

User Manual



**RSA3303B, RSA3308B, & RSA3408B
Option 26
1xEV-DO Analysis Software**

071-2402-00

This document supports firmware version 4.0 and above.

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Contacting Tektronix

Tektronix, Inc.
14200 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

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Preface

This manual provides operating instructions for the RSA3303B, RSA3308B, and RSA3408B Real-Time Spectrum Analyzer Option 26 1xEV-DO analysis software.

This manual supports the following instruments:

- RSA3303B Option 26
- RSA3308B Option 26
- RSA3408B Option 26

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* provides 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:

- *RSA3303B & RSA3308B User Manual*
(Standard accessory; Tektronix part number 071-2363-XX)
RSA3408B User Manual
(Standard accessory; Tektronix part number 071-2364-XX)
Describes how to install the analyzer and how to work with the menus, and details the standard functions. Also provides the specifications.
- *RSA3000B Series Programmer Manual*
(Standard accessory; PDF, Tektronix part number 071-2382-XX)
Contains an alphabetical listing of the programming commands and other information related to controlling the analyzer over the GPIB interface.

PDF Manual The *RSA3000B Series Programmer Manual* (PDF only) is included in the Documents CD (Tektronix part number 063-4089-XX).



Getting Started

Getting Started

This section provides an overview of the product capabilities.

Product Description

The RSA3300B Series and RSA3408B Real-Time Spectrum Analyzer Option 26 is an analysis software option that adds transmitter measurements capability for 1xEV-DO forward link (3GPP2 C.S0032) and reverse link (3GPP2 C.S0033) to the analyzers.

You can perform the following 1xEV-DO measurements:

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

In addition, the option provides predefined 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 26 measurement functions.

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

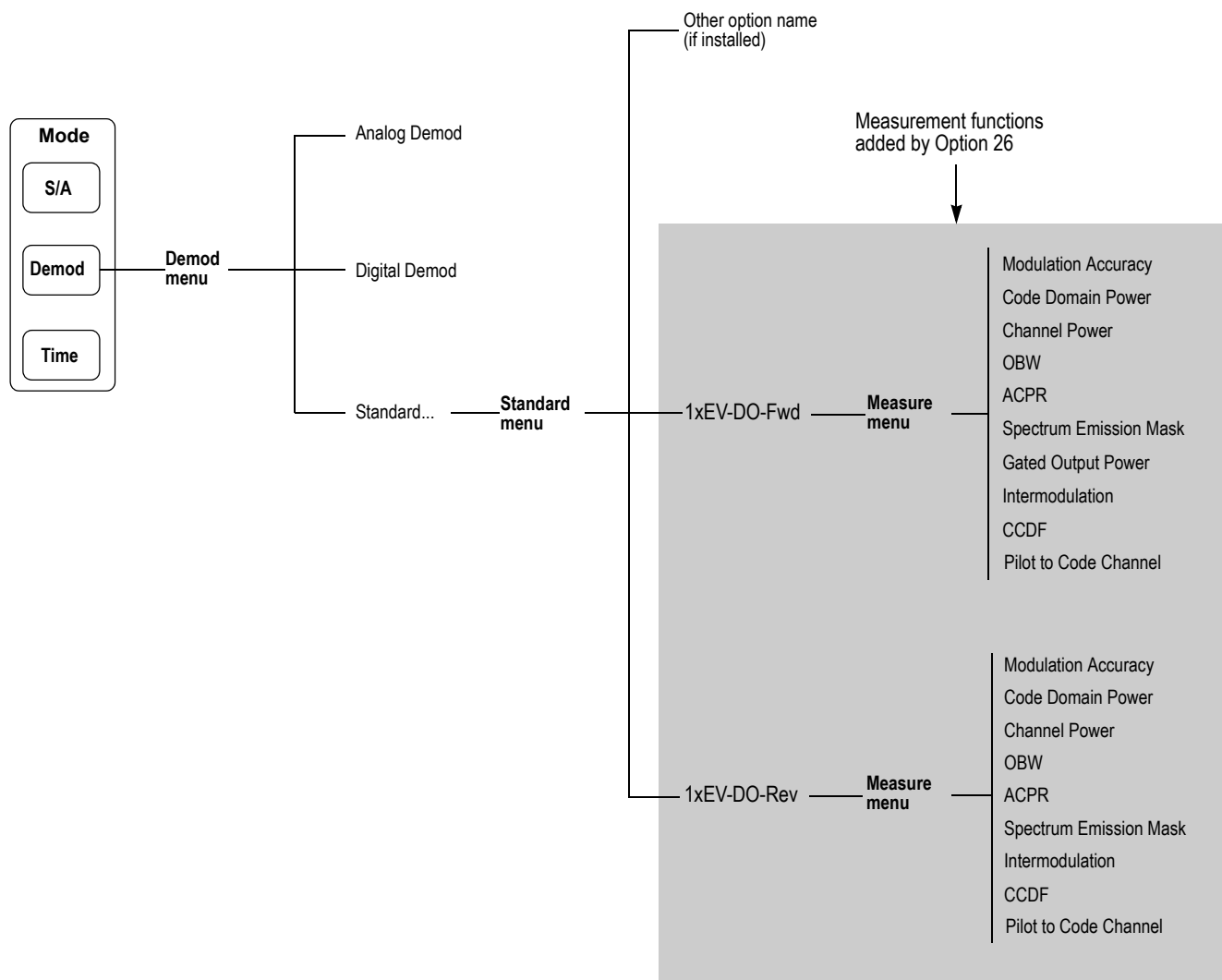


Figure 2-1: Menu diagram showing measurement functions available in Option 26

Accessing a Measurement Function

All of the measurement functions available in Option 26 can be selected from the Demod (demodulation) mode.

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

1. Press the **Demod** key to open the Demod menu.
2. Press the **Standard...** side key to open the Standard menu.
3. Press the **1xEV-DO Fwd** or **1xEV-DO 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 your instrument user manual for information on how to set frequency, span, and amplitude.

1xEV-DO Forward Link Measurements

This section describes the functions and features of the 1xEV-DO 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
- Gated output power measurement
- Intermodulation measurement
- CCDF measurement
- Pilot to code channel measurement

NOTE. *If you are not familiar with the operation of the analyzer, refer to your instrument 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.

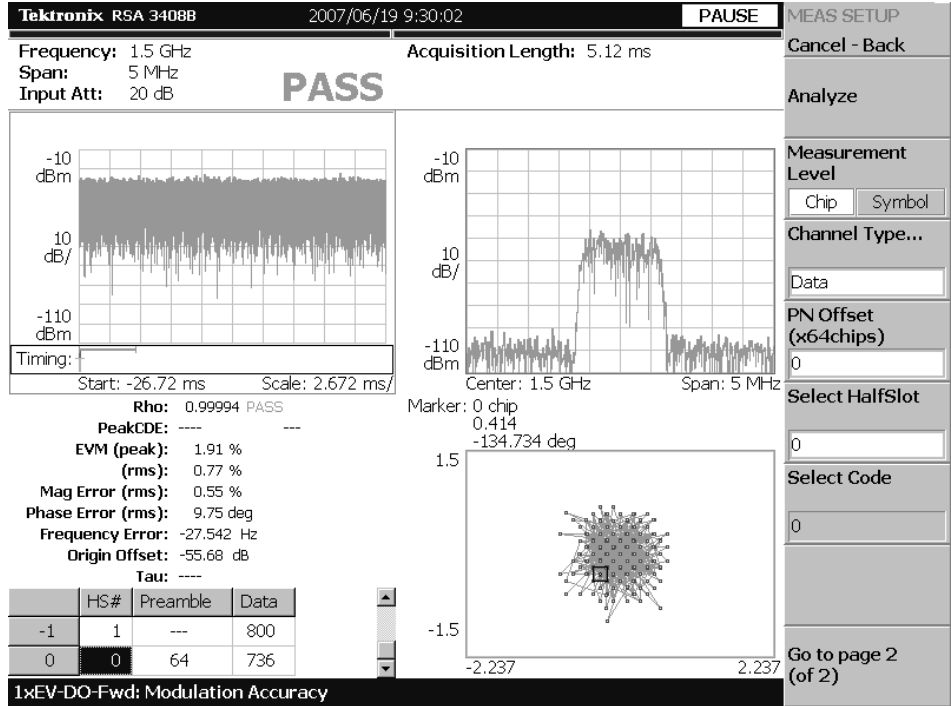


Figure 2-2: Modulation accuracy measurement

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 Acquisition and Analysis Parameters

You can set the following timing parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis menu.

- **Acquisition (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 half slots. 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 half slots.
- **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 your instrument 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). When Overall is selected in the Channel Type menu item, you cannot select Symbol.
- **Channel Type...:** Select the channel type to be measured. When Symbol is selected in the Measurement Level menu item, you can select MAC, Pilot, Data, or Preamble. When Chip is selected in the Measurement Level menu item, you can select Overall, MAC, Pilot, Data, or Preamble.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select HalfSlot:** Sets the half slot for the measurement.
- **Select Code:** Sets the code in the half slot for the measurement. This setting is only available when Measurement Level is set to Symbol.
- **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.
- **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).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **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 2-61 for more information.

Changing the View Contents

You can change the view contents in the overview, subview, and main view using the View Define menu. Press the View: **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 changes of I and Q powers over time. 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 (timing error) 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.

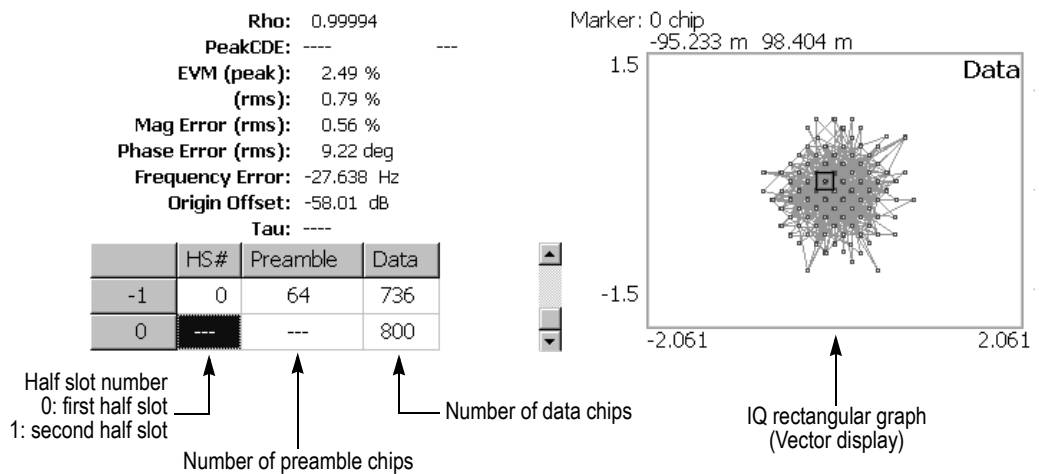


Figure 2-3: Modulation accuracy display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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).

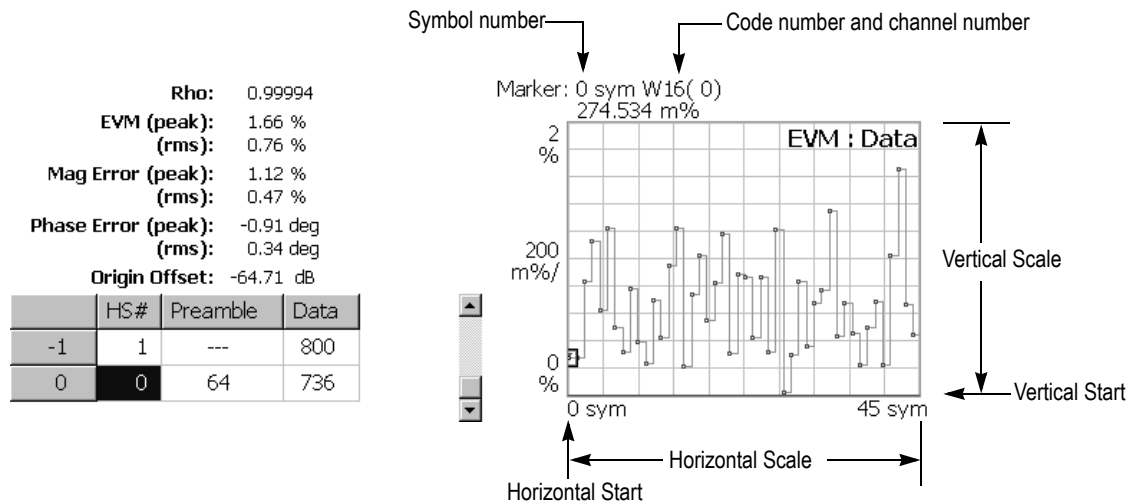


Figure 2-4: EVM display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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).

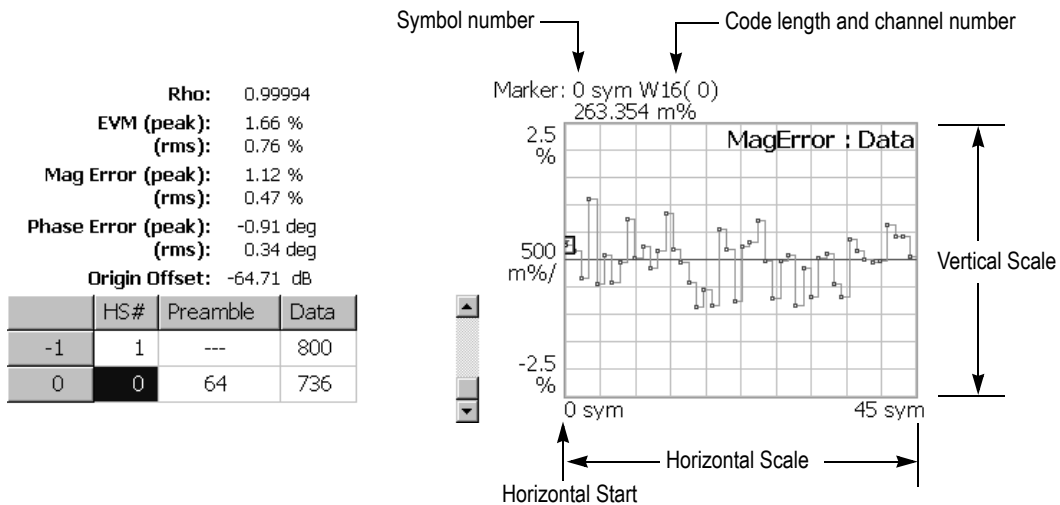


Figure 2-5: MagErr display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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).

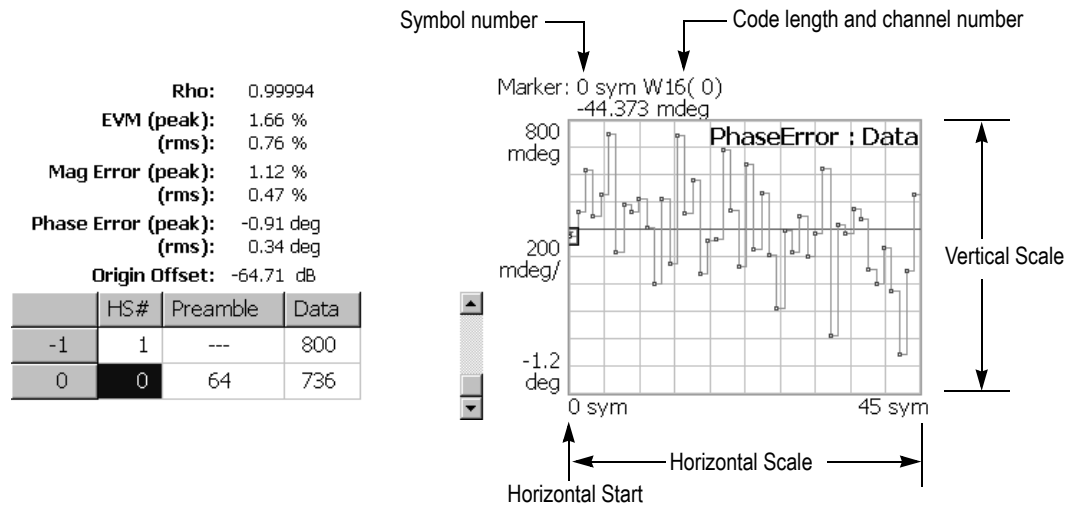


Figure 2-6: PhaseErr display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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.

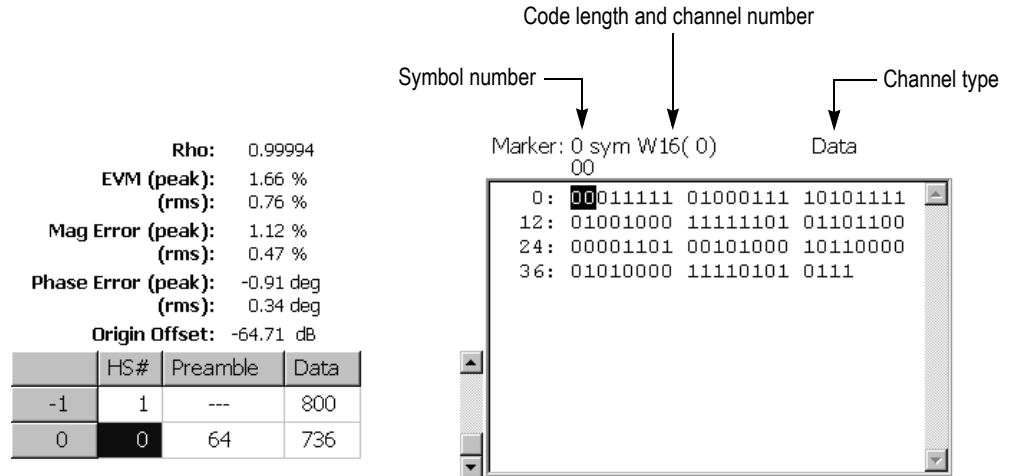


Figure 2-7: Symbol table display

You can set the radix for the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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.

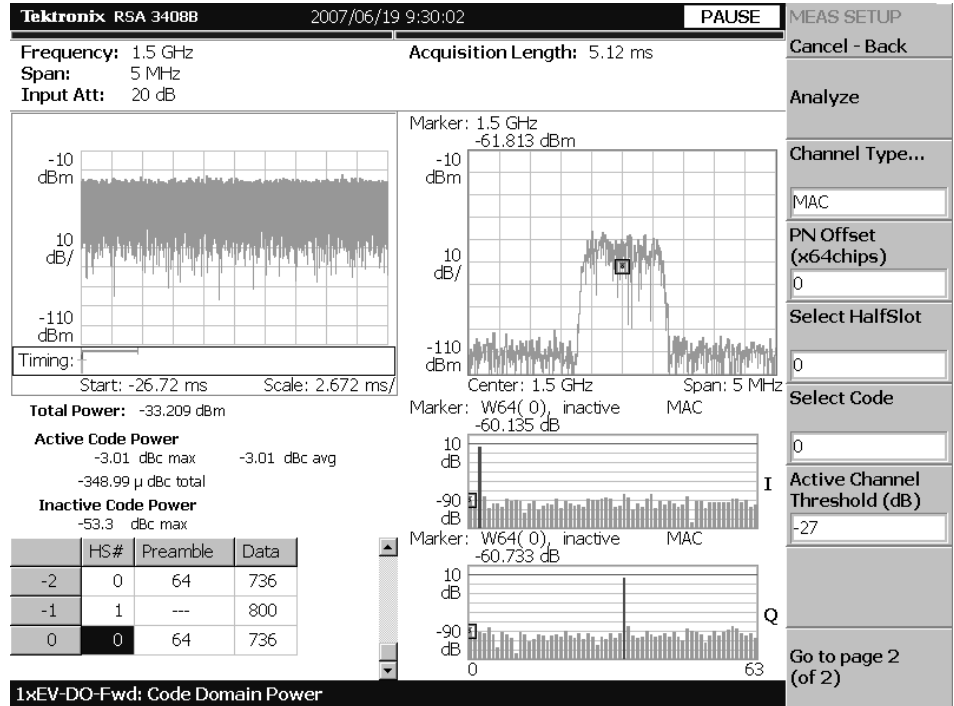


Figure 2-8: Code domain power measurement

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 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 Acquisition and Analysis Parameters

You can set the following timing parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis 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 half slots. 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 half slots.
- **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.

NOTE. Refer to your instrument 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.
- **Channel Type...:** Selects the channel type to be measured. You can select MAC, Pilot, Data, or Preamble.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select HalfSlot:** Sets the half slot for the measurement.
- **Select Code:** Sets the code in the half slot for the measurement.
- **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.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating code domain power results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **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 2-61 for more information.

Changing the View Contents

You can change the contents in the overview, subview, and main view using the View Define menu. Press the View: **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 changes I and Q powers over time. 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).

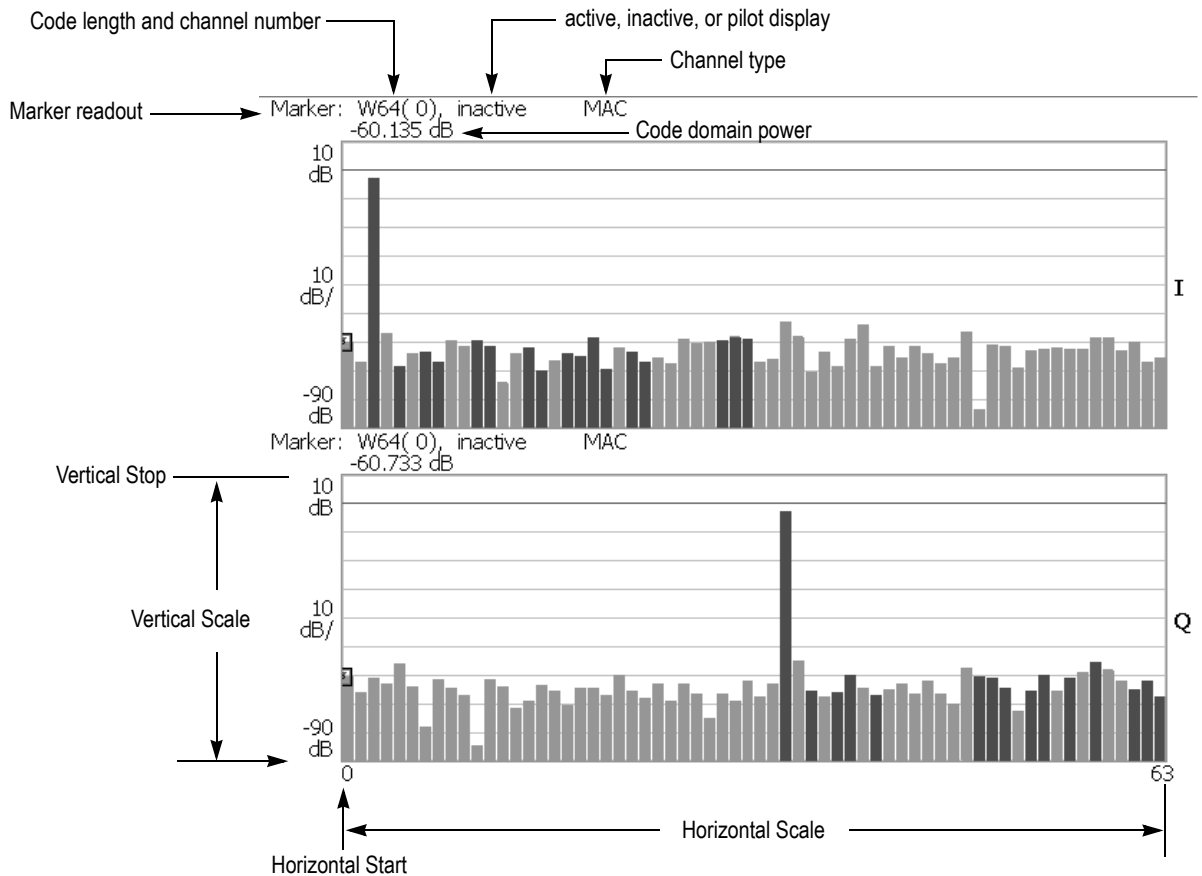


Figure 2-9: Code domain power display

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 Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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 Channel Type 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 μ dB 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).

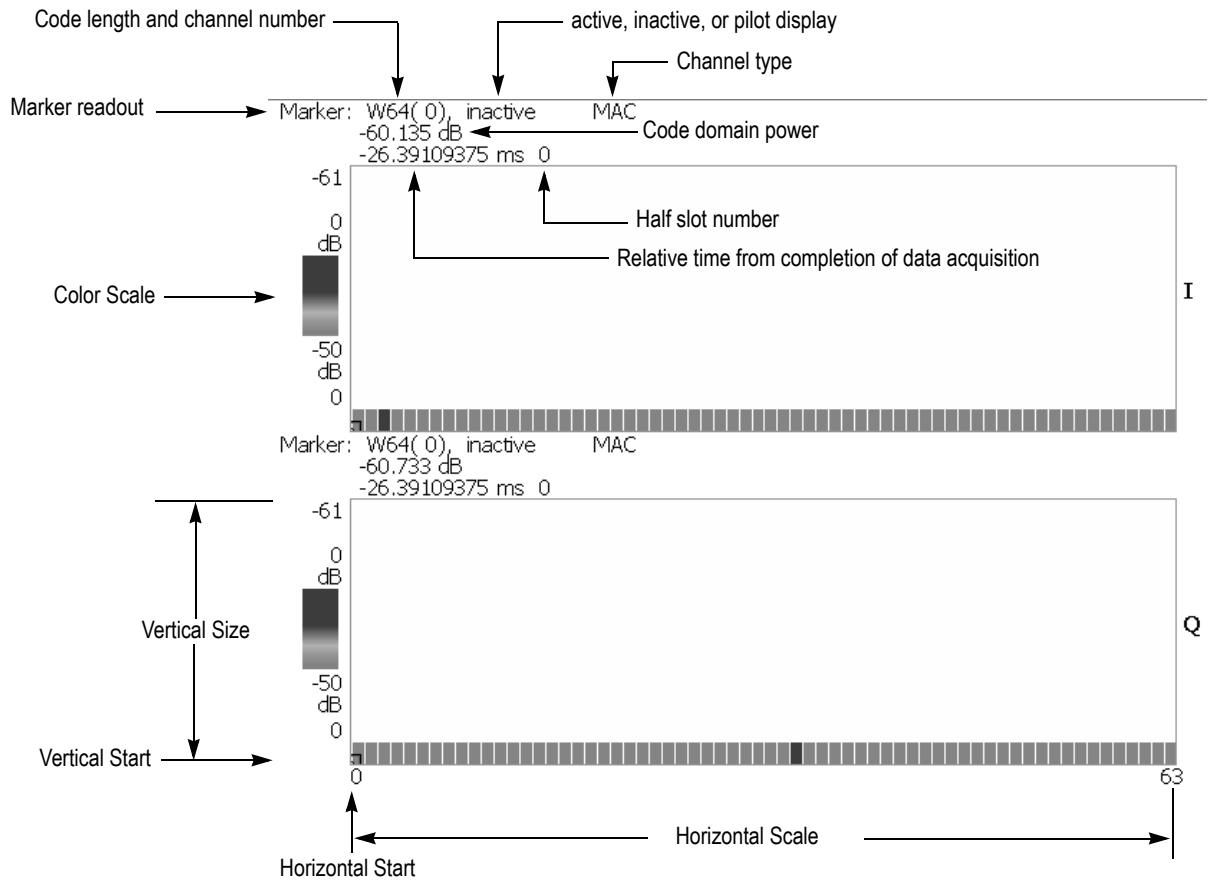


Figure 2-10: Power codogram display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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 Channel Type 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 are displayed for each chip or symbol (see Figure 2-11).

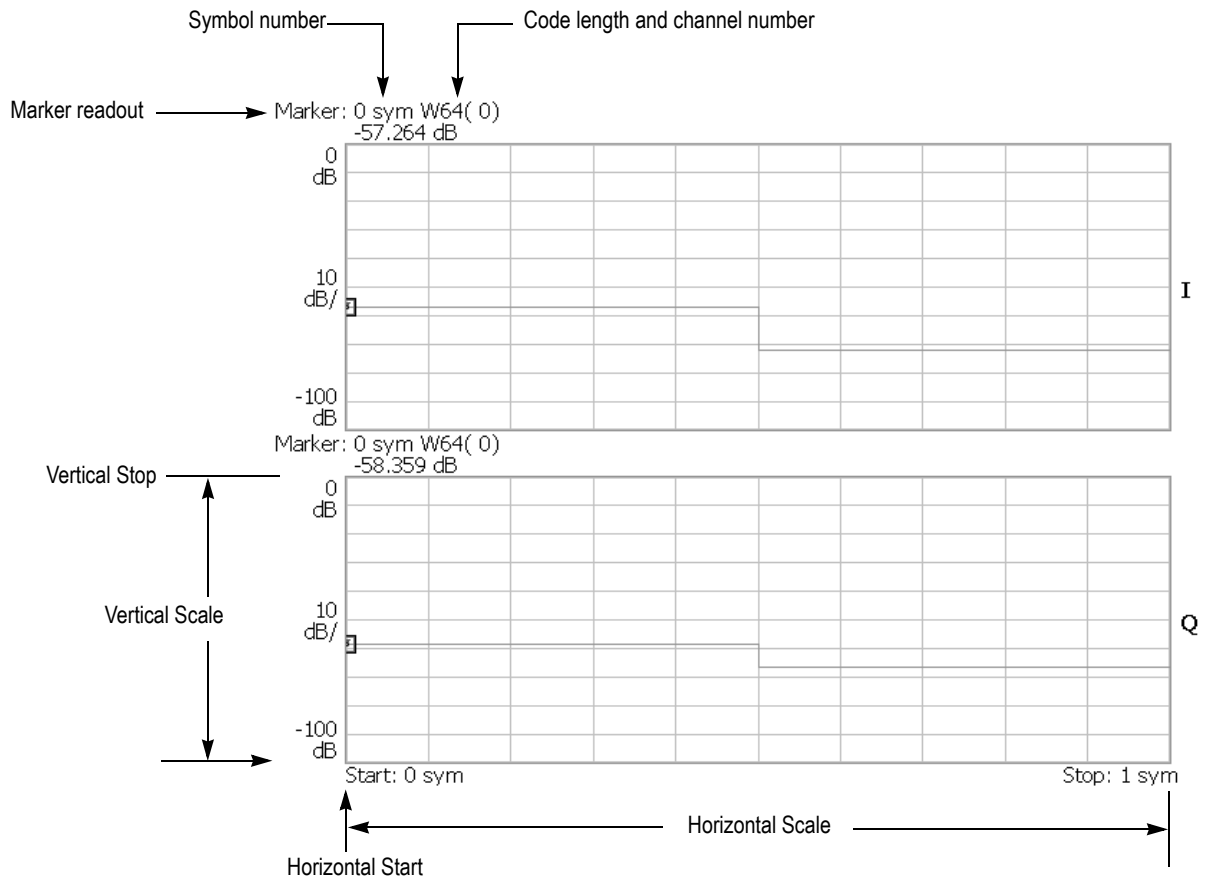


Figure 2-11: IQ power graph display

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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 start chip or symbol number of the horizontal axis.
- **Vertical Scale:** Sets the scale of the vertical axis. You can set the value from 100 μ dB to 100 dB.
- **Vertical Stop:** Sets the stop 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.

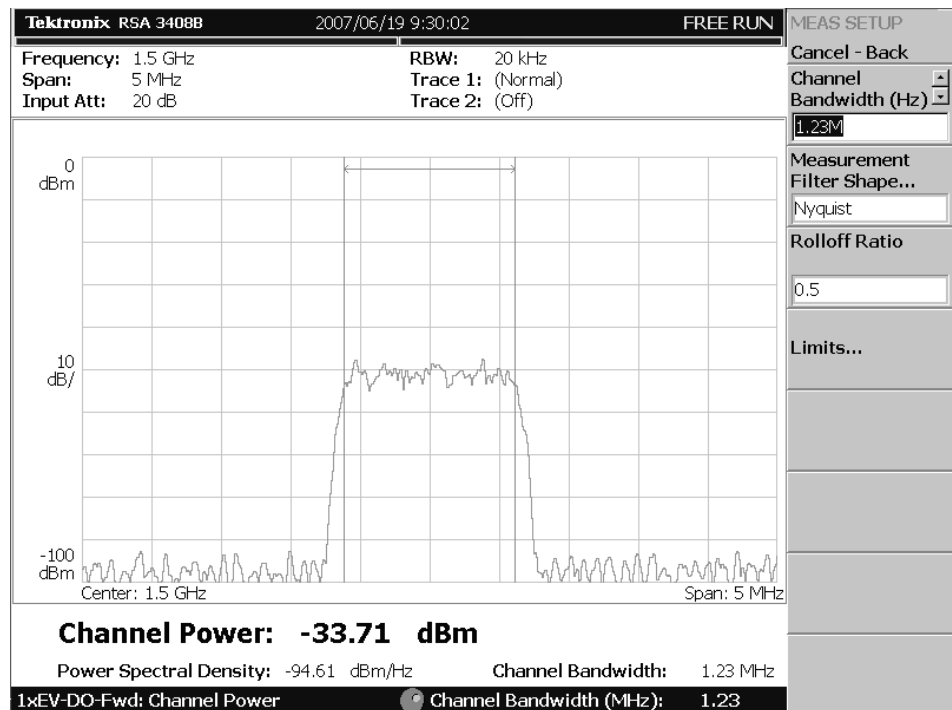


Figure 2-12: Channel power measurement

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 2-61 for more information.

NOTE. Refer to your instrument 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.

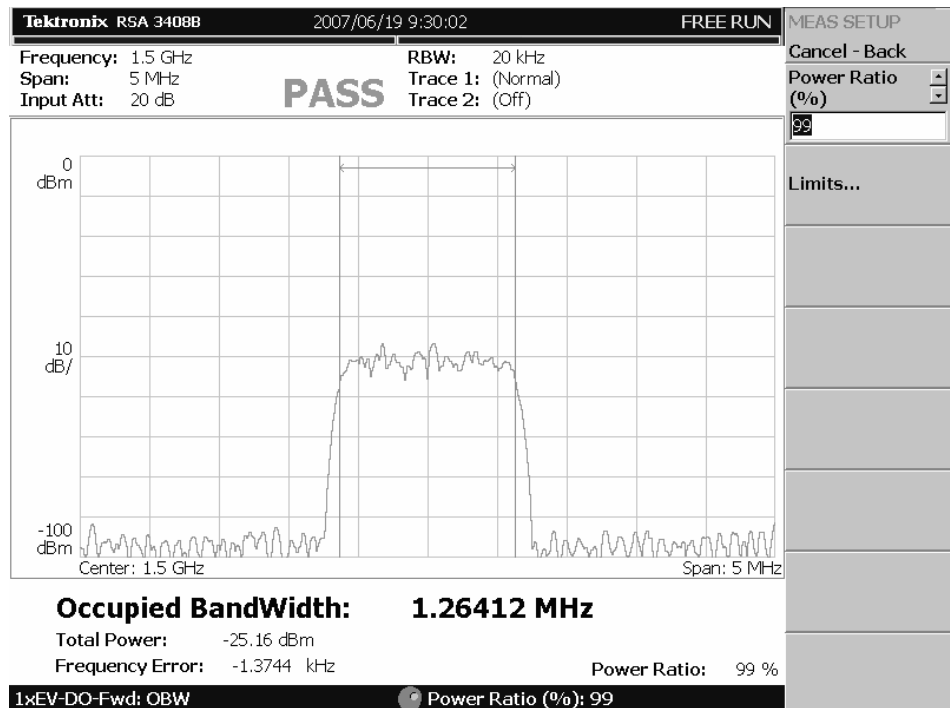


Figure 2-13: OBW measurement

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 you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

NOTE. Refer to your instrument 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 channels specified by limits. Figure 2-14 shows an example of the ACPR measurement.

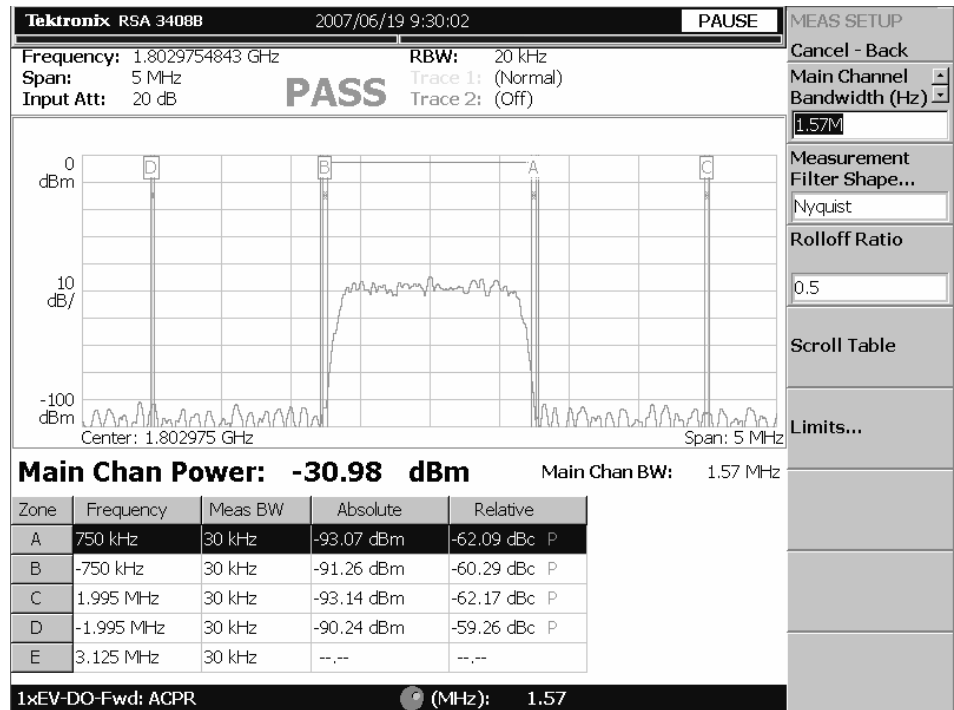


Figure 2-14: ACPR measurement

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.
- **Scroll Table:** Scrolls the table displayed in the view.
- **Limits:** Sets the pass/fail limit for the ACPR measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

NOTE. Refer to your instrument 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. Since the Option 26 provides the predefined measurement limits for each band class, you can perform pass/fail evaluations easily. Figure 2-15 shows an example of the spectrum emission mask measurement.

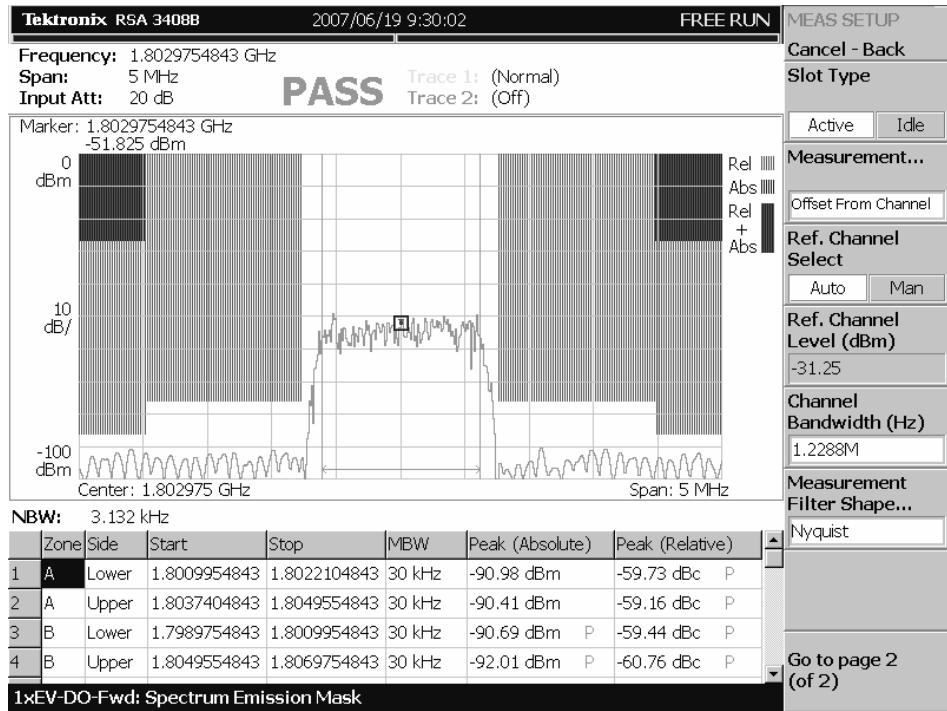


Figure 2-15: Spectrum emission mask measurement

NOTE. When performing this measurement, be sure to apply a continuous active slot signal or a continuous idle slot signal.

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.

- **Slot Type:** Selects the slot type to be measured. You can select Active or Idle. For Active, the total power of the Pilot, MAC, and Data channels is measured. For Idle, the burst power of the Pilot and MAC channels is measured.

The displayed menu items change depending on which slot type is selected.

When Active is selected:

- **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 channel level is measured from the input signal for the specified channel bandwidth. For Man, you can set the reference channel level in the Ref. Channel Level menu item.
- **Ref. Channel Level:** Sets the reference channel 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 spectrum emission mask measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.

When Idle is selected:

NOTE. *In this measurement, you cannot edit a frequency mask for trigger.*

- **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.
- **Gate Length:** Sets the gate length to be measured. You can set the value from 180 μ s to 840 μ s.
- **Burst Sync...:** Sets the burst point to be measured. You can select Rising Edge, Mid Point, or Trigger Position. This setting is only available when Slot Type is set to Idle.
- **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 channel 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 channel 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).
- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Limits...:** Sets the pass/fail limits for the spectrum emission mask measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.

NOTE. *Refer to your instrument user manual for information about the scale settings for the display.*

Setting the Acquisition and Analysis Parameters

When Idle is selected as the slot type, you can set the following timing parameter using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis menu.

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

Display Elements

When Idle is selected as the slot type, the following information is shown in the spectrum emission measurement display:

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

The display content in the overview can be changed using the View Define menu. Refer to the next subsection for more information about the View Define menu.

Changing the View Contents

When Idle is selected as the slot type, you can change the contents in the overview using the View Define menu. Press the View: **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).
- **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 2-16 shows an example of the gated output power measurement.

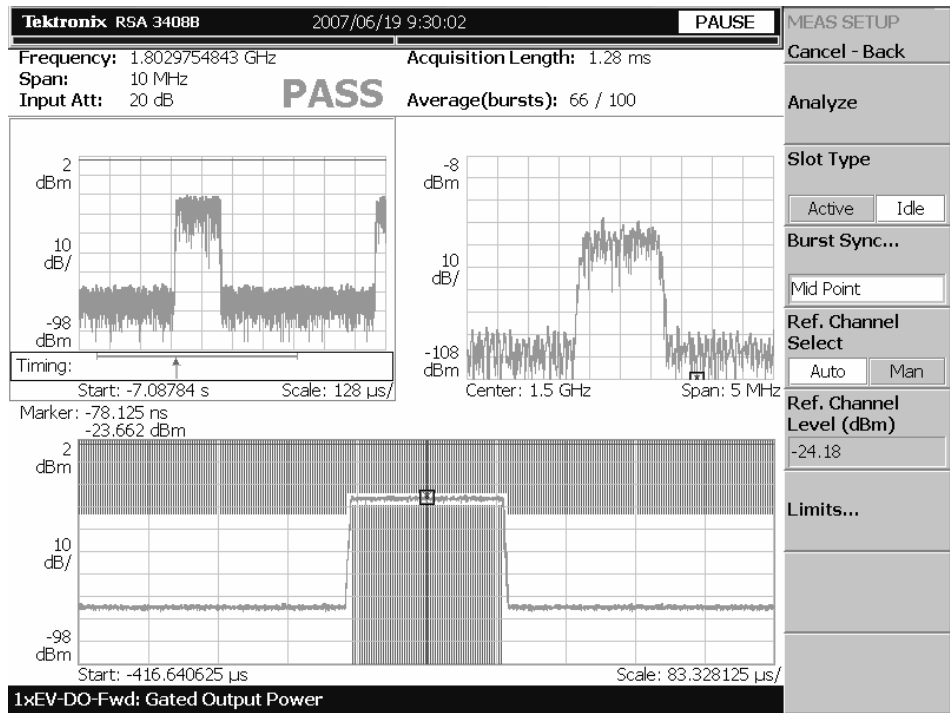


Figure 2-16: Gated output power measurement

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 2-32 for more information about the View Define menu.

Setting the Acquisition and Analysis Parameters

You can set the following timing parameter using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis 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.
- **Slot Type:** Selects the slot type to be measured. You can select Active or Idle. For Active, the total power of the Pilot, MAC, and Data channels is measured. For Idle, the burst power of the Pilot and MAC channels is measured.

NOTE. *When you select Idle, the trigger source need to be set to Level. For information about setting the trigger source, refer to your instrument user manual.*

- **Burst Sync...:** Sets the burst point to be measured. You can select Rising Edge, Mid Point, or Trigger Position. This setting is only available when Idle is selected as the slot type.
- **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 1 ms. 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 channel level is measured from the input signal. For Man, you can set the reference channel level in the Ref. Channel Level menu item.
- **Ref. Channel Level:** Sets the reference channel 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 you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

Changing the View Contents

You can change the contents in the overview using the View Define menu. Press the View: **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 Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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.

Intermodulation Measurement

The intermodulation measurement measures the third-order and fifth-order harmonic distortion components of a modulated signal. Figure 2-17 shows an example of the intermodulation measurement.

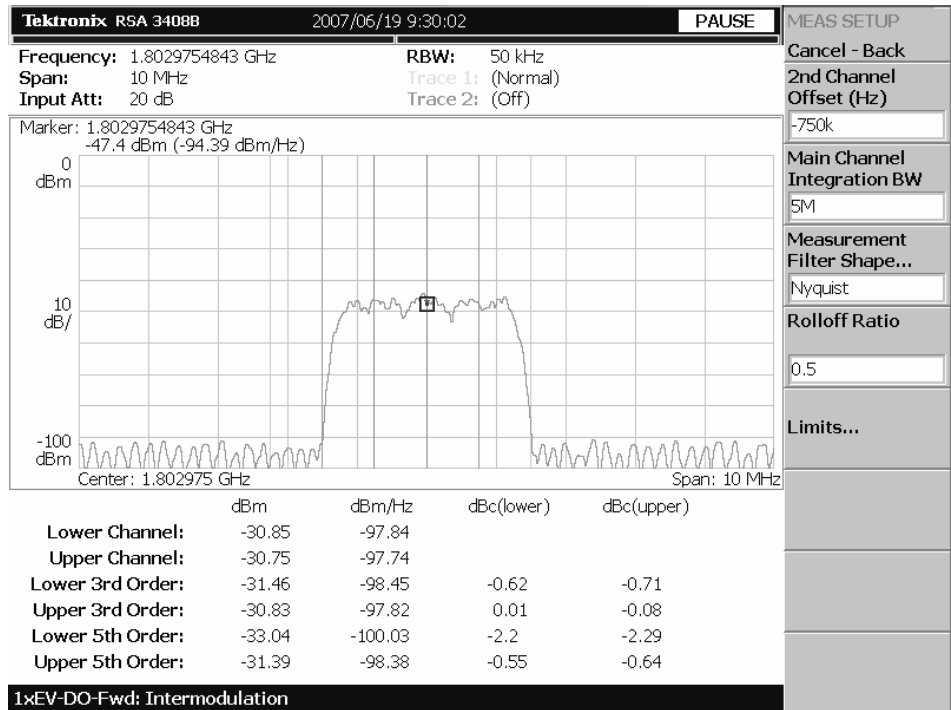


Figure 2-17: Intermodulation measurement

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 where the interfering carrier exists.
- **Main Channel Integration BW:** Sets the main channel 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 you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

NOTE. Refer to your instrument 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 2-18 shows an example of the CCDF measurement.

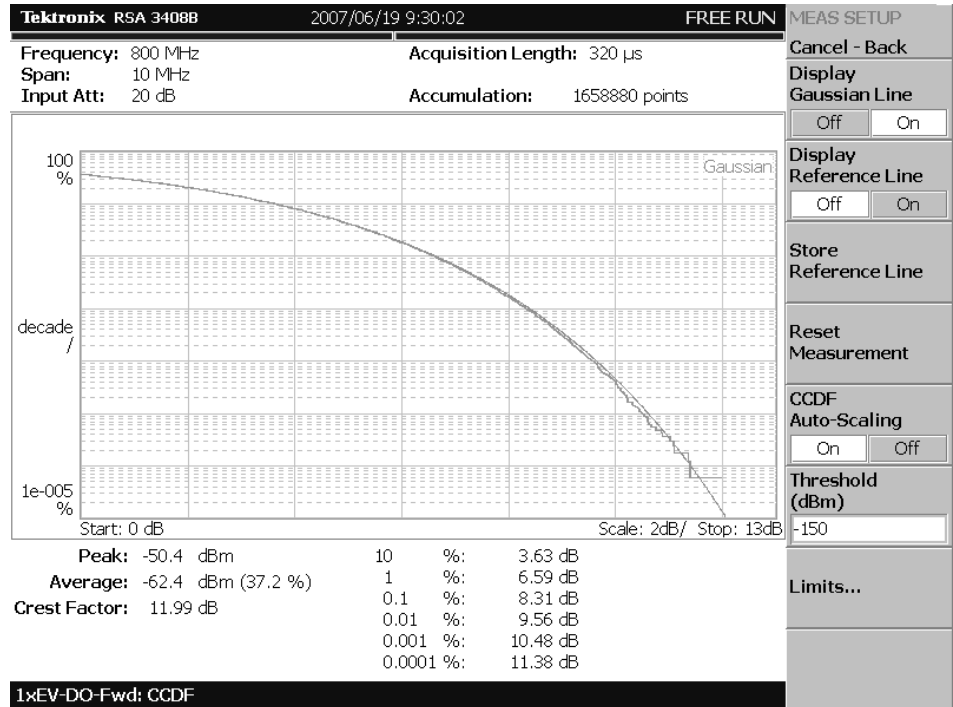


Figure 2-18: CCDF measurement (single view)

Setting the Acquisition and Analysis Parameters

You can set the following timing parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis 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 your instrument 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 which defines the samples to be included in the CCDF calculation. You can set the value from -250 dBm to 130 dBm.
- **Limits...:** When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

Changing the View Contents

You can change the contents in the overview using the View Define menu. Press the View: **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 Scale menu. Press the View: **Scale/Lines** key, and then press the **View Scale...** side 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) 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^{-5} 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:** Sets whether to display the sub-grid on the graticule.

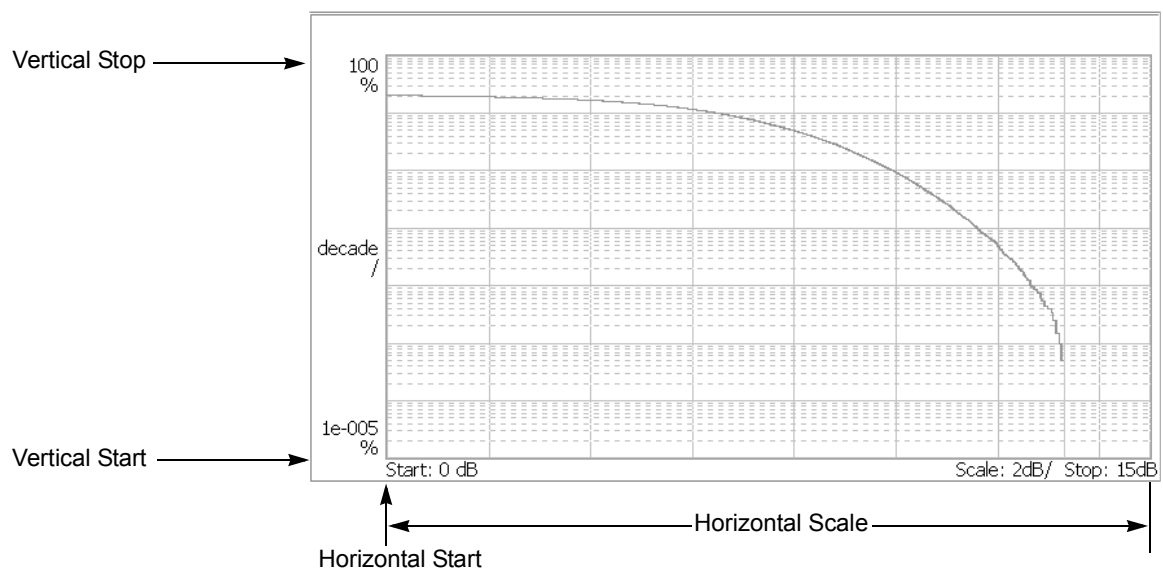


Figure 2-19: Scale settings in the CCDF display

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 2-20 shows an example of the pilot to code channel measurement.

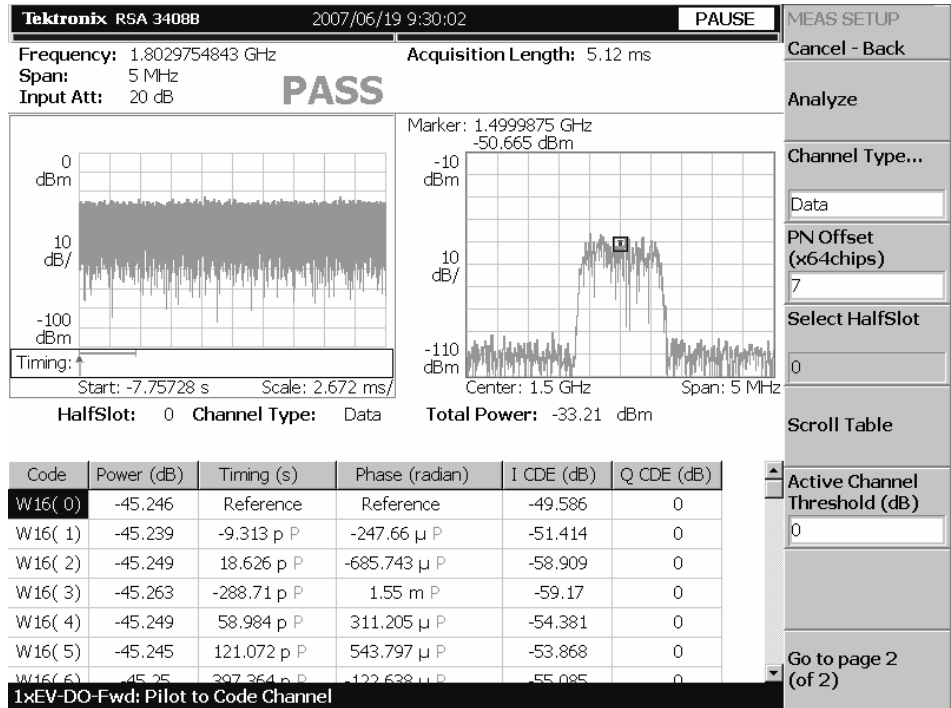


Figure 2-20: Pilot to code channel measurement

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, constellation.
- **Main view:** This view lists the following measurement results for the active channels:

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 2-40 for more information about the View Define menu.

Setting the Acquisition and Analysis Parameters

You can set the following timing parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the Acquisition/Analysis 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 half slots. 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 half slots.
- **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.

NOTE. Refer to your instrument 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.

- **Analyze:** Performs analysis for the time slots in the analysis range.
- **Channel Type...:** Select the channel type to be measured. You can select MAC, Data, or Preamble.
- **PN Offset:** Sets the PN offset in units of 64 chips. You can set the value from 0 to 511.
- **Select HalfSlot:** Sets the half slot for the measurement.
- **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 –100 dB to 0 dB.
- **Measurement Filter...:** Selects the measurement filter to apply when calculating pilot to code channel results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Limits...:** Sets the pass/fail limits for the pilot to code channel measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

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.

- **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) in symbols.
 - **MagErr:** Displays changes of magnitude error in symbols.
 - **PhaseErr:** Displays changes of phase error in symbols.
 - **Constellation:** Displays the signal as an I-Q constellation.

1xEV-DO Reverse Link Measurements

This section describes the functions and features of the 1xEV-DO 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
- Spectrum emission mask measurement
- Pilot to code Channel measurement

The following measurement items available in the 1xEVDO reverse link measurements are the same as those in the 1xEV-DO forward link measurements. Refer to *1xEV-DO Forward Link Measurements* beginning on page 2-3.

- Channel power measurement
- OBW measurement
- ACPR measurement
- Intermodulation measurement
- CCDF measurement

NOTE. *If you are not familiar with the operation of the analyzer, refer to your instrument 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 2-21 shows an example of the modulation accuracy measurement.

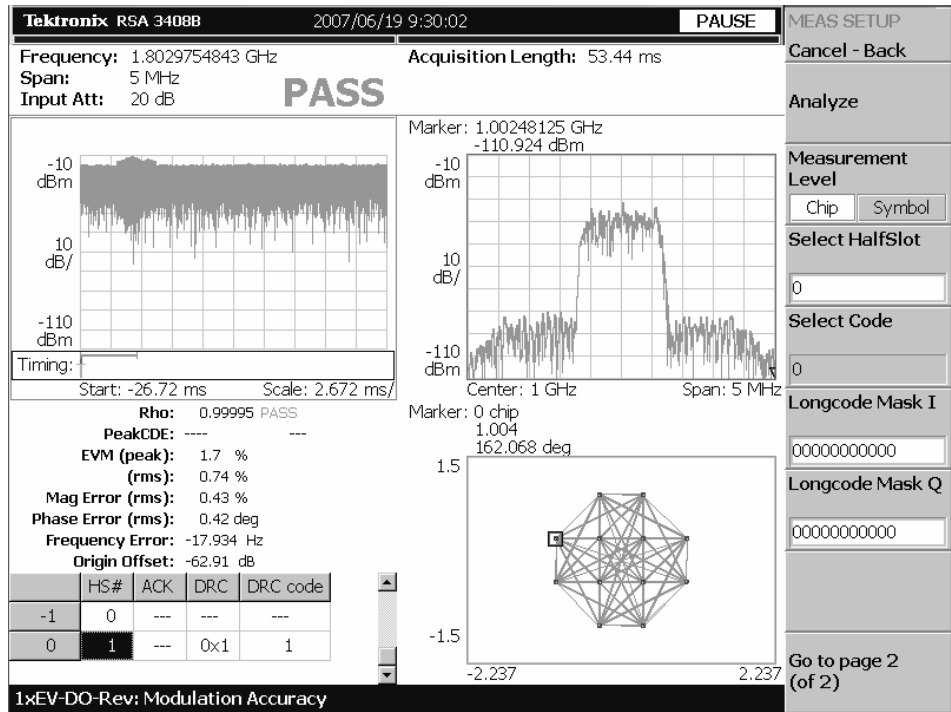


Figure 2-21: Modulation accuracy measurement-reverse link

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 2-45 for more information about the View Define menu.

Setting Acquisition and Analysis Parameters

You can set the following acquisition and analysis parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The setting 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 half slots. The setting 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 half slots.
- **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.

NOTE. Refer to your instrument user manual for detailed information about the acquisition and analysis 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).
- **Select HalfSlot:** Sets the half slot for the measurement.
- **Select Code:** Sets the code in the half slot for the measurement. This setting is only available when Measurement Level is set to Symbol.
- **Longcode Mask I:** Sets the long code mask value for the I signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **Longcode Mask Q:** Sets the long code mask value for the Q signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **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.
- **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).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Limits...:** Sets the pass/fail limits for the modulation accuracy measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

Changing the View Contents

You can change the view contents in the overview, subview, and main view using the View Define menu. Press the View: **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 changes of I and Q powers over time. 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 2-46 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 (see Figure 2-22). The peak code domain error is displayed only when the Measurement Level menu item is set to Symbol.

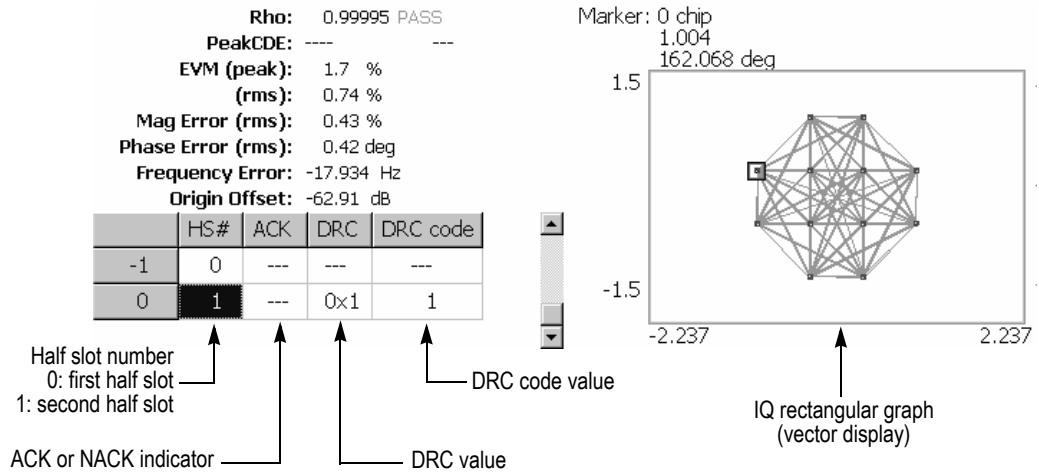


Figure 2-22: Modulation accuracy display-reverse link

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press **View Scale...** side 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 2-23).

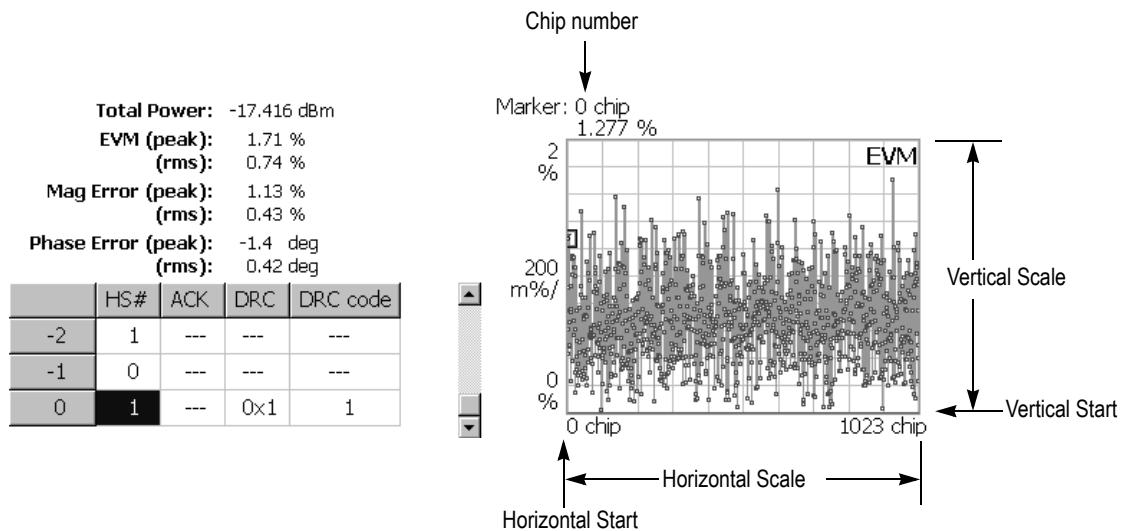


Figure 2-23: EVM display-reverse link

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press **View Scale...** side 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, MagError, or PhaseError. 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 2-24).

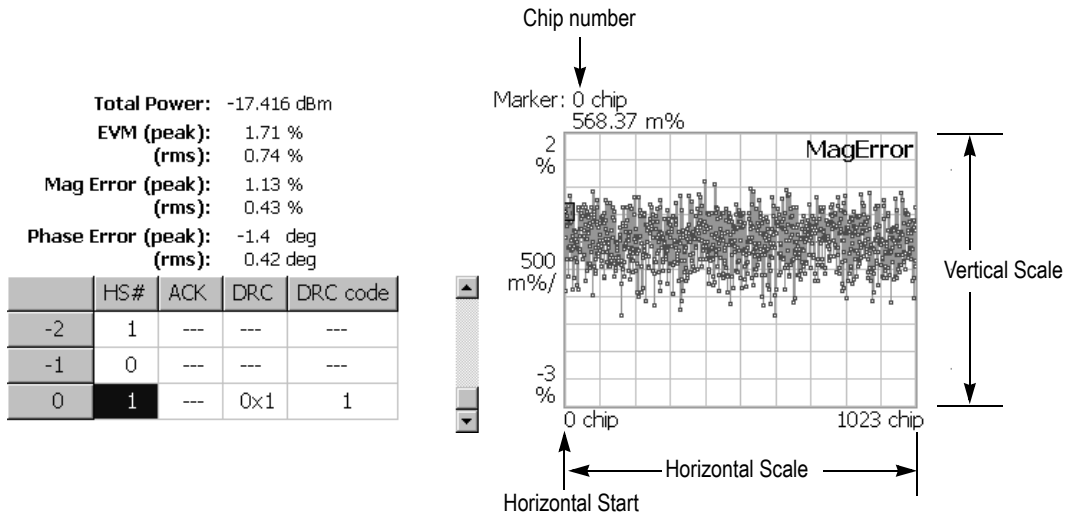


Figure 2-24: MagErr display-reverse link

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press **View Scale...** side 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, MagError, or PhaseError. 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 2-25).

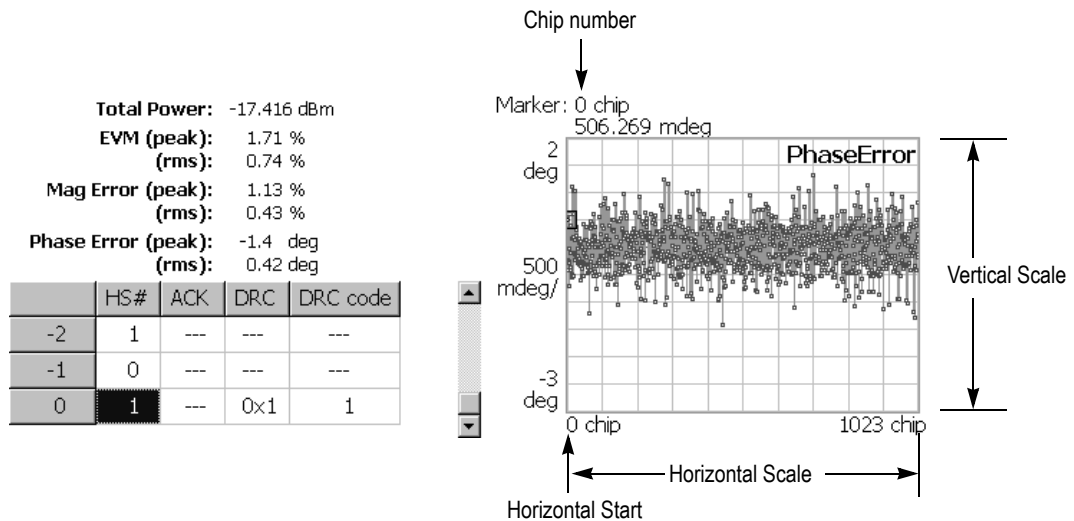


Figure 2-25: PhaseErr display-reverse link

You can set the scale of the display using the Scale menu. Press the View: **Scale/Lines** key, and then press **View Scale...** side 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 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, MagError, or PhaseError. 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 2-26). This display is only available when the Measurement Level menu item is set to Symbol.

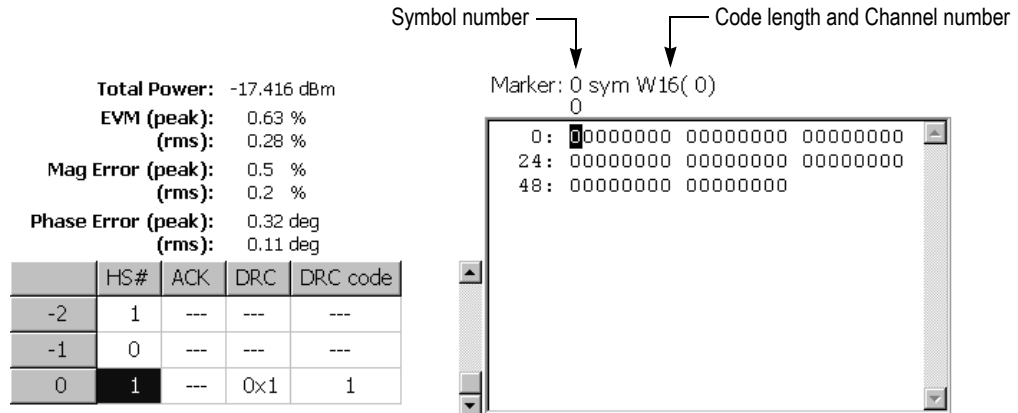


Figure 2-26: Symbol table display-reverse link

You can set the radix for the display using the Scale menu. Press the View: **Scale/Lines** key, and then press **View Scale...** side 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 2-27 shows an example of the code domain power measurement.

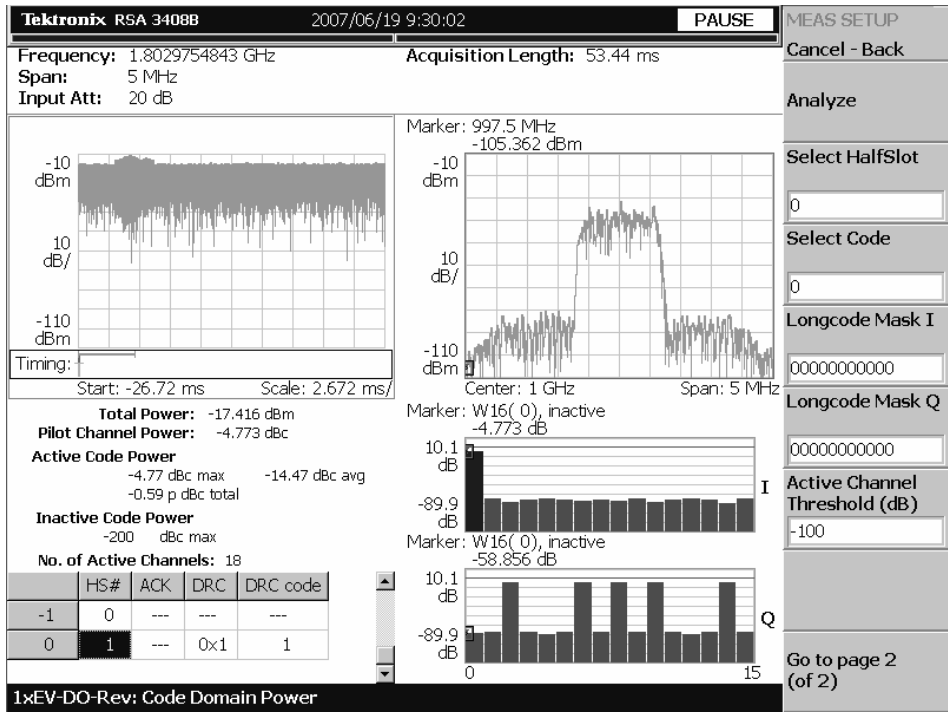


Figure 2-27: Code domain power measurement-reverse link

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.

The display contents in each view 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 Acquisition and Analysis Parameters

You can set the following acquisition and analysis parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The setting 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 half slots. The setting 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 half slots.
- **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 your instrument user manual for detailed information about the acquisition and analysis 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 Mainview Content in the View Define menu is set to IQ Power Graph.
- **Select HalfSlot:** Sets the half slot for the measurement.
- **Select Code:** Sets the code in the half slot for the measurement.
- **Longcode Mask I:** Sets the long code mask value for the I signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **Longcode Mask Q:** Sets the long code mask value for the Q signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **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
- **Measurement Filter...:** Selects the measurement filter to apply when calculating code domain power results. You can select None, cdma2000, or cdma2000+EQ (equalizer).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Limits...:** Sets the pass/fail limits for the code domain power measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

Changing the View Contents

You can change the contents in the overview, subview, and main view using the View Define menu. Press the View: **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.

Spectrum Emission Mask Measurement

The spectrum emission mask measurement verifies that the base station is not transmitting excessive power outside of its designated channel. Because Option 26 provides predefined measurement limits for each band class, you can perform pass/fail evaluations easily. Figure 2-28 shows an example of the spectrum emission mask measurement.

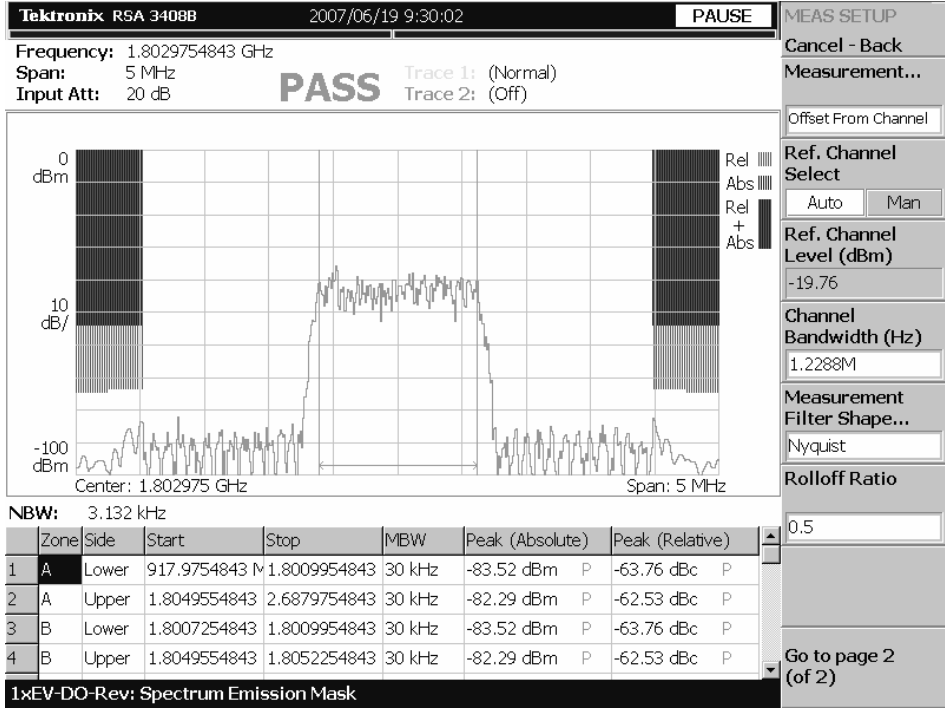


Figure 2-28: Spectrum emission mask measurement-reverse link

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 channel level is measured from the input signal for the specified channel bandwidth. For Man, you can set the reference channel level in the Ref. Channel Level menu item.
- **Ref. Channel Level:** Sets the reference channel 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 spectrum emission mask measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.
- **Scroll Table:** Scrolls the table displayed in the view.

NOTE. Refer to your instrument user manual for information about the scale settings for the 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 2-29 shows an example of the pilot to code channel measurement.

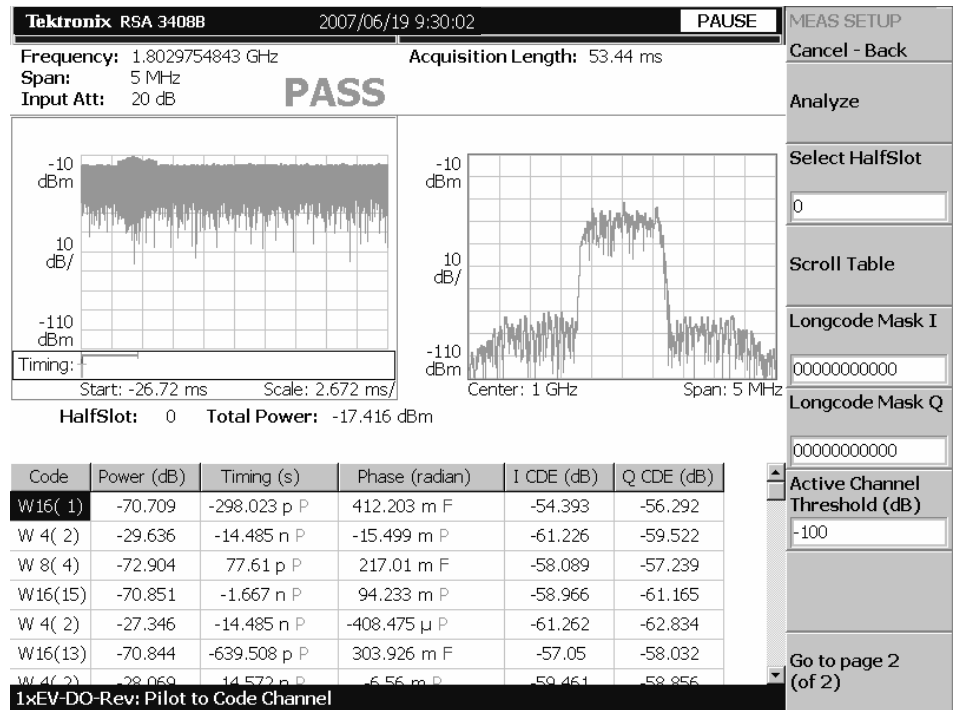


Figure 2-29: Pilot to code channel measurement-reverse link

Display Elements

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

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

- 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 2-59 for more information about the View Define menu.

Setting Acquisition and Analysis Parameters

You can set the following acquisition and analysis parameters using the Acquisition/Analysis menu. Press the **Acquisition/Analysis** key to open the menu.

- **Acquisition Length (chips):** Sets the acquisition length in chips. The setting 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 half slots. The setting 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 half slots.
- **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.

NOTE. Refer to your instrument user manual for detailed information about the time 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.
- **Select HalfSlot:** Sets the half slot for the measurement.
- **Select Code:** Sets the code in the half slot for the measurement.
- **Longcode Mask I:** Sets the long code mask value for the I signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **Longcode Mask Q:** Sets the long code mask value for the Q signal. You can set the value from 0 to 3FFFFFFFFF in the hexadecimal format.
- **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.
- **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).
- **IQ Swap:** Sets whether to swap the I and Q data streams before demodulation.
- **Limits...:** Sets the pass/fail limits for the pilot to code channel measurement. When you press this side key, the measurement limits editor appears. Refer to *Editing the Measurement Limits* on page 2-61 for more information.

Changing the View Contents

You can change the contents in the overview and subview using the View Define menu. Press the View: **Define** key to display the View Define menu.

- **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.

Editing the Measurement Limits

This section tells how to set measurement limits that can be used to perform pass/fail testing for the 1xEV-DO measurements.

Refer to *Measurement Limit Defaults* on page 2-71 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 2-30 shows the measurement limits editor for the 1xEV-DO forward link measurements.

Limit	Enable	Lower	Upper	Units
Channel Power	No	-150	30	dBm
ACPR		Select this row to edit limits		
Intermod 3rd Order	Yes		-20	dBc
Intermod 5th Order	Yes		-40	dBc
SEM Offset From Channel		Select this row to edit limits		
SEM Inband Spurious		Select this row to edit limits		
RMS EVM	No		10	percent
Peak EVM	No		31	percent
Peak Code Domain Error	No		0.4	dB
Rho	Yes	0.192		
Pilot To Code Timing	Yes	-50n	50n	s
Pilot To Code Phase	Yes	-0.15	0.15	radian
OBW	Yes	0	1.48M	Hz
Tau	Yes		0.00001	s
Gated Output Power (Idle)		Select this row to edit limits		
Gated Output Power (Active)		Select this row to edit limits		

Figure 2-30: 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.	-----	-----
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.	-1 to 1 s	-1 to 1 s
Pilot To Code Phase	Sets the lower and upper limits for the pilot to code phase measurement.	-100 to 100 degree	-100 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 (Idle)*	Select this item to access another measurement limits editor to edit gated output power limits.	-----	-----
Gated Output Power (Active)*	Select this item to access another measurement limits editor to edit gated output power limits.	-----	-----

* These items are only available in the 1xEV-DO forward 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**, **Gated Output Power (Idle)**, or **Gated Output Power (Active)** row.
3. Press the **Edit ACPR Limits...**, **Edit SEM Offset Limits...**, **Edit SEM Inband Limits...**, **Edit Gated Output Power (Idle) Limits...**, or **Edit Gated Output Power (Active) Limits...** 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 2-31 shows the measurement limits editor for the ACPR measurement.

Zone	A	B	C	D	E	F
Enable	Yes	Yes	Yes	Yes	Yes	No
Frequency	750 kHz	-750 kHz	1.995 MHz	-1.995 MHz	3.125 MHz	-3.125 MHz
Measure BW	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz
Limit (Abs)	-27 dBm	-27 dBm	-27 dBm	-27 dBm	-13 dBm	-13 dBm
Limit (Rel)	-45 dBc	-45 dBc	-55 dBc	-55 dBc	-55 dBc	-55 dBc
Fail Mode	Relative	Relative	Relative	Relative	Relative	Relative

LIMITS

Cancel - Back

Select column to edit

Enable

Yes No

Frequency Offset (Hz)

750k

Measurement BW (Hz)

30k

Absolute Limit (dBm)

-27

Relative Limit (dBc)

-45

Failure Mode...

Relative

Default limits to...

BC1

1xEV-DO-Fwd: ACPR Select column to edit:

Figure 2-31: 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 an absolute level limit for the zone.	-200 to 200 dBm
Limit (Rel)	Sets a relative level limit for the zone.	-200 to 200 dBc
Failure Mode	<p>Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are:</p> <ul style="list-style-type: none"> ■ 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 2-71 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 2-32 shows the measurement limits editor for the spectrum emission mask measurement.

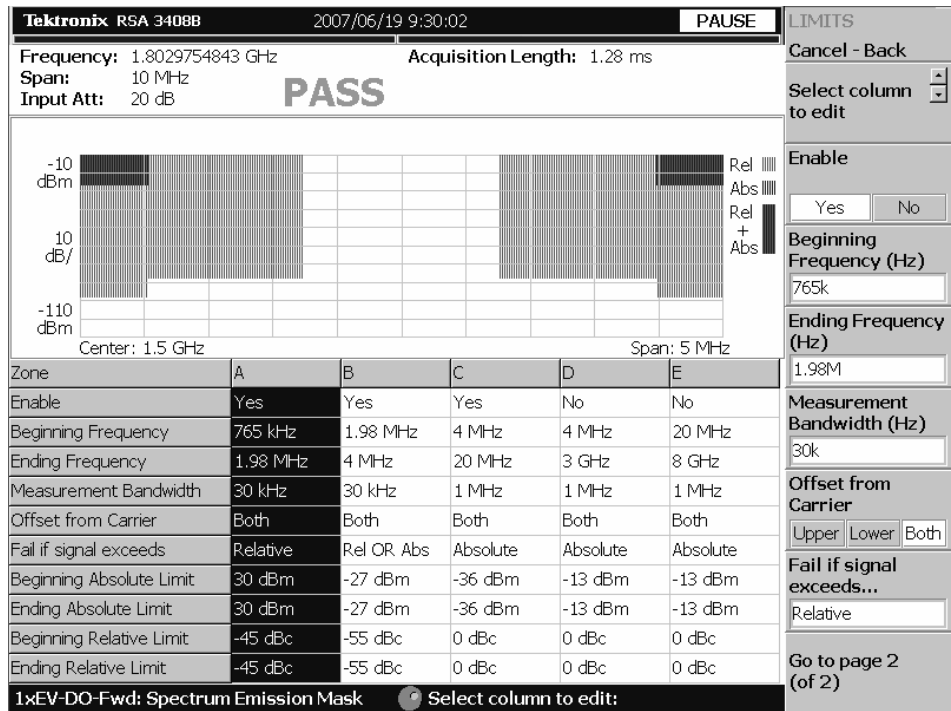


Figure 2-32: Spectrum emission mask measurement limits editor

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	<p>Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are:</p> <ul style="list-style-type: none"> ■ 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 2-71 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

When you select the Gated Output Power (Idle) row or Gated Output Power (Active) row in the measurement limits editor, another measurement limits editor for the gated output power measurement is displayed. Figure 2-33 shows the measurement limits editor for the gated output power measurement.

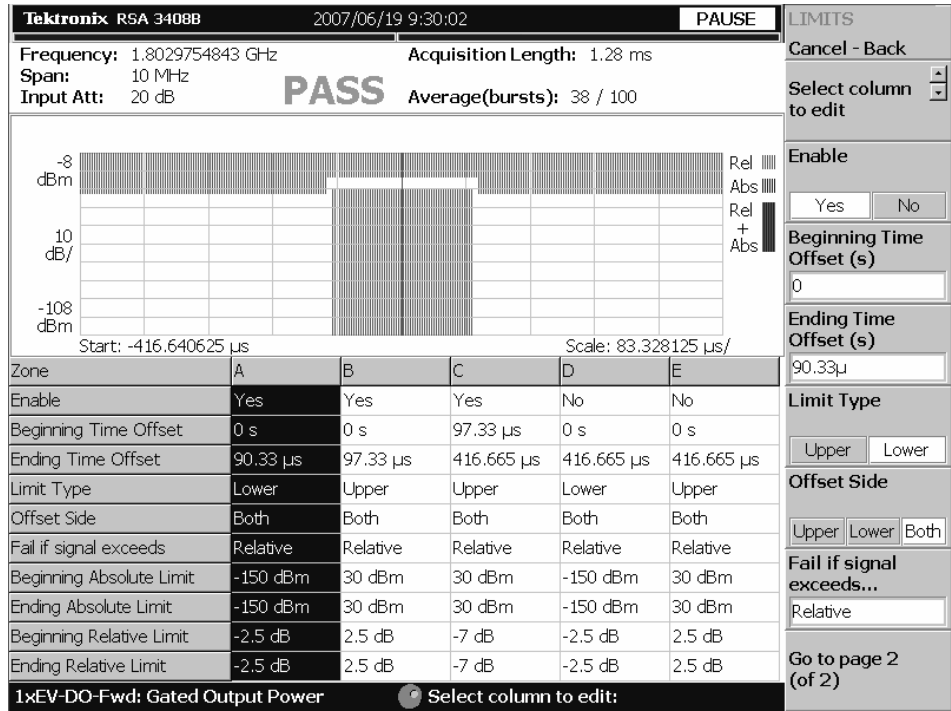


Figure 2-33: Gated output power measurement limits editor

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 from the center of the zone.	-10 to 10 s
Ending Time Offset	Sets the ending time from the center of the zone.	-10 to 10 s
Limit Type	Sets the limit type for the measurement. You can select Upper (upper limit) or Lower (lower limits).	-----
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	<p>Selects the fail mode to detect fail conditions between the measurement results and the test limits. The choices are:</p> <ul style="list-style-type: none"> ■ 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 2-71 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 your instrument 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 2-30).

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 2-30).

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 1xEV-DO measurements. Refer to *Using the Measurement Limits Editor* on page 2-61 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	-20	dBc
Intermod 5th Order	Yes	N.A	-40	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	-18	dBc
Intermod 5th Order	Yes	N.A	-36	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 Table 2-7 list the measurement limits that can be used for the ACPR measurement.

Table 2-7: Forward and reverse 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	-55 dBc	Relative
D	Yes	-1.995 MHz	30 kHz	-27 dBm	-55 dBc	Relative
E	Yes	3.125 MHz	30 kHz	-13 dBm	-55 dBc	Relative
F	No	-3.125 MHz	30 kHz	-13 dBm	-55 dBc	Relative
G	No	4 MHz	30 kHz	-13 dBm	-55 dBc	Relative
H	No	-4 MHz	30 kHz	-13 dBm	-55 dBc	Relative
I	No	7.5 MHz	30 kHz	-13 dBm	-55 dBc	Relative
J	No	-7.5 MHz	30 kHz	-13 dBm	-55 dBc	Relative
K	No	0 Hz	30 kHz	-13 dBm	-55 dBc	Relative
L	No	0 Hz	30 kHz	-13 dBm	-55 dBc	Relative

SEM Offset from Channel Limits Tables 2-8 through 2-16 list the measurement limits that can be used for the SEM Offset From Channel measurement.

Table 2-8: 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 2-9: 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 2-10: 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 2-11: 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 $-[13+17x(\Delta f-1.45 \text{ MHz})]$ dBm when Δf is 2.25 MHz.

Table 2-12: 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 2-13: 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 2-14: 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 2-15: 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 $-[13+1x(\Delta f-2.25 \text{ MHz})]$ dBm when Δf is 4 MHz.

Table 2-16: 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 2-17 through 2-19 list the measurement limits that can be used for the SEM Inband Spurious measurement.

Table 2-17: 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 2-18: 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 2-19: 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 Tables 2-20 and 2-21 list the measurement limits that can be used for the gated output power measurement.

Table 2-20: Forward link, all band classes, idle slot

Zone	A	B	C	D	E
Enable	Yes	Yes	Yes	No	No
Start Time	0 s	0 s	97.33 μ s	0 s	0 s
Stop Time	90.33 μ s	97.33 μ s	416.665 μ s	416.665 μ s	416.665 μ s
Upper/Lower	Lower	Upper	Upper	Lower	Upper
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Relative	Relative	Relative	Relative
Absolute Start	-150 dBm	30 dBm	30 dBm	-150 dBm	30 dBm
Absolute Stop	-150 dBm	30 dBm	30 dBm	-150 dBm	30 dBm
Relative Start	-2.5 dB	2.5 dB	-7 dB	-2.5 dB	2.5 dB
Relative Stop	-2.5 dB	2.5 dB	-7 dB	-2.5 dB	2.5 dB

Table 2-21: Forward link, all band classes, active slot

Zone	A	B	C	D	E
Enable	No	No	No	Yes	Yes
Start Time	0 s	0 s	97.33 μ s	0 s	0 s
Stop Time	90.33 μ s	97.33 μ s	416.665 μ s	416.665 μ s	416.665 μ s
Upper/Lower	Lower	Upper	Upper	Lower	Upper
Offset Side	Both	Both	Both	Both	Both
Failure Mode	Relative	Relative	Relative	Relative	Relative
Absolute Start	-150 dBm	30 dBm	30 dBm	-150 dBm	30 dBm
Absolute Stop	-150 dBm	30 dBm	30 dBm	-150 dBm	30 dBm
Relative Start	-2.5 dB	2.5 dB	-7 dB	-2.5 dB	2.5 dB
Relative Stop	-2.5 dB	2.5 dB	-7 dB	-2.5 dB	2.5 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: MAC: 64 codes Pilot: 32 codes Data: 16 codes Preamble: 32 codes Reverse link: 16 codes	Relative: -200 to 100 dB Absolute: 140 to -160 dBm																		
Modulation accuracy	Fixed	Fixed																		
EVM	Forward link: <table border="1"> <thead> <tr> <th>Channel</th> <th>Chip</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>Overall</td> <td>1024</td> <td>-----</td> </tr> <tr> <td>MAC</td> <td>128</td> <td>2</td> </tr> <tr> <td>Pilot</td> <td>96</td> <td>3</td> </tr> <tr> <td>Data</td> <td>max 800</td> <td>max 50</td> </tr> <tr> <td>Preamble</td> <td>max 800</td> <td>max 25</td> </tr> </tbody> </table> Reverse link: Chip: 1024 Symbol: max 256	Channel	Chip	Symbol	Overall	1024	-----	MAC	128	2	Pilot	96	3	Data	max 800	max 50	Preamble	max 800	max 25	-100 to 200%
Channel	Chip	Symbol																		
Overall	1024	-----																		
MAC	128	2																		
Pilot	96	3																		
Data	max 800	max 50																		
Preamble	max 800	max 25																		
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	Forward link: MAC: 2 Pilot: 3 Data: max 50 Preamble: max 25 Reverse link: 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																		



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