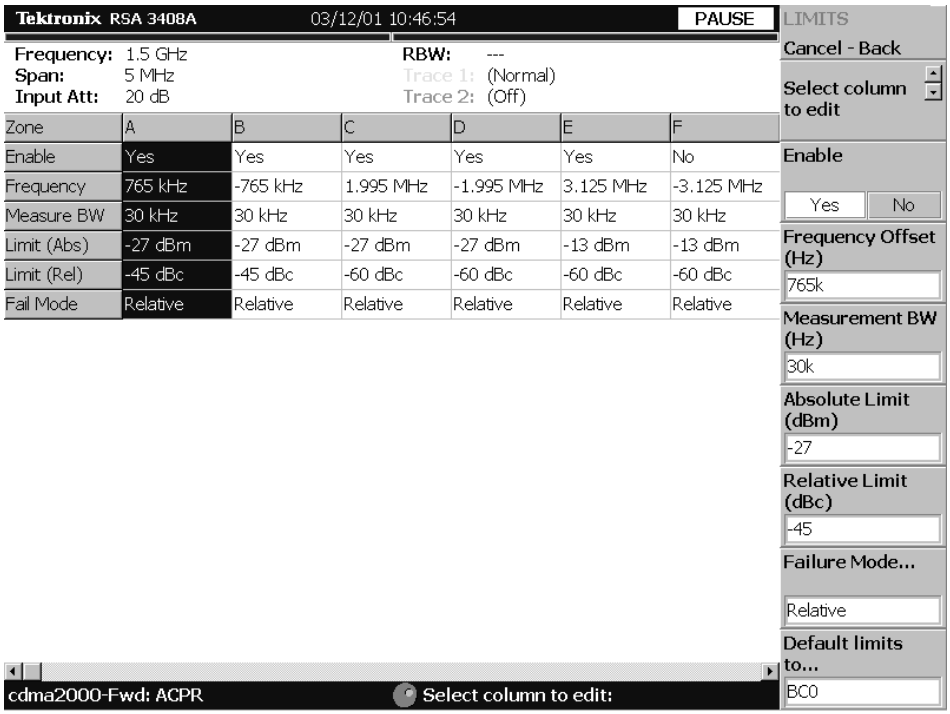

Figure 2-30: ACPR measurement limits editor

Table 2-2 lists the measurement limit items that can be set in the measurement limits editor.

Table 2-2: Measurement limit items for the ACPR measurement

Item	Description	Limit ranges
Enable	Enables or disables use of the limits in the specified zone (A to L).	----------
Frequency	Sets the frequency offset for the zone.	-8 to 8 GHz
Measurement BW	Sets the measurement bandwidth for the zone.	-8 to 8 GHz
Limit (Abs)	Sets a relative level limit.	-200 to 200 dBm
Limit (Rel)	Sets an absolute level limit.	-200 to 200 dBc
Fail Mode	Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are: ■ Absolute: Fail is detected when the absolute measurement result is larger than the limit for Limit (Abs). ■ Relative: Fail is detected when the relative measurement result is larger than the limit for Limit (Rel).	----------

Perform the following steps to set measurement limits in the limits editor:

1. Press the **Select column to edit** side key.
2. Turn the rotary knob or press the arrow keys to select the column that you want to edit.
3. Press the **Enable** side key to enable or disable use of the limits for the zone.
4. Press the side key corresponding to the limit item, and then use the rotary knob or arrow keys to set the value.
5. Press the **Failure Mode...** side key to select the failure mode.
6. Press the **Default limits to...** side key if you want to use a given measurement limit for the measurement. Refer to *Measurement Limit Defaults* on page 2-67 for information about the default settings of each measurement limit.

Setting the Spectrum Emission Mask Limits

When you select the SEM Offset From Channel or SEM Inband Spurious row in the measurement limits editor, another measurement limits editor for the spectrum emission mask measurement is displayed. Figure 2-31 shows the measurement limits editor for the spectrum emission mask measurement.

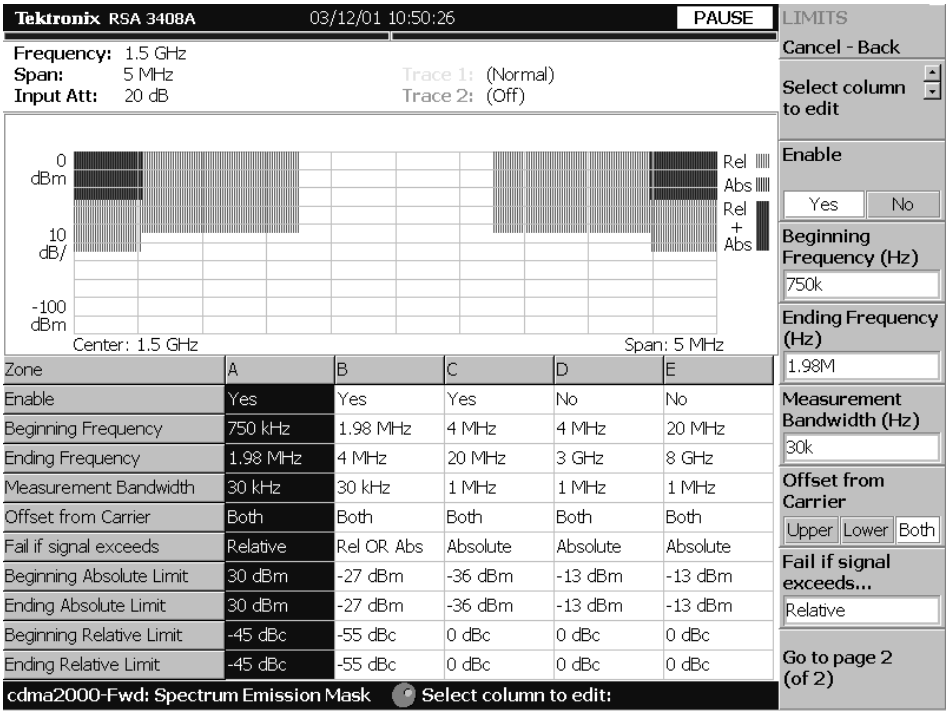

Figure 2-31: Spectrum emission mask measurement limits editor

Table 2-3 lists the measurement limit items that can be set in the measurement limits editor.

Table 2-3: Measurement limit items for the spectrum emission mask measurement

Item	Description	Limit ranges
Enable	Enables or disables use of the mask in the specified zone (A, B, C, D, or E).	----------
Beginning Frequency	Sets the beginning frequency for the zone.	-8 to 8 GHz
Ending Frequency	Sets the ending frequency for the zone.	-8 to 8 GHz
Measurement Bandwidth	Sets the measurement bandwidth.	-8 to 8 GHz
Offset from Carrier*	Specifies which offset side is to be measured You can select Upper (positive), Lower (negative), or Both.	----------

Table 2-3: Measurement limit items for the spectrum emission mask measurement (cont.)

Item	Description	Limit ranges
Fail if signal exceeds	Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are: ■ Absolute: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and/or Ending Absolute Limit. ■ Relative: Fail is detected when one of the relative measurement results is larger than the limit for Beginning Relative Limit and/or Ending Relative Limit. ■ Rel OR Abs: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and Ending Absolute Limit OR one of the relative measurement results is larger than the limit for Beginning Relative Limit and Ending Relative Limit. ■ Rel AND Abs: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and Ending Absolute Limit AND one of the relative measurement results is larger than the limit for Beginning Relative Limit and Ending Relative Limit.	----------
Beginning Absolute Limit	Sets an absolute level limit at Beginning Frequency.	-200 to 200 dBm
Ending Absolute Limit	Sets an absolute level limit at Ending Frequency.	-200 to 200 dBm
Beginning Relative Limit	Sets a relative level limit at Beginning Frequency.	-200 to 200 dBc
Ending Relative Limit	Sets a relative level limit at Ending Frequency.	-200 to 200 dBc

* **This item is only available when SEM Offset From Channel is selected..**

Perform the following steps to set measurement limits in the limits editor:

1. Press the **Select column to edit** side key.
2. Turn the rotary knob or press the arrow keys to select the column that you want to edit.
3. Press the **Enable** side key to enable or disable use of the limits for the zone.
4. Press the side key corresponding to the limit item, and then use the rotary knob or arrow keys to set the value.
5. Press the **Default limits to...** side key if you want to use a given measurement limit for the measurement. Refer to *Measurement Limit Defaults* on page 2-67 for information about the default settings of each measurement limit.
6. When you press the **Rescale Graph** side key, the graph is rescaled to match the set limits.

Setting the Gated Output Power Limits (Reverse Link Only)

When you select the Gated Output Power row in the measurement limits editor, another measurement limits editor for the gated output power measurement is displayed. Figure 2-32 shows the measurement limits editor for the gated output power measurement.

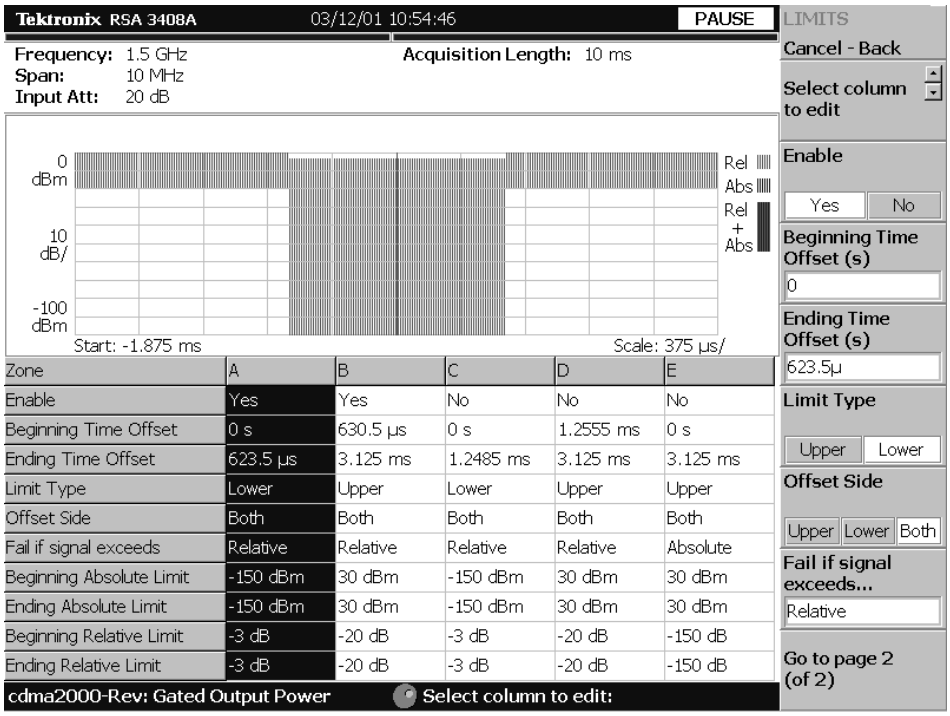

Figure 2-32: Gated output power measurement limits editor

Table 2-4 lists the measurement limit items that can be set in the measurement limits editor.

Table 2-4: Measurement limit items for the gated output power measurement

Item	Description	Limit ranges
Enable	Enables or disables use of the mask in the specified zone (A, B, C, D, or E).	----------
Beginning Time Offset	Sets the beginning time for the zone.	-10 to 10 s
Ending Time Offset	Sets the ending time for the zone.	-10 to 10 s
Limit Type	Sets the limit type for the measurement. You can select Upper or Lower.	----------
Offset Side	Specifies which offset side is to be measured. You can select Upper (positive), Lower (negative), or Both.	----------

Table 2-4: Measurement limit items for the gated output power measurement (cont.)

Item	Description	Limit ranges
Fail if signal exceeds	Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are: ■ Absolute: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and/or Ending Absolute Limit. ■ Relative: Fail is detected when one of the relative measurement results is larger than the limit for Beginning Relative Limit and/or Ending Relative Limit. ■ Rel OR Abs: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and Ending Absolute Limit OR one of the relative measurement results is larger than the limit for Beginning Relative Limit and Ending Relative Limit. ■ Rel AND Abs: Fail is detected when one of the absolute measurement results is larger than the limit for Beginning Absolute Limit and Ending Absolute Limit AND one of the relative measurement results is larger than the limit for Beginning Relative Limit and Ending Relative Limit.	----------
Beginning Absolute Limit	Sets an absolute level limit at Beginning Time Offset.	-200 to 200 dBm
Ending Absolute Limit	Sets an absolute level limit at Ending Time Offset.	-200 to 200 dBm
Beginning Relative Limit	Sets a relative level limit at Beginning Time Offset.	-200 to 200 dB
Ending Relative Limit	Sets a relative level limit at Ending Time Offset.	-200 to 200 dB

Perform the following steps to set measurement limits in the limits editor:

1. Press the **Select column to edit** side key.
2. Turn the rotary knob or press the arrow keys to select the column that you want to edit.
3. Press the **Enable** side key to enable or disable use of the limits for the zone.
4. Press the side key corresponding to the limit item, and then use the rotary knob or arrow keys to set the value.
5. Press the **Default limits to...** side key if you want to use a given measurement limits for the measurement. Refer to *Measurement Limit Defaults* on page 2-67 for information about the default settings of each measurement limit.
6. When you press the **Rescale Graph** side key, the graph is rescaled to match the set limits.

Saving and Loading Measurement Limits

Measurement limits that set in the measurement limits editor can be saved as a file and loaded from a file. This section describes how to save and load measurement limits.

Refer to the *RSA3408A Real-Time Spectrum Analyzer User Manual*, for further information about file operation including how to enter a file name and how to delete a file.

Saving Measurement Limits

Perform the following steps to save the current measurement limits to a file:

1. When you open the spectrum emission mask measurement limits editor or gated output power measurement limits editor, press the **Cancel-Back (MENU)** side key to return the measurement limit editor (see Figure 2-29).
2. Press the **Save Limits** side key to open the **Save to File** menu.

   You can save the limits by using the preset file name or by entering a new file name.
3. To use the preset file name, press one of the following side keys: **Save to LimitsA**, **Save to LimitsB**, or **Save to LimitsC**.
4. To enter a new file name, type a file name in the text box at the top of the menu, and then press the **Save File Now** side key.

The file extension *.lmt is automatically added to the limits file.

Loading Measurement Limits

Perform the following steps to load measurement limits from a file:

1. When you open the spectrum emission mask measurement limits editor or gated output power measurement limits editor, press the **Cancel-Back (MENU)** side key to return the measurement limit editor (see Figure 2-29).
2. Press the **Load Limits** side key to open the **Load From File** menu.
3. To load limits from the preset file, press one of the following side keys: **Load from LimitsA**, **Load from LimitsB**, or **Load from LimitsC**.
4. To load limits from an existing file, select the file from the file list, and then press the **Load File Now** side key.

Measurement Limit Defaults

Tables 2-5 through 2-21 list the default limit settings used to perform the pass/file testing for the cdma2000 measurements. Refer to *Using the Measurement Limits Editor* on page 2-57 for procedures to edit the measurement limits.

Common Limits

Tables 2-5 and 2-6 list the common measurement limits that can be used for the measurements other than the ACPR, Spectrum Emission Mask, and Gated Output Power measurements.

Table 2-5: Forward link common limits

Limit	Enable	Lower	Upper	Units
Channel Power	No	-150	30	dBm
Intermod 3rd Order	Yes	N.A	-45	dBc
Intermod 5th Order	Yes	N.A	-55	dBc
RMS EVM	No	N.A	10	percent
Peak EVM	No	N.A	31	percent
Peak Code Domain Error	No	N.A	0.4	dB
Rho	Yes	0.912	N.A	N.A
Pilot To Code Timing	Yes	-50 n	50 n	s
Pilot To Code Phase	Yes	-0.15	0.15	radian
OBW	Yes	N.A	1.48 M	Hz
Tau	Yes	N.A	0.00001	s

Table 2-6: Reverse link common limits

Limit	Enable	Lower	Upper	Units
Channel Power	No	-150	30	dBm
Intermod 3rd Order	Yes	N.A	-42	dBc
Intermod 5th Order	Yes	N.A	-50	dBc
RMS EVM	No	N.A	10	percent
Peak EVM	No	N.A	24	percent
Peak Code Domain Error	No	N.A	0.25	dB
Rho	Yes	0.994	N.A	N.A
Pilot To Code Timing	Yes	-10 n	10 n	s
Pilot To Code Phase	Yes	-0.15	0.15	radian
OBW	Yes	N.A	1.48 M	Hz

ACPR Limits

Tables 2-7 and 2-8 list the measurement limits that can be used for the ACPR measurement.

Table 2-7: Forward link: all band classes

Zone	Enable	Frequency	Measure BW	Limit (Abs)	Limit (Rel)	Fail Mode
A	Yes	750 kHz	30 kHz	-27 dBm	-45 dBc	Relative
B	Yes	-750 kHz	30 kHz	-27 dBm	-45 dBc	Relative
C	Yes	1.995 MHz	30 kHz	-27 dBm	-60 dBc	Relative
D	Yes	-1.995 MHz	30 kHz	-27 dBm	-60 dBc	Relative
E	Yes	3.125 MHz	30 kHz	-13 dBm	-60 dBc	Relative
F	No	-3.125 MHz	30 kHz	-13 dBm	-60 dBc	Relative
G	No	4 MHz	30 kHz	-13 dBm	-60 dBc	Relative
H	No	-4 MHz	30 kHz	-13 dBm	-60 dBc	Relative
I	No	7.5 MHz	30 kHz	-13 dBm	-60 dBc	Relative
J	No	-7.5 MHz	30 kHz	-13 dBm	-60 dBc	Relative
K	No	0 Hz	30 kHz	-13 dBm	-60 dBc	Relative
L	No	0 Hz	30 kHz	-13 dBm	-60 dBc	Relative

Table 2-8: Reverse link: all band classes

Zone	Enable	Frequency	Measure BW	Limit (Abs)	Limit (Rel)	Fail Mode
A	Yes	900 kHz	30 kHz	-27 dBm	-42 dBc	Relative
B	Yes	-900 kHz	30 kHz	-27 dBm	-42 dBc	Relative
C	Yes	1.995 MHz	30 kHz	-27 dBm	-54 dBc	Relative
D	Yes	-1.995 MHz	30 kHz	-27 dBm	-54 dBc	Relative
E	Yes	3.125 MHz	30 kHz	-13 dBm	-54 dBc	Relative
F	No	-3.125 MHz	30 kHz	-13 dBm	-54 dBc	Relative
G	No	4 MHz	30 kHz	-13 dBm	-54 dBc	Relative
H	No	-4 MHz	30 kHz	-13 dBm	-54 dBc	Relative
I	No	7.5 MHz	30 kHz	-13 dBm	-54 dBc	Relative
J	No	-7.5 MHz	30 kHz	-13 dBm	-54 dBc	Relative
K	No	0 Hz	30 kHz	-13 dBm	-54 dBc	Relative
L	No	0 Hz	30 kHz	-13 dBm	-54 dBc	Relative

SEM Offset from Channel Limits

Tables 2-9 through 2-17 list the measurement limits that can be used for the SEM Offset From Channel measurement.

Table 2-9: Forward link: BC (band class) 0, 2, 3, 5, and 9

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Frequency	750 kHz	1.98 MHz	4 MHz	4 MHz	20 MHz
Stop Frequency	1.98 MHz	4.00 MHz	20 MHz	3 GHz	8 GHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Rel OR Abs	Absolute	Absolute	Absolute
Absolute Start	30 dBm	-27 dBm	-36 dBm	-13 dBm	-13 dBm
Absolute Stop	30 dBm	-27 dBm	-36 dBm	-13 dBm	-13 dBm
Relative Start	-45 dBc	-55 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	-45 dBc	-55 dBc	0 dBc	0 dBc	0 dBc

Table 2-10: Forward link: BC (band class) 1, 4, and 8

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	No
Start Frequency	885 kHz	1.25 MHz	2.25 MHz	4 MHz	4 MHz
Stop Frequency	1.25 MHz	2.25 MHz	4 MHz	20 MHz	3 GHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Rel OR Abs	Absolute	Absolute	Absolute
Absolute Start	30 dBm	-9 dBm	-13 dBm	-36 dBm	-13 dBm
Absolute Stop	30 dBm	-9 dBm	-13 dBm	-36 dBm	-13 dBm
Relative Start	-45 dBc	-45 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	-45 dBc	-45 dBc	0 dBc	0 dBc	0 dBc

Table 2-11: Forward link: BC (band class) 3b

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Frequency	750 kHz	1.98 MHz	4 MHz	4 MHz	20 MHz
Stop Frequency	1.98 MHz	4 MHz	20 MHz	3 MHz	8 GHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Relative	Absolute	Absolute	Absolute
Absolute Start	30 dBm	-27 dBm	-36 dBm	-13 dBm	-13 dBm
Absolute Stop	30 dBm	-27 dBm	-36 dBm	-13 dBm	-13 dBm
Relative Start	-45 dBc	-60 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	-45 dBc	-60 dBc	0 dBc	0 dBc	0 dBc

Table 2-12: Forward link: BC (band class) 6

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	Yes
Start Frequency	885 kHz	1.25 MHz	1.45 MHz	2.25 MHz	4 MHz
Stop Frequency	1.25 MHz	1.45 MHz	2.25 MHz	4 MHz	20 MHz
Measurement BW	30 kHz	30 kHz	30 kHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Rel OR Abs	Rel OR Abs	Absolute	Absolute
Absolute Start	30 dBm	-13 dBm	-13 dBm	-13 dBm	-36 dBm
Absolute Stop	30 dBm	-13 dBm	-26.6 dBm[1]	-13 dBm	-36 dBm
Relative Start	-45 dBc	-45 dBc	-45 dBc	0 dBc	0 dBc
Relative Stop	-45 dBc	-45 dBc	-45 dBc	0 dBc	0 dBc

1 Based on -[13+17x(Δf-1.45 MHz)] dBm when Δf is 2.25 MHz.

Table 2-13: Forward link: BC (band class) 7

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	Yes
Start Frequency	750 kHz	1.98 MHz	3.25 MHz	4 MHz	4 MHz
Stop Frequency	1.98 MHz	3.25 MHz	4 MHz	20 MHz	20 MHz
Measurement BW	30 kHz	30 kHz	30 kHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Rel OR Abs	Rel OR Abs	Absolute	Absolute
Absolute Start	30 dBm	-27 dBm	-46 dBm	-36 dBm	-36 dBm
Absolute Stop	30 dBm	-27 dBm	-46 dBm	-36 dBm	-36 dBm
Relative Start	-45 dBc	-55 dBc	-55 dBc	0 dBc	0 dBc
Relative Stop	-45 dBc	-55 dBc	-55 dBc	0 dBc	0 dBc

Table 2-14: Reverse link: BC (band class) 0, 2, 3, 5, and 9

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Frequency	885 kHz	1.98 MHz	4 MHz	4 MHz	20 MHz
Stop Frequency	1.98 MHz	4 MHz	20 MHz	3 GHz	8 GHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Rel AND Abs	Rel AND Abs	Absolute	Absolute	Absolute
Absolute Start	-54 dBm	-54 dBm	-36 dBm	-13 dBm	-13 dBm
Absolute Stop	-54 dBm	-54 dBm	-36 dBm	-13 dBm	-13 dBm
Relative Start	-42 dBc	-55 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	-42 dBc	-55 dBc	0 dBc	0 dBc	0 dBc

Table 2-15: Reverse link: BC (band class) 1, 4, and 8

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Frequency	1.25 MHz	1.98 MHz	4 MHz	4 MHz	20 MHz
Stop Frequency	1.98 MHz	4 MHz	20 MHz	3 GHz	8 GHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Rel OR Abs	Absolute	Absolute	Absolute
Absolute Start	-54 dBm	-54 dBm	-36 dBm	-13 dBm	-13 dBm
Absolute Stop	-54 dBm	-54 dBm	-36 dBm	-13 dBm	-13 dBm
Relative Start	-42 dBc	-50 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	-42 dBc	-50 dBc	0 dBc	0 dBc	0 dBc

Table 2-16: Reverse link: BC (band class) 6

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Frequency	1.25 MHz	1.98 MHz	2.25 MHz	2.25 MHz	4 MHz
Stop Frequency	1.98 MHz	2.25 MHz	4 MHz	4 MHz	20 MHz
Measurement BW	30 kHz	30 kHz	1 MHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Rel AND Abs	Rel OR Abs	Rel OR Abs	Absolute	Absolute
Absolute Start	-54 dBm	-54 dBm	-13 dBm	-13 dBm	-36 dBm
Absolute Stop	-54 dBm	-54 dBm	-14.75 dBm[2]	-13 dBm	-36 dBm
Relative Start	-42 dBc	-50 dBc	-45 dBc	0 dBc	0 dBc
Relative Stop	-42 dBc	-50 dBc	-45 dBc	0 dBc	0 dBc

2 Based on -[13+1x(Δf-2.25 MHz)] dBm when Δf is 4 MHz.

Table 2-17: Reverse link: BC (band class) 7

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	Yes
Start Frequency	885 kHz	1.98 MHz	2.25 MHz	4 MHz	4 MHz
Stop Frequency	1.98 MHz	2.25 MHz	4 MHz	20 MHz	20 MHz
Measurement BW	30 kHz	30 kHz	30 kHz	1 MHz	1 MHz
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Rel AND Abs	Rel AND Abs	Rel AND Abs	Absolute	Absolute
Absolute Start	-54 dBm	-54 dBm	-35 dBm	-36 dBm	-36 dBm
Absolute Stop	-54 dBm	-54 dBm	-35 dBm	-36 dBm	-36 dBm
Relative Start	-42 dBc	-54 dBc	-55 dBc	0 dBc	0 dBc
Relative Stop	-42 dBc	-54 dBc	-55 dBc	0 dBc	0 dBc

SEM Inband Spurious Limits

Tables 2-18 through 2-20 list the measurement limits that can be used for the SEM Inband Spurious measurement.

Table 2-18: Forward and reverse link: BC (band class) 0, 1, 2, 3, 4, 5, 7, 8, and 9

Zone	A	B	C	D	E
Enable	Yes	Yes	No	No	No
Start Frequency	1 GHz	925 MHz	935 MHz	1.805 GHz	4 MHz
Stop Frequency	3 GHz	935 MHz	960 MHz	1.880 GHz	8 GHz
Measurement BW	1 MHz	100 kHz	100 kHz	100 kHz	1 MHz
Failure Mode	Absolute	Absolute	Absolute	Absolute	Absolute
Absolute Start	-36 dBm	-67 dBm	-79 dBm	-71 dBm	-36 dBm
Absolute Stop	-36 dBm	-67 dBm	-79 dBm	-71 dBm	-36 dBm
Relative Start	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc

Table 2-19: Forward link: BC (band class) 6

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	No
Start Frequency	1.8935 GHz	925 MHz	935 MHz	1.805 GHz	4 MHz
Stop Frequency	1.9196 GHz	935 MHz	960 MHz	1.880 GHz	20 MHz
Measurement BW	300 kHz	100 kHz	100 kHz	100 kHz	1 MHz
Failure Mode	Absolute	Absolute	Absolute	Absolute	Absolute
Absolute Start	-41 dBm	-67 dBm	-79 dBm	-71 dBm	-36 dBm
Absolute Stop	-41 dBm	-67 dBm	-79 dBm	-71 dBm	-36 dBm
Relative Start	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc

Table 2-20: Reverse link: BC (band class) 6

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	Yes	Yes
Start Frequency	1.8935 GHz	876 MHz	921 MHz	1.710 GHz	1.805 GHz
Stop Frequency	1.9196 GHz	915 MHz	960 MHz	1.785 GHz	1.880 GHz
Measurement BW	300 kHz	100 kHz	100 kHz	100 kHz	100 kHz
Failure Mode	Absolute	Absolute	Absolute	Absolute	Absolute
Absolute Start	-41 dBm	-98 dBm	-57 dBm	-98 dBm	-47 dBm
Absolute Stop	-41 dBm	-98 dBm	-57 dBm	-98 dBm	-47 dBm
Relative Start	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc
Relative Stop	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc

Gated Output Power Limits

Table 2-21 list the measurement limits that can be used for the gated output power measurement.

Table 2-21: Reverse link: all band classes

Zone	A	B	C	D	E
Enable	Yes	Yes	No	No	No
Start Time	0 s	630.5 µs	0 s	1.2555 ms	0 s
Stop Time	623.5 µs	3.125 ms	1.2485 ms	3.125 ms	3.125 ms
Upper/Lower	Lower	Upper	Lower	Upper	Upper
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Relative	Relative	Relative	Absolute
Absolute Start	-150 dBm	30 dBm	-150 dBm	30 dBm	30 dBm
Absolute Stop	-150 dBm	30 dBm	-150 dBm	30 dBm	30 dBm
Relative Start	-3 dB	-20 dB	-3 dB	-20 dB	-150 dB
Relative Stop	-3 dB	-20 dB	-3 dB	-20 dB	-150 dB

Appendices

Appendix A: Setting Range

This section lists the setting range of the horizontal and vertical scale for the views.

Table A-1: Display format and scale

Display format	Horizontal range	Vertical range
Spectrum	0 Hz to 8 GHz	-200 to 100 dBm
Spectrogram	0 Hz to 8 GHz	-15999 to 0 frame -63999 to 0 frame (Option 02)
Code domain power	Forward link: RC1/RC2: 16 to 64 channels RC3/RC4/RC5: 16 to 128 channels Reverse link: RC3/RC4: 16 to 64 channels	Relative: -200 to 100 dB Absolute: 140 to -160 dBm
Modulation accuracy	Fixed	Fixed
EVM	Foward link: Chip: 24 to 1536 Symbol: 24 (fixed) Reverse link: Chip: 24 to 1536 Symbol: 24 to 48	-100 to 200%
Amplitude (Mag) error	Same as the horizontal range of EVM	-300 to 300%
Phase error	Same as the horizontal range of EVM	-675 to 675 degrees
Power codogram	Same as the horizontal range of Code domain power	-6144 to 0 frame -24579 to 0 frame (Option 02)
Symbol table	max 256	NA
IQ power graph	same as the horizontal range of EVM	-6144 to 0 frame -24579 to 0 frame (Option 02)
Constellation	Fixed	Fixed

Index

Index

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