MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Signal Analyzer Function Operation

23rd Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided within the MS2830A Signal Analyzer Operation Manual (Mainframe Operation), MS2840A Signal Analyzer Operation Manual (Mainframe Operation), or MS2850A Signal Analyzer Operation Manual (Mainframe Operation). Please also refer to this document before using the equipment.
- Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W3335AE-23.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

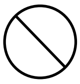
⚠ DANGER This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

⚠ WARNING This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

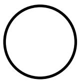
⚠ CAUTION This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

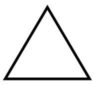
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



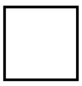
This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



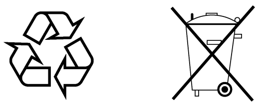
This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MS2830A/MS2840A/MS2850A
Signal Analyzer
Operation Manual Signal Analyzer Function Operation

15 December 2009 (First Edition)
20 February 2019 (23rd Edition)

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Cautions against computer virus infection

- Copying files and data

  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.

  All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software

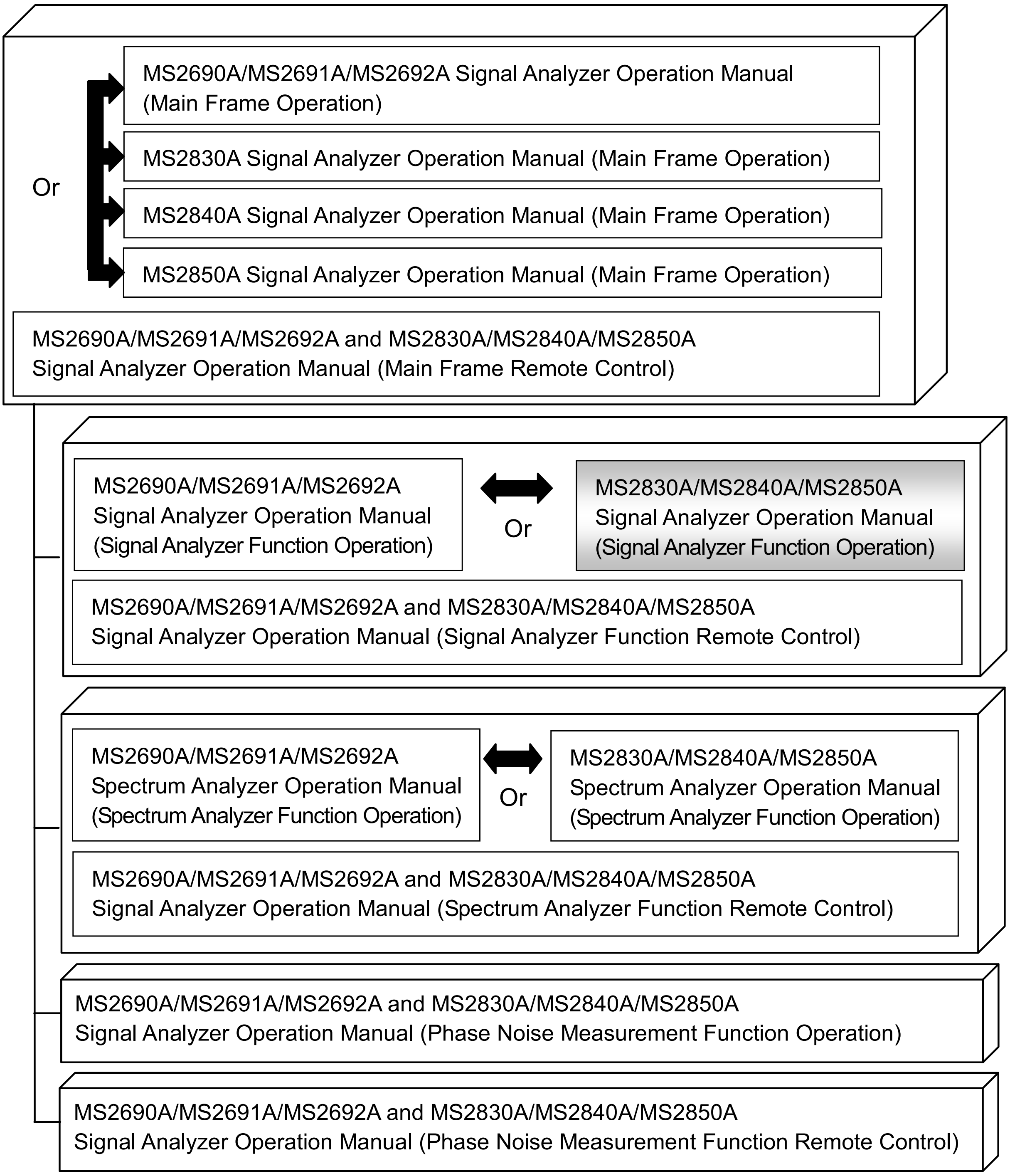
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections

  Ensure that the network has sufficient anti-virus security protection in place.

About This Manual

■ Operation manual configuration

The operation manual configuration of the MS2830A, MS2840A, and MS2850A Signal Analyzer is shown below.



- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)
  Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe

- Signal Analyzer Operation Manual (Signal Analyzer Function Operation) <This document>
- Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)
  Description of basic operations, functions and remote functions of the signal analyzer

- Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)
- Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)
  Description of basic operations, functions and remote functions of the spectrum analyzer

- Signal Analyzer Operation Manual (Phase Noise Measurement Function Operation)
- Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control)
  Description of basic operations, functions and remote functions of the phase noise measurement function.

Convention Used in This Manual

Throughout this document, the use of MS2830A is assumed unless otherwise specified. If using MS2840A or MS2850A, change MS2830A to read MS2840A or MS2850A.

In this document,  indicates a panel key.

Table of Contents

Chapter 1 Overview

This chapter describes an overview of the Signal Analyzer function.

1.1 Overview of Signal Analyzer

The MS2830A, MS2840A, and MS2850A Signal Analyzer is a spectrum analyzer to which options such as real-time signal analysis and vector modulation analysis can be added.

The signal analyzer application (hereinafter “this application”) enables high-speed and high-accuracy signal processing of wide-ranging analyses at full-span, a characteristic of conventional sweep-type spectrum analyzers, using a digital IF block. In addition, the FFT process (high-speed Fourier conversion) realizes high-speed spectrum analysis and simultaneous analysis on frequency and time axes not possible with conventional sweep-type spectrum analyzers. Also, added option enables recording of the RF input signal as digital data (digitize function). It can be used in a variety of applications from research and development to manufacturing thanks to its characteristics.

The Signal Analyzer function has the following features:

- Broad frequency band
  MS2830A: 3.6 GHz/6 GHz/13.5 GHz/26.5 GHz/43 GHz
  MS2840A: 3.6 GHz/6 GHz/26.5 GHz/44.5 GHz
  MS2850A: 32 GHz/44.5 GHz
- Broad analysis bandwidth

MS2830A-006/106	10 MHz
MS2830A-005/105/007/009/109	31.25 MHz
MS2830A-077	62.5 MHz
MS2830A-078	125 MHz
MS2840A-006/106	10 MHz
MS2840A-005/105/009/109	31.25 MHz
MS2840A-077/177	62.5 MHz
MS2840A-078/178	125 MHz
MS2850A-032	255 MHz
MS2850A-033/133	510 MHz
MS2850A-034/134	1 MHz

- High dynamic range
- High-speed measurement
- High-speed, high-accuracy signal analysis using digital IF
- Enables time-continuous analysis of loaded data
- Large-capacity waveform memory and digitization function that records RF signals without missing.
  MS2830A-005/105/006/106/007/009/109/077/078
  MS2840A-005/105/006/106/009/109/077/177/078/178
  MS2850A-032/033/133/034/134
- Wide variety of measurement functions

1.2 Features of Signal Analyzer

A signal analyzer can perform analysis with both the frequency and time axes. It achieves high-speed spectrum analysis by using fast Fourier transformation (FFT) technology.

Differences from a sweep type spectrum analyzer

This section compares the signal analyzer with a conventional sweep type spectrum analyzer and describes the differences.

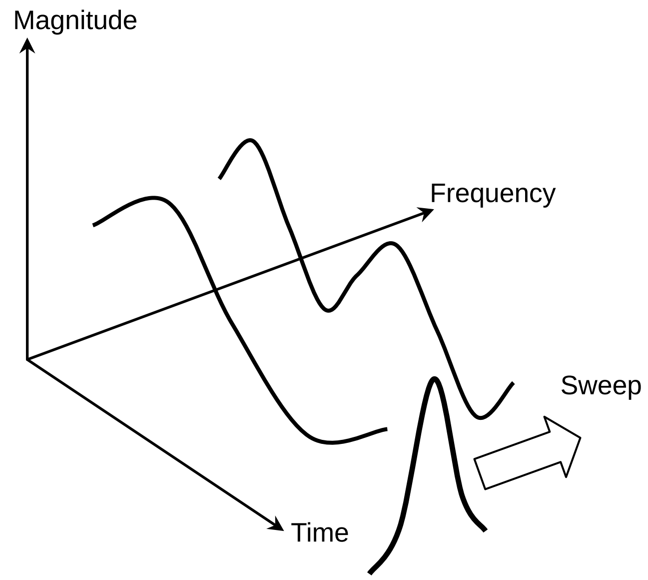


Figure 1.2-1 Principle of a sweep type spectrum analyzer

As shown in Figure 1.2-1, a sweep type spectrum analyzer sweeps a filter with a certain frequency band. Because observation is done only within the filter band, only one frequency can be observed at one given moment. To analyze a spectrum of multiple signals simultaneously, the filter must be swept in the entire band, and no signal can be detected for a high sweep speed (i.e., short sweep time). This results in a limitation of the sweep speed for accurate measurement.

On the other hand, the signal analyzer captures the time domain data and performs FFT processing to display all the signals in the frequency band simultaneously, quickly, and accurately.

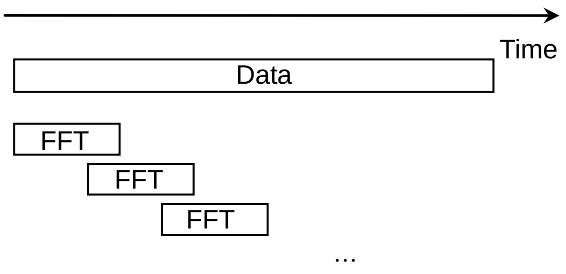


Figure 1.2-2 Principle of Signal Analyzer

Analyzing captured IQ data in various domains

The signal analyzer can analyze simultaneous input signals by capturing IQ data for a certain time interval.

Spectrum:	Performs spectrum analysis by the FFT method. It performs noise measurement and power measurement of modulation signal waves accurately and quickly, which are difficult to measure accurately by using a sweep type spectrum analyzer.
Power vs Time:	Observes time fluctuations of power. It performs burst average power accurately and quickly.
Frequency vs Time:	Observes time fluctuations of frequency. It can perform frequency lock time measurement without using any special instrument.
Phase vs Time:	Measures time fluctuation of phase.
CCDF:	Performs Complementary Cumulative Distribution Function (CCDF) analysis.
Spectrogram	Performs Spectrogram analysis. It is used to diagram the changes in a spectrum over time.
No Trace:	Only captures IQ data without executing signal analysis.

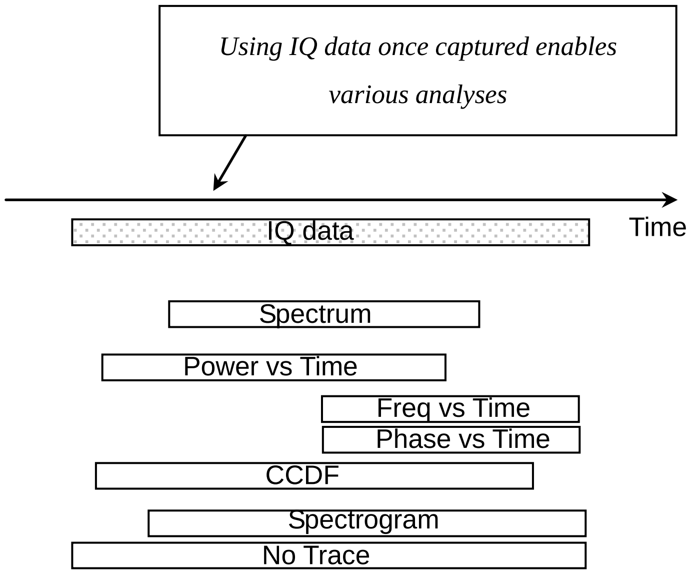


Figure 1.2-3 Multiple analyses

As shown in Figure 1.2-3, once the IQ data for a certain time interval is captured, 6 types of analysis methods can be selected for analysis in the time range. When No Trace is selected, only IQ data is captured without executing signal analysis.

Chapter 2 Basic Operation

This chapter describes the basic operation for the Signal Analyzer function.

2

Basic Operation

2.1 Display Description

This section describes the display items on the main screen of the Signal Analyzer function.

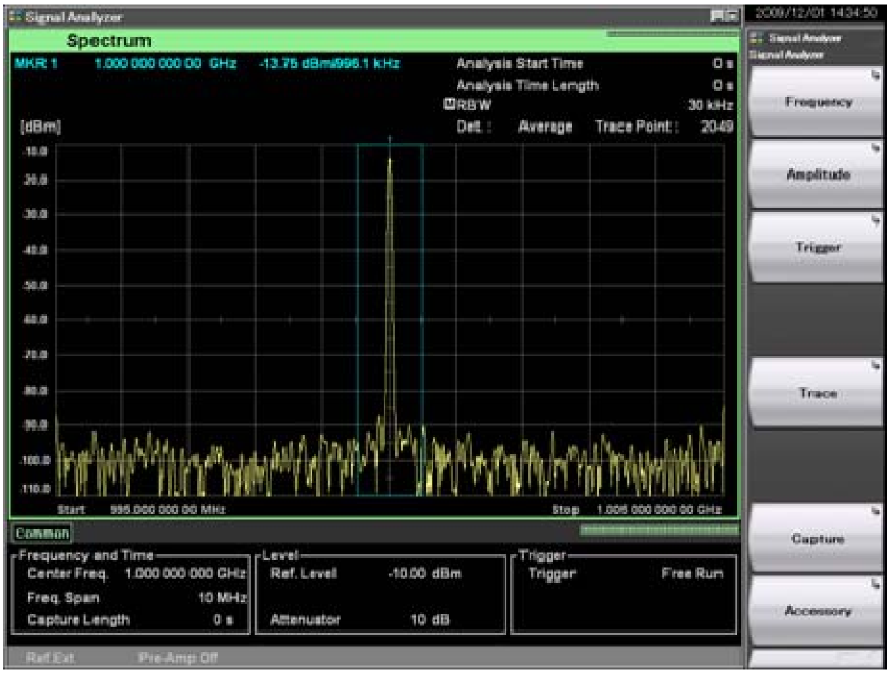


Figure 2.1-1 Main screen of Signal Analyzer function

The main function menu on the main screen is described below.

Table 2.1-1 Main function menu

Function key	Menu Display	Function
F1	Frequency	Sets the frequency. ☞ 2.2 "Setting Frequency"
F2	Amplitude	Sets the level. ☞ 2.3 "Setting Level"
F3	Trigger	Sets the trigger. ☞ 3.2 "Trigger Function"
F5	Trace	Configures the settings related to trace. ☞ Chapter 4 "Trace"
F7	Capture	Used for setting related to IQ data capture. ☞ 2.4 "Setting IQ Data Capture Time Range"
F8	Accessory	Sets up other functions. ☞ Chapter 6 "System Setting"

2.2 Setting Frequency

The Signal Analyzer function can set the following four measurement frequencies.

- Center frequency
- Frequency span
- Start frequency
- Stop frequency

Pressing F1 (Frequency) from page 1 of the main function menu, or pressing Frequency displays the Frequency function menu.

Press the span setting key Span to set the frequency span.

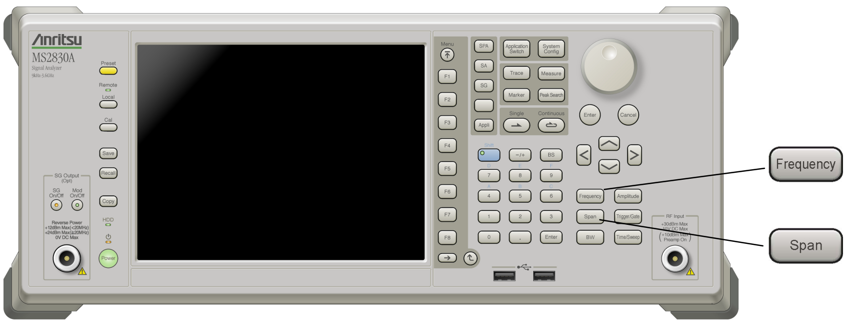


Figure 2.2-1 Frequency key and Span key

Table 2.2-1 Frequency function menu

Function key	Menu Display	Function
Page 1	Frequency	Press **Frequency** to display this menu.
F1	Center	Sets the center frequency. ☞ 2.2.1 “Setting center frequency”
F2	Start	Sets the start frequency. ☞ 2.2.3 “Setting start frequency”
F3	Stop	Sets the stop frequency. ☞ 2.2.4 “Setting stop frequency”
F4	Span	Sets the frequency span. ☞ 2.2.2 “Setting frequency span”
F5	Preselector Auto Tune	Perform the preselector auto tuning. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A-047/046. ☞ 6.7.1 “Preselector auto tuning”
F6	Switching Speed	Sets the frequency switching speed. ☞ 2.2.6 “Switching Speed”
F7	Step Size	Sets the step size for center, start and stop frequency. ☞ 2.2.7 “Setting step size”
F8	Frequency Band Mode (Spurious/Normal)	Selects the Spurious Mode or Normal Mode. This function is available with MS2830A-041/043/044/045, MS2840A-041/044/046, or MS2850A-047/046. ☞ 2.2.5 “Setting frequency band”

Table 2.2-1 Frequency function menu (Cont'd)

Function key	Menu Display	Function
Page 2	Frequency	Press **Frequency**, and then press ➔ to display this menu.
F1	External Mixer (On/Off)	Turn on when using external mixer. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. ☞ Chapter 7 "External Mixer"
F2	External Mixer Band Select	Opens the Ext Band Select menu. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is available when External Mixer is turned On. ☞ 7.4 "Setting Band of External Mixer"
F3	External Mixer Bias	Sets the External Mixer Bias. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is not available when High Performance Waveguide Mixer is selected, or External Mixer is turned Off. ☞ 7.5 "Setting External Mixer Bias"
F4	External Mixer Loss	Sets the External Mixer Loss. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is not available when High Performance Waveguide Mixer is selected, or External Mixer is turned Off. ☞ 7.6 "Setting Conversion Loss of External Mixer"
F8	Micro Wave Preselector Bypass (On/Off)	Enables/Disables the Micro Wave Preselector Bypass function. This function is available with MS2830A-007/067/167, MS2840A-067/167, or MS2850A. The frequency characteristics can be improved at 4 GHz or more of the preselector band when setting preselector Bypass to On. If Frequency Span is 50 MHz or more, the microwave preselector is bypassed regardless of this setting. This function is not available when External Mixer is turned On. ☞ 1.3.13 "MS2830A-067/167", 1.3.14 "MS2830A-007" in the *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*, 1.3.15 "MS2840A-067/167" in the *MS2840A Signal Analyzer Operation Manual (Mainframe Operation)*, or 1.3.6 "MS2850A-067" in the *MS2850A Signal Analyzer Operation Manual (Mainframe Operation)*.

The display items related to the frequency parameters are described below.

Figure 2.2-2 Display items related to frequency parameters

Table 2.2-2 Display items related to frequency parameters

No.	Display	Description
[1]	Center Freq. or Start Freq.	Displays the center frequency or start frequency.
[2]	Freq. Span	Displays the frequency span.

The relationships between the center frequency, frequency span, start frequency, and stop frequency are always as shown in Figure 2.2-3. When any of the center frequency, start frequency, stop frequency, and frequency span are set, the remaining 2 frequencies that have not been set are automatically set.

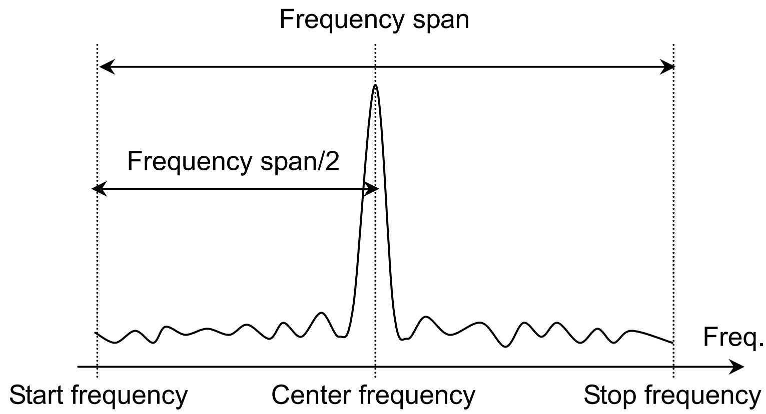


Figure 2.2-3 Center frequency, frequency span, start frequency, and stop frequency

Example: When the frequency span is set to 5 MHz, and the stop frequency to 1 GHz

Frequency span: 5 MHz
Stop frequency: 1 GHz
Start frequency: 995 MHz (auto setting)
Center frequency: 997.5 MHz (auto setting)

2.2.1 Setting center frequency

Example: To set the center frequency to 1 MHz

<Procedure>

1. Press [Frequency], or press [F1] (Center) from the Frequency function menu.
2. After pressing [1], press [F2] (MHz) to set the center frequency.

Setting range and resolution for center frequency

Setting range:

MS2830A

Without MS2830A-077/078, or frequency span ≤ 31.25 MHz

MS2830A-040: 0 Hz to 3.6 GHz
MS2830A-041: 0 Hz to 6.0 GHz
MS2830A-043: 0 Hz to 13.5 GHz
MS2830A-044: 0 Hz to 26.5 GHz
MS2830A-045: 0 Hz to 43 GHz

With MS2830A-077/078, and frequency span > 31.25 MHz

MS2830A-040: 300 MHz to 3.6 GHz
MS2830A-041: 300 MHz to 6.0 GHz
MS2830A-043: 300 MHz to 13.5 GHz

With MS2830A-077/078, without MS2830A-067/167, and frequency span > 31.25 MHz

MS2830A-044: 300 MHz to 6 GHz
MS2830A-045: 300 MHz to 6 GHz

With MS2830A-077/078, with MS2830A-067/167, and frequency span > 31.25 MHz

MS2830A-044: 300 MHz to 26.5 GHz
MS2830A-045: 300 MHz to 43 GHz

MS2840A

Without MS2840A-077/177/078/178, or frequency span ≤ 31.25 MHz

MS2840A-040: 0 Hz to 3.6 GHz
MS2840A-041: 0 Hz to 6.0 GHz
MS2840A-044: 0 Hz to 26.5 GHz
MS2840A-046: 0 Hz to 44.5 GHz

With MS2840A-077/177/078/178, and frequency span ≤ 31.25 MHz

MS2840A-040: 300 MHz to 3.6 GHz
MS2840A-041: 300 MHz to 6.0 GHz

With MS2840A-077/177/078/178, without MS2840A-067/167, and frequency span > 31.25 MHz

MS2840A-044: 300 MHz to 6 GHz
MS2840A-046: 300 MHz to 6 GHz

With MS2840A-077/177/078/178, with MS2840A-067/167, and frequency span > 31.25 MHz
MS2840A-044: 300 MHz to 26.5 GHz
MS2840A-046: 300 MHz to 44.5 GHz

MS2850A

Frequency span ≤ 31.25 MHz
MS2840A-047: 0 MHz to 32 GHz
MS2840A-046: 0 MHz to 44.5 GHz

31.25 MHz < Frequency span ≤ 510 MHz
MS2850A-047: 100 MHz to 32 GHz
MS2850A-046: 100 MHz to 44.5 GHz

510 MHz > Frequency span
MS2850A-047: 4.2 GHz* to 32 GHz
MS2850A-046: 4.2 GHz* to 44.5 GHz

*: When the MS2850A-034/134 is installed and the center frequency is lower than 4.2 GHz, the bandwidth cannot be set to 1 GHz.

Minimum setting resolution:	1 Hz
Rotary knob resolution:	$x/100$ Hz
Up/down step key resolution:	☞ 2.2.7 “Setting step size”
Left/right step key resolution:	☞ 2.2.7 “Setting step size”
x : Frequency span [Hz]:	☞ 2.2.2 “Setting frequency span”

The start frequency and stop frequency are automatically set when the center frequency is set.

2.2.2 Setting frequency span

Example: To set the frequency span to 1 kHz

<Procedure>

1. Press Span, or press F4 (Span) from the Frequency function menu.
2. After pressing 1, press F3 (kHz) to set the frequency span.

Setting range and resolution for frequency span

Setting range:	1 kHz to 10 MHz (MS2830A-006/106, MS2840A-006/106)	
	1 kHz to 31.25 MHz (MS2830A-005/105/007/009/109, MS2840A-005/105/009/109)	
	1 kHz to 62.5 MHz (MS2830A-077, MS2840A-077/177)	
	1 kHz to 125 MHz (MS2830A-078, MS2840A-078/178)	
	1 kHz to 255 MHz	(MS2850A-032)
	1 kHz to 510 MHz	(MS2850A-033/133)
	1 kHz to 1 GHz	(MS2850A-034/134)
Rotary knob resolution:	Refer to Table 2.2.2-1	
Step key resolution:	Refer to Table 2.2.2-1	

The sampling rate of the IQ data is automatically set when the frequency span is set.

Table 2.2.2-1 Frequency span and sampling rate

<table>
<tr><th rowspan="2">Frequency Span</th><th colspan="2">Sampling Rate</th></tr>
<tr><th>MS2830A-006/106
MS2840A-006/106</th><th>MS2830A-005/105/007/009/109/077/078
MS2840A-005/105/009/109/077/177/078/178
MS2850A-032/033/133/034/134</th></tr>
<tr><td>1 kHz</td><td colspan="2">2 kHz</td></tr>
<tr><td>2.5 kHz</td><td colspan="2">5 kHz</td></tr>
<tr><td>5 kHz</td><td colspan="2">10 kHz</td></tr>
<tr><td>10 kHz</td><td colspan="2">20 kHz</td></tr>
<tr><td>25 kHz</td><td colspan="2">50 kHz</td></tr>
<tr><td>50 kHz</td><td colspan="2">100 kHz</td></tr>
<tr><td>100 kHz</td><td colspan="2">200 kHz</td></tr>
<tr><td>250 kHz</td><td colspan="2">500 kHz</td></tr>
<tr><td>500 kHz</td><td colspan="2">1 MHz</td></tr>
<tr><td>1 MHz</td><td colspan="2">2 MHz</td></tr>
<tr><td>2.5 MHz</td><td colspan="2">5 MHz</td></tr>
<tr><td>5 MHz</td><td colspan="2">10 MHz</td></tr>
<tr><td>10 MHz</td><td colspan="2">20 MHz</td></tr>
<tr><td>25 MHz</td><td>–</td><td>50 MHz</td></tr>
<tr><td>31.25 MHz</td><td>–</td><td>50 MHz</td></tr>
</table>

Table 2.2.2-1 Frequency span and sampling rate (Cont'd)

<table>
<tr><th rowspan="2">Frequency Span</th><th colspan="5">Sampling Rate</th></tr>
<tr><th>MS2830A-077
MS2840A-077
/177</th><th>MS2830A-078
MS2840A-078
/178</th><th>MS2850A-032</th><th>MS2850A-033
/133</th><th>MS2850A-034
/134</th></tr>
<tr><td>50 MHz</td><td colspan="2" rowspan="2">100 MHz</td><td colspan="3" rowspan="2">81.25 MHz</td></tr>
<tr><td>62.5 MHz</td></tr>
<tr><td>100 MHz</td><td>–</td><td rowspan="2">200 MHz</td><td colspan="3" rowspan="2">162.5 MHz</td></tr>
<tr><td>125 MHz</td><td>–</td></tr>
<tr><td>255 MHz</td><td colspan="2">–</td><td colspan="3">325 MHz</td></tr>
<tr><td>510 MHz</td><td colspan="3">–</td><td colspan="2">650 MHz</td></tr>
<tr><td>1 GHz</td><td colspan="4">–</td><td>1300 MHz</td></tr>
</table>

2.2.3 Setting start frequency

Example: To set the start frequency to 10 MHz

<Procedure>

1. Press [Frequency].
2. Press [F2] (Start).
3. After pressing [1] [0], press [F2] (MHz) to set the start frequency.

Setting range and resolution for start frequency

Setting range:

MS2830A

Without MS2830A-077/078, or frequency span ≤ 31.25 MHz

MS2830A-040:	$-x/2$ Hz to 3.6 GHz $-x/2$ Hz
MS2830A-041:	$-x/2$ Hz to 6.0 GHz $-x/2$ Hz
MS2830A-043:	$-x/2$ Hz to 13.5 GHz $-x/2$ Hz
MS2830A-044:	$-x/2$ Hz to 26.5 GHz $-x/2$ Hz
MS2830A-045:	$-x/2$ Hz to 43 GHz $-x/2$ Hz

With MS2830A-077/078, and frequency span > 31.25 MHz

MS2830A-040:	300 MHz $-x/2$ Hz to 3.6 GHz $-x/2$ Hz
MS2830A-041:	300 MHz $-x/2$ Hz to 6.0 GHz $-x/2$ Hz
MS2830A-043:	300 MHz $-x/2$ Hz to 13.5 GHz $-x/2$ Hz

With MS2830A-077/078, without MS2830A-067/167, and frequency span > 31.25 MHz

MS2830A-044:	300 MHz $-x/2$ Hz to 6 GHz $-x/2$ Hz
MS2830A-045:	300 MHz $-x/2$ Hz to 6 GHz $-x/2$ Hz

With MS2830A-077/078, with MS2830A-067/167, and frequency span > 31.25 MHz

MS2830A-044:	300 MHz $-x/2$ Hz to 26.5 GHz $-x/2$ Hz
MS2830A-045:	300 MHz $-x/2$ Hz to 43 GHz $-x/2$ Hz

MS2840A

Without MS2840A-077/177/078/178, or frequency span ≤ 31.25 MHz

MS2840A-040:	$-x/2$ Hz to 3.6 GHz $-x/2$ Hz
MS2840A-041:	$-x/2$ Hz to 6.0 GHz $-x/2$ Hz
MS2840A-044:	$-x/2$ Hz to 26.5 GHz $-x/2$ Hz
MS2840A-046:	$-x/2$ Hz to 44.5 GHz $-x/2$ Hz

With MS2840A-077/177/078/178, and frequency span ≤ 31.25 MHz

MS2840A-040: 300 MHz $-\frac{x}{2}$ Hz to 3.6 GHz $-\frac{x}{2}$ Hz

MS2840A-041: 300 MHz $-\frac{x}{2}$ Hz to 6.0 GHz $-\frac{x}{2}$ Hz

With MS2840A-077/177/078/178, without MS2840A-067/167, and frequency span > 31.25 MHz

MS2840A-044: 300 MHz $-\frac{x}{2}$ Hz to 6 GHz $-\frac{x}{2}$ Hz

MS2840A-046: 300 MHz $-\frac{x}{2}$ Hz to 6 GHz $-\frac{x}{2}$ Hz

With MS2840A-077/177/078/178, with MS2840A-067/167, and frequency span > 31.25 MHz

MS2840A-044: 300 MHz $-\frac{x}{2}$ Hz to 26.5 GHz $-\frac{x}{2}$ Hz

MS2840A-046: 300 MHz $-\frac{x}{2}$ Hz to 44.5 GHz $-\frac{x}{2}$ Hz

MS2850A

Frequency span ≤ 31.25 MHz

MS2850A-047: $-\frac{x}{2}$ Hz to 32 GHz $-\frac{x}{2}$ Hz

MS2850A-046: $-\frac{x}{2}$ Hz to 44.5 GHz $-\frac{x}{2}$ Hz

31.25 MHz < Frequency span ≤ 510 MHz

MS2850A-047: 100 MHz $-\frac{x}{2}$ Hz to 32 GHz $-\frac{x}{2}$ Hz

MS2850A-046: 100 MHz $-\frac{x}{2}$ Hz to 44.5 GHz $-\frac{x}{2}$ Hz

Frequency span > 510 MHz

MS2850A-047: 4.2 GHz $-\frac{x}{2}$ Hz to 32 GHz $-\frac{x}{2}$ Hz

MS2850A-046: 4.2 GHz $-\frac{x}{2}$ Hz to 44.5 GHz $-\frac{x}{2}$ Hz

Minimum resolution: 1 Hz

Rotary knob resolution: $\frac{x}{100}$ Hz

Up/down step key resolution: 2.2.7 “Setting step size”

Left/right step key resolution: 2.2.7 “Setting step size”

x: Frequency span [Hz]: 2.2.2 “Setting frequency span”

2.2.4 Setting stop frequency

Example: To set the stop frequency to 1 GHz

<Procedure>

1. Press Frequency.
2. Press F3 (Stop).
3. After pressing 1, press F1 (GHz) to set the stop frequency.

Setting range and resolution for stop frequency

Setting range:

MS2830A

Without MS2830A-077/078, or frequency span ≤ 31.25 MHz

MS2830A-040: $\frac{x}{2}$ Hz to 3.6 GHz + $\frac{x}{2}$ Hz

MS2830A-041: $\frac{x}{2}$ Hz to 6.0 GHz + $\frac{x}{2}$ Hz

MS2830A-043: $\frac{x}{2}$ Hz to 13.5 GHz + $\frac{x}{2}$ Hz

MS2830A-044: $\frac{x}{2}$ Hz to 26.5 GHz + $\frac{x}{2}$ Hz

MS2830A-045: $\frac{x}{2}$ Hz to 43 GHz + $\frac{x}{2}$ Hz

With MS2830A-077/078, and frequency span > 31.25 MHz

MS2830A-040: 300 MHz + $\frac{x}{2}$ Hz to 3.6 GHz + $\frac{x}{2}$ Hz

MS2830A-041: 300 MHz + $\frac{x}{2}$ Hz to 6.0 GHz + $\frac{x}{2}$ Hz

MS2830A-043: 300 MHz + $\frac{x}{2}$ Hz to 13.5 GHz + $\frac{x}{2}$ Hz

With MS2830A-077/078, without MS2830A-067/167,
and frequency span > 31.25 MHz

MS2830A-044: 300 MHz + $\frac{x}{2}$ Hz to 6 GHz + $\frac{x}{2}$ Hz

MS2830A-045: 300 MHz + $\frac{x}{2}$ Hz to 6 GHz + $\frac{x}{2}$ Hz

With MS2830A-077/078, with MS2830A-067/167,
and frequency span > 31.25 MHz

MS2830A-044: 300 MHz + $\frac{x}{2}$ Hz to 26.5 GHz + $\frac{x}{2}$ Hz

MS2830A-045: 300 MHz + $\frac{x}{2}$ Hz to 43 GHz + $\frac{x}{2}$ Hz

MS2840A

Without MS2840A-077/177/078/178,
or frequency span ≤ 31.25 MHz

MS2840A-040: $\frac{x}{2}$ Hz to 3.6 GHz + $\frac{x}{2}$ Hz

MS2840A-041: $\frac{x}{2}$ Hz to 6.0 GHz + $\frac{x}{2}$ Hz

MS2840A-044: $\frac{x}{2}$ Hz to 26.5 GHz + $\frac{x}{2}$ Hz

MS2840A-046: $\frac{x}{2}$ Hz to 44.5 GHz + $\frac{x}{2}$ Hz

With MS2840A-077/177/078/178, and frequency span ≤ 31.25 MHz

MS2840A-040:	300 MHz + $x/2$ Hz to 3.6 GHz + $x/2$ Hz
MS2840A-041:	300 MHz + $x/2$ Hz to 6.0 GHz + $x/2$ Hz

With MS2840A-077/177/078/178, without MS2840A-067/167, and frequency span > 31.25 MHz

MS2840A-044:	300 MHz + $x/2$ Hz to 6 GHz + $x/2$ Hz
MS2840A-046:	300 MHz + $x/2$ Hz to 6 GHz + $x/2$ Hz

With MS2840A-077/177/078/178, with MS2840A-067/167, and frequency span > 31.25 MHz

MS2840A-044:	300 MHz + $x/2$ Hz to 26.5 GHz + $x/2$ Hz
MS2840A-046:	300 MHz + $x/2$ Hz to 44.5 GHz + $x/2$ Hz

MS2850A

Frequency span ≤ 31.25 MHz

MS2850A-047:	$x/2$ Hz to 32 GHz + $x/2$ Hz
MS2850A-046:	$x/2$ Hz to 44.5 GHz + $x/2$ Hz

31.25 MHz < Frequency span ≤ 510 MHz

MS2850A-047:	100 MHz + $x/2$ Hz to 32 GHz + $x/2$ Hz
MS2850A-046:	100 MHz + $x/2$ Hz to 44.5 GHz + $x/2$ Hz

Frequency span > 510 MHz

MS2850A-047:	4.2 GHz + $x/2$ Hz to 32 GHz + $x/2$ Hz
MS2850A-046:	4.2 GHz + $x/2$ Hz to 44.5 GHz + $x/2$ Hz

Minimum resolution:	1 Hz
Rotary knob resolution:	$x/100$ Hz
Up/down step key resolution:	☞ 2.2.7 “Setting step size”
Left/right step key resolution:	☞ 2.2.7 “Setting step size”
x: Frequency span [Hz]:	☞ 2.2.2 “Setting frequency span”

2.2.5 Setting frequency band

Note:

This function can be used when MS2830A-041/043/044/045 or MS2840A-041/044/046 is installed.

The frequency band of the preselector can be changed by changing the frequency band mode. The setting procedure for the band mode is as follows.

<Procedure>

1. Press [Frequency].
2. Press [F8] (Frequency Band Mode).

When the frequency band mode is changed, the preselector passing frequency is changed, as shown in Table 2.2.5-1.

Table 2.2.5-1 Preselector passing lower limit frequency

Frequency Band Mode	Preselector Passing Frequency
Normal	> 4.0 GHz
Spurious	≥ 3.5 GHz

When the frequency band mode is set to Spurious, the preselector can be used for frequencies above 3.5 GHz as shown in Table 2.2.5-1. If the frequency span is more than 50 MHz, the frequency band mode is fixed to Normal.

2.2.6 Switching Speed

Selects the normal or fast frequency switching speed.

Table 2.2.6-1 Switching Speed

Switching Speed	Descriptions
Fast Tuning	The operation is done so as to increase the frequency switching speed. (fast switching)
Normal	The operation is done so as to improve the phase noise characteristic rather than the frequency switching speed. (normal switching)

Example: To specify the fast Switching Speed.

<Procedure>

1. Press Frequency.
2. Press F4 (Switching Speed) to change to Switching Speed menu.
3. Press F1 (Fast Tuning) to specify fast switching.

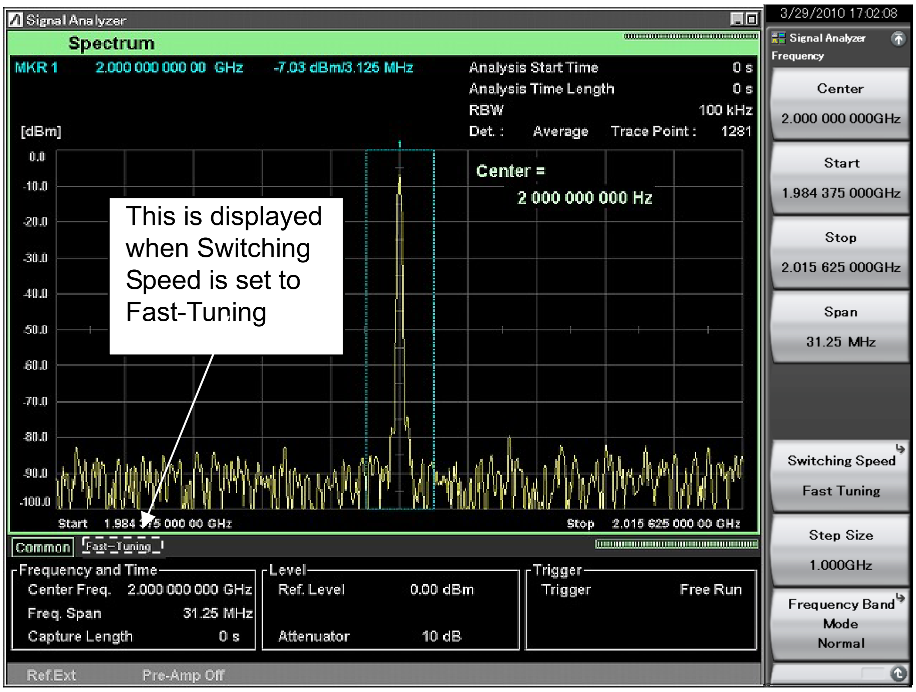


Figure 2.2.6-1 Fast-Tuning display

2.2.7 Setting step size

The step size of the center, start and stop frequency can be set.

Example: To set the step size to 1 GHz.

<Procedure>

1. Press [Frequency].
2. Press [F7] (Step Size).
3. After pressing [1], press [F1] (GHz) to set the stop frequency.

Setting range and resolution for step size

Setting range:

MS2830A

Without MS2830A-077/078, or frequency span ≤ 31.25 MHz

MS2830A-040: 1 Hz to 3.6 GHz
MS2830A-041: 0 Hz to 6.0 GHz
MS2830A-043: 1 Hz to 13.5 GHz
MS2830A-044: 1 Hz to 26.5 GHz
MS2830A-045: 1 Hz to 43 GHz

With MS2830A-077/078, and frequency span > 31.25 MHz

MS2830A-040: 1 Hz to 3.6 GHz
MS2830A-041: 1 Hz to 6.0 GHz
MS2830A-043: 1 Hz to 13.5 GHz

With MS2830A-077/078, without MS2830A-067/167,
and frequency span > 31.25 MHz

MS2830A-044: 1 Hz to 6 GHz
MS2830A-045: 1 Hz to 6 GHz

With MS2830A-077/078, with MS2830A-067/167,
and frequency span > 31.25 MHz

MS2830A-044: 1 Hz to 26.5 GHz
MS2830A-045: 1 Hz to 43 GHz

MS2840A

Without MS2840A-077/177/078/178,
or frequency span ≤ 31.25 MHz

MS2840A-040: 1 Hz to 3.6 GHz
MS2840A-041: 1 Hz to 6.0 GHz
MS2840A-044: 1 Hz to 26.5 GHz
MS2840A-046: 1 Hz to 44.5 GHz

With MS2840A-077/177/078/178, and frequency span ≤ 31.25 MHz

MS2840A-040: 1 Hz to 3.6 GHz
MS2840A-041: 1 Hz to 6.0 GHz

With MS2840A-077/177/078/178, without MS2840A-067/167,
and frequency span > 31.25 MHz

MS2840A-044: 1 Hz to 6 GHz
MS2840A-046: 1 Hz to 6 GHz

With MS2840A-077/177/078/178, with MS2840A-067/167,
and frequency span > 31.25 MHz

MS2840A-044: 1 Hz to 26.5 GHz
MS2840A-046: 1 Hz to 44.5 GHz

MS2850A

MS2850A-047: 1 Hz to 32 GHz
MS2850A-046: 1 Hz to 44.5 GHz

Minimum setting resolution: 1 Hz

Rotary knob resolution: $x/100$ Hz

Up/down step key resolution: $x/10$ Hz

Left/right step key resolution: x Hz

x: Frequency span [Hz]: ☞ 2.2.2 “Setting frequency span”

2.2.8 Low Phase Noise Display

This function is available when MS2830A-062/066 or MS2840A-066/166 Low Phase Noise is installed.

Low Phase Noise is displayed when the Low Phase Noise Performance function is enabled at the conditions in Table 2.2.8-1.

Refer to section 3.4.4 “System Settings Low Phase Noise” in the *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* or *MS2840A Signal Analyzer Operation Manual (Mainframe Operation)* for the settings.

Table 2.2.8-1 Low Phase Noise Performance Enabled Conditions

System Settings, Low Phase Noise	Low Phase Noise
On	Enabled
Off	Disabled

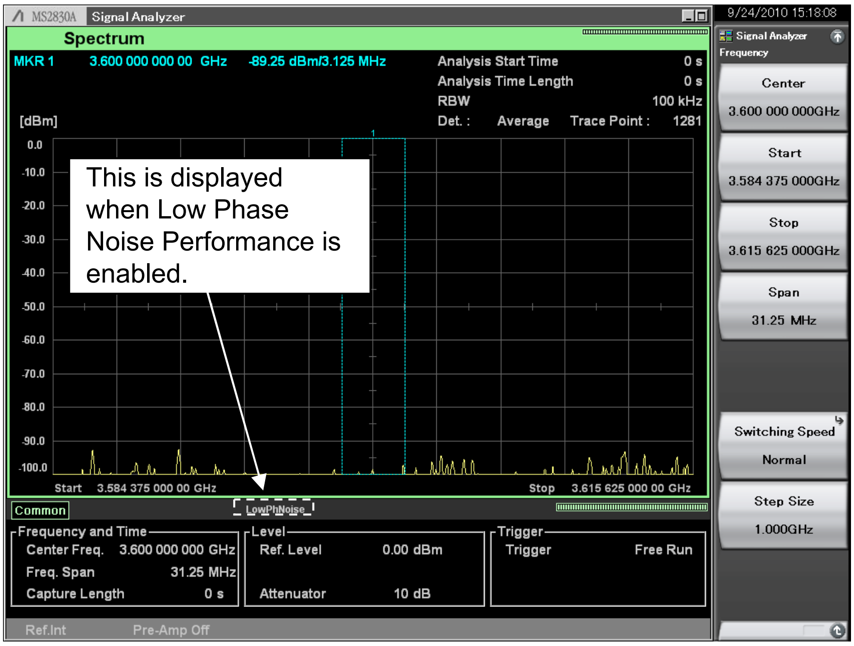


Figure 2.2.8-1 Low Phase Noise Display

2.3 Setting Level

Pressing F2 (Amplitude) from the main function menu, or pressing Amplitude displays the Amplitude function menu.

Figure 2.3-1 Amplitude key

Table 2.3-1 Amplitude function menu

Function key	Menu Display	Function
Page 1	Amplitude	Press **Amplitude** to display this menu.
F1	Reference Level	Sets the maximum level of the input signal. 2.3.1 “Setting reference level”
F2	Attenuator (Auto/Manual)	Sets the input attenuator to the optimal value according to the reference level setting. 2.3.2 “Setting input attenuator”
F3	Attenuator	Sets the input attenuator. 2.3.2 “Setting input attenuator”
F4	Pre-Amp	Switches Pre-Amp On/Off. This is displayed only when MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 Preamplifier is installed. 2.3.6 “Pre-Amp”
F5	Log Scale Unit	Sets the unit (Log scale) of the level axis. 2.3.4 “Setting reference level unit”
F6	Scale	Sets the scale mode of the level axis. 2.3.3 “Setting scale”
F7	Offset (On/Off)	Switches On/Off the reference level offset function. 2.3.5 “Setting reference level offset”
F8	Offset Value	Sets the reference level offset value. 2.3.5 “Setting reference level offset”

Table 2.3-1 Amplitude function menu (Cont'd)

Function key	Menu Display	Function
Page 2	Amplitude	Press **Amplitude**, and then press → to display this menu.
F8	Micro Wave Preselector Bypass (On/Off)	Enables/Disables the Micro Wave Preselector Bypass function. This function is available with MS2830A-007/067/167, MS2840A-067/167, or MS2850A. The frequency characteristics can be improved at 4 GHz or more of the preselector band when setting preselector Bypass to On. If Frequency Span is 50 MHz or more, the microwave preselector is bypassed regardless of this setting. This function is not available when External Mixer is turned On. , 1.3.13 "MS2830A-067/167", 1.3.14 "MS2830A-007" in the *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*, 1.3.15 "MS2840A-067/167" in the *MS2840A Signal Analyzer Operation Manual (Mainframe Operation), or* 1.3.6 "MS2850A-067" in the *MS2850A Signal Analyzer Operation Manual (Mainframe Operation).*

The display items related to the level parameters are described below.

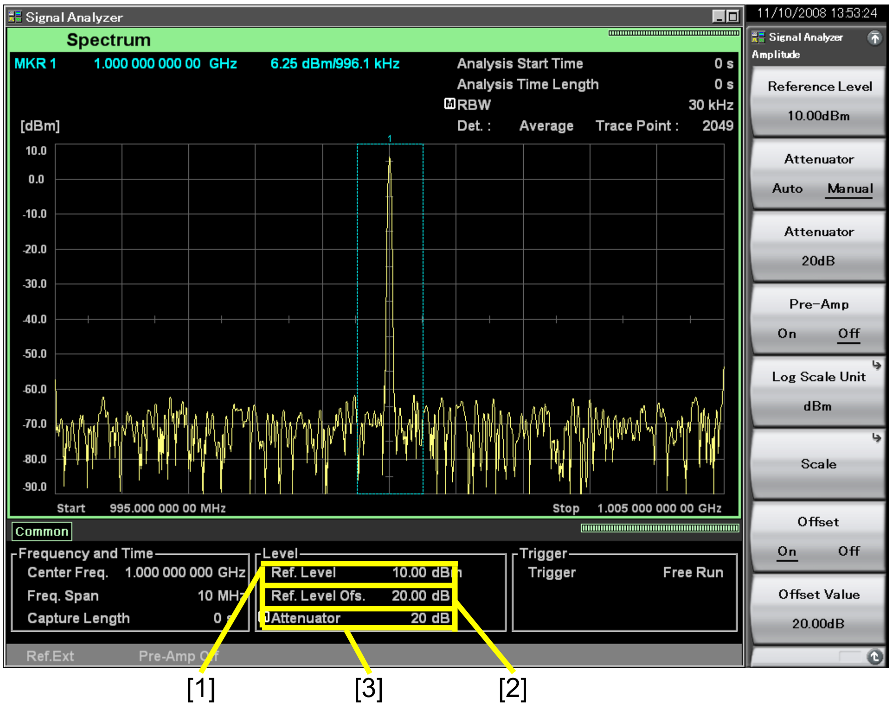


Figure 2.3-2 Display items related to level parameters

Table 2.3-2 Display items related to level parameters

No.	Display	Description
[1]	Ref. Level	Displays the reference level.
[2]	Ref. Level Ofs.	Displays the adding offset value of the reference level when the reference level offset function is On.
[3]	Attenuator	Displays the input attenuator value.

Table 2.3-3 and Table 2.3-4 show the level display modes of the Signal Analyzer function and the reference level (top of the amplitude scale) setting range of each mode.

Table 2.3-3 Reference level setting range (When Pre-Amp is set to Off)

Scale Mode	Unit	Reference Level Range
Log Scale	dBm	–120 to +50 dBm
	dBμV	–13.01 to +156.99 dBμV
	dBmV	–73.01 to +96.99 dBmV
	V	0.224 μV to 70.7 V
	W	1 fW to 100 W
	dBμV(emf)	–6.99 to +163.01 dBμV (emf)
	dBμV/m	–13.01 to +156.99 dBμV/m
Linear Scale (in dBm)	V	22.4 μV to 70.7 V (–80 to +50 dBm)

Table 2.3-4 Reference level setting range (When Pre-Amp is set to On)

Scale Mode	Unit	Reference Level Range
Log Scale	dBm	–120 to +30 dBm
	dBμV	–13.01 to +136.99 dBμV
	dBmV	–73.01 to +76.99 dBmV
	V	0.224 μV to 7.07 V
	W	1 fW to 1W
	dBμV (emf)	–6.99 to +143.01 dBμV (emf)
	dBμV/m	–13.01 to +136.99 dBμV/m
Linear Scale (in dBm)	V	2.24 μV to 7.07 V (–100 to +30 dBm)

dBm: Unit system where 1 mW/50 Ω = 0 dBm.

dBμV: Unit system where 1 μV = 0 dBμV. Displayed with 50 Ω termination voltage.

dBmV: Unit system where 1 mV = 0 dBmV. Displayed with 50 Ω termination voltage.

dBμV (emf): dBμV unit system that uses open voltage display, where values are equal to dBμV + 6 dB.

dBμV/m: Unit system that displays field intensity. Measurement values are the same as values when dBμV is selected.

2.3.1 Setting reference level

The reference level (upper end of amplitude scale) can be set.

Example: To set the reference level to –10 dBm

<Procedure>

1. Press Amplitude.
2. Press F1 (Reference Level).
3. After pressing –/+ 1 0, press F1 (dBm) to set the reference level.

Setting range and resolution for reference level

Setting range:	Refer to Table 2.3-3.	
Minimum resolution:	0.01 dB (dB unit system)	
	Number of significant figures:	3 (in W)
	Number of significant figures:	3 (in V)
Rotary knob resolution:	This changes depending on Scale	
Step key resolution:	This changes depending on Scale	

2.3.2 Setting input attenuator

This configures the input attenuator settings.

(1) Auto mode
The input attenuator is automatically set according to the set reference level.
Table 2.3.2-1 and Table 2.3.2-2 show the settings in the Auto mode.

Table 2.3.2-1 Input attenuators set in Auto mode (When Pre-Amp is set to Off)

N=Reference Level (dBm)	Attenuator Auto (dB)	
	Resolution 2 dB	Resolution 10 dB
$-120 \leq N \leq 0$	10	10
$0 < N \leq 2$	12	20
$2 < N \leq 4$	14	20
$4 < N \leq 6$	16	20
$6 < N \leq 8$	18	20
$8 < N 10$	20	20
$10 < N \leq 12$	22	30
$12 < N \leq 14$	24	30
$14 < N \leq 16$	26	30
$16 < N \leq 18$	28	30
$18 < N \leq 20$	30	30
$20 < N \leq 22$	32	40
$22 < N \leq 24$	34	40
$24 < N \leq 26$	36	40
$26 < N \leq 28$	38	40
$28 < N \leq 30$	40	40
$30 < N \leq 32$	42	50
$32 < N \leq 34$	44	50
$34 < N \leq 36$	46	50
$36 < N \leq 38$	48	50
$38 < N \leq 40$	50	50
$40 < N \leq 42$	52	60
$42 < N \leq 44$	54	60
$44 < N \leq 46$	56	60
$46 < N \leq 48$	58	60
$48 < N \leq 50$	60	60

Refer to Table 2.3.2-3 for resolution of input attenuator.

Table 2.3.2-2 Input attenuators set in Auto mode (When Pre-Amp is set to On)

N=Reference Level (dBm)	Attenuator Auto (dB)	
	Resolution 2 dB	Resolution 10 dB
$-120 < N \leq -20$	10	10
$-20 < N \leq -18$	12	20
$-18 < N \leq -16$	14	20
$-16 < N \leq -14$	16	20
$-14 < N \leq -12$	18	20
$-12 < N \leq -10$	20	20
$-10 < N \leq -8$	22	30
$-8 < N \leq -6$	24	30
$-6 < N \leq -4$	26	30
$-4 < N \leq -2$	28	30
$-2 < N \leq 0$	30	30
$0 < N \leq 2$	32	40
$2 < N \leq 4$	34	40
$4 < N \leq 6$	36	40
$6 < N \leq 8$	38	40
$8 < N \leq 10$	40	40
$10 < N \leq 12$	42	50
$12 < N \leq 14$	44	50
$14 < N \leq 16$	46	50
$16 < N \leq 18$	48	50
$18 < N \leq 20$	50	50
$20 < N \leq 22$	52	60
$22 < N \leq 24$	54	60
$24 < N \leq 26$	56	60
$26 < N \leq 28$	58	60
$28 < N \leq 30$	60	60

Refer to Table 2.3.2-3 for resolution of input attenuator.

(2) Manual setting

In the Auto mode, the input attenuator is set so that the level can be measured with high accuracy, without any effect of gain compression, with a low noise level, when a signal at the same level as the reference level is input. However, to measure minute signals with increased sensitivity to measure non-harmonic spurious or proximity spurious of the signal, the attenuator value may be too high to measure with the specified sensitivity in the Auto mode. In this case, set the input attenuator in Manual setting.

The setting range of the input attenuator in Manual setting is as follows. The following tables show the setting range and resolution of input attenuator.

Table 2.3.2-3 Resolution of Input Attenuator

<table>
<tr><th>System</th><th>ATT mode</th><th>Center frequency range</th><th>ATT value</th><th>Resolution</th></tr>
<tr><td>Excluding
MS2830A-045,
MS2840A-046</td><td>—</td><td>—</td><td>—</td><td>2 dB</td></tr>
<tr><td rowspan="5">MS2830A-045</td><td rowspan="4">Electric
Combined</td><td rowspan="3">Frequency Band Mode:
Normal,
Center frequency ≤ 6 GHz
Spurious,
Center frequency ≤ 4 GHz</td><td>ATT ≤ 10 dB</td><td>10 dB</td></tr>
<tr><td>10 dB < ATT ≤ 40 dB</td><td>2 dB</td></tr>
<tr><td>40 dB < ATT ≤ 60 dB</td><td>10 dB</td></tr>
<tr><td>Frequency Band Mode:
Normal,
Center frequency > 6 GHz
Spurious,
Center frequency > 4 GHz</td><td>—</td><td>10 dB</td></tr>
<tr><td>Mechanical
Only</td><td>—</td><td>—</td><td>10 dB</td></tr>
<tr><td rowspan="3">MS2840A-046
without
MS2840A-019/119</td><td rowspan="2">Electric
Combined</td><td>Frequency Band Mode:
Normal,
Center frequency ≤ 6 GHz
Spurious,
Center frequency ≤ 4 GHz</td><td>—</td><td>2 dB</td></tr>
<tr><td>Frequency Band Mode:
Normal,
Center frequency > 6 GHz
Spurious,
Center frequency > 4 GHz</td><td>—</td><td>10 dB</td></tr>
<tr><td>Mechanical
Only</td><td>—</td><td>—</td><td>10 dB</td></tr>
<tr><td>MS2840A-046
with
MS2840A-019/119</td><td>—</td><td>—</td><td>—</td><td>2 dB</td></tr>
<tr><td>MS2850A*</td><td>—</td><td>—</td><td>—</td><td>2 dB</td></tr>
</table>

*: The input attenuator resolution of the MS2850A is fixed to 2 dB regardless of option, ATT Mode, or SPAN.

Table 2.3.2-4 Input attenuator setting range (When Pre-Amp is set to Off)

Attenuator Manual	
Lower Limit	**Upper Limit**
Logic* (α = 0, β = 1, γ = 2) The minimum value is 0 dB.	60 dB

Table 2.3.2-5 Input attenuator setting range (When Pre-Amp is set to On)

Attenuator Manual	
Lower Limit	**Upper Limit**
Logic* (α = 20, β = 21, γ = 22) The minimum value is 0 dB.	60 dB

*: The following rules apply:

<1> If the reference level is 0 or if it is divisible by 2.
Attenuator (dB) = RL*1 + α

<2> Not <1>, and INT (RL)*2 is an odd number.
Attenuator (dB) = INT (RL)*2 + β

<3> Not <1>, and INT (RL) is an even number.
Attenuator (dB) = INT (RL)*2 + γ

*1: Reference level (dBm)

*2: Maximum integer not exceeding reference level.

For measurement of second and third harmonic spurious, the mixer input level must be lowered to eliminate the effect of internal distortion. Internal distortion is below –65 dBc (at 1 GHz) when the mixer input level is –30 dBm, so to measure harmonic spurious up to –65 dBc, the mixer input level must be below –30 dBm. In this case, if the attenuator setting is Auto, the attenuator value is too small. Set the attenuator value manually.

<u>Setting the input attenuator</u>

Example: To set the input attenuator to 30 dB using the Auto mode
<Procedure>

1. Press [Amplitude].
2. Press [F2] (Attenuator Auto/Manual) and select Auto.
3. Press [F1] (Reference Level).
4. After pressing [3] [0], press [F1] (dBm). The input attenuator is set to 30 dB.

Example: To set the input attenuator to 30 dB using the Manual mode.
<Procedure>

1. Press [Amplitude].
2. Press [F3] (Attenuator).
3. After pressing [3] [0], press [F1] (dB) to set the input attenuator.

In Manual mode, the [M] icon is displayed.

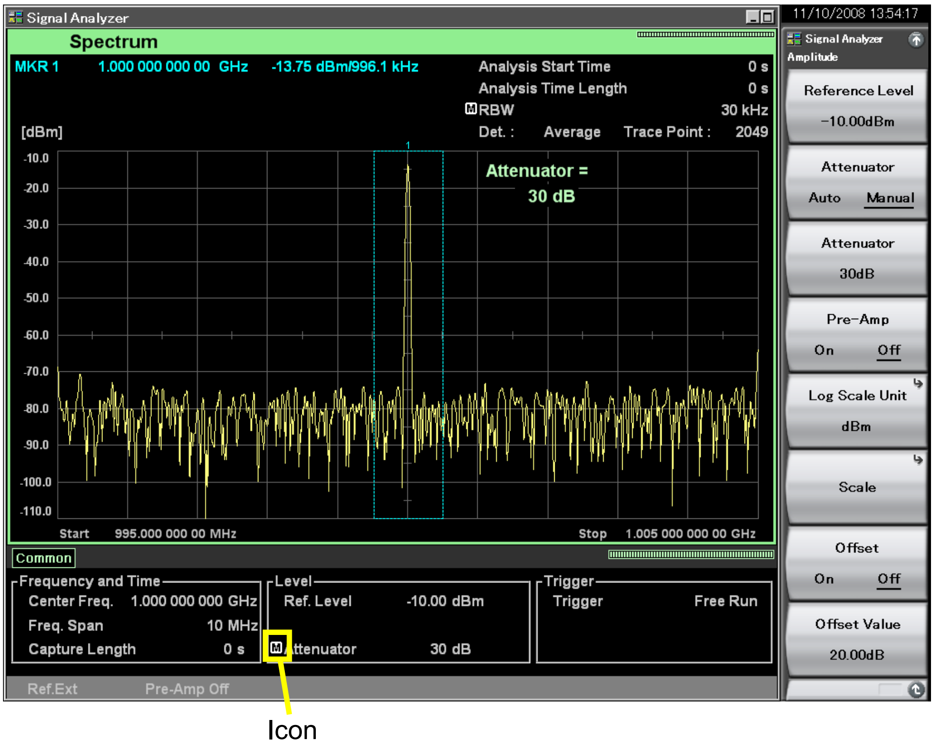


Figure 2.3.2-1 Manual icon

Displaying Level Over

When the RF input signal level exceeds the specified value, distortion occurs and correct measurement values cannot be obtained. In this case, Level Over is displayed on the screen. When Level Over is displayed, lower the RF input signal level, or do the following:

- When the attenuator is in the Auto mode, increase the reference level until Level Over disappears.
- When the attenuator is in the Manual mode, increase the attenuator until Level Over disappears.

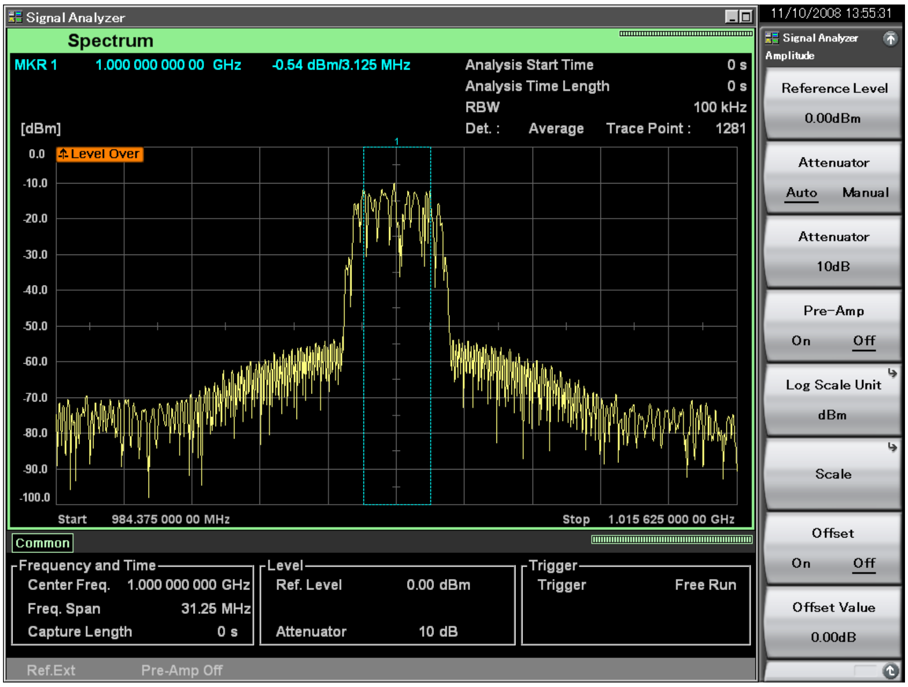


Figure 2.3.2-2 Level Over icon

2.3.3 Setting scale

Pressing F6 (Scale) from the Amplitude function menu displays the Scale function menu.

Table 2.3.3-1 Scale function menu

Function key	Menu Display	Function
F1	Scale (Log/Lin)	Sets the scale mode (Log/Lin). This switches F2 and F3 display. Cannot be set to Lin on Spectrogram trace.
F2	Log Scale Division	This is displayed when Log is selected for F1 Scale. Sets the scale range (Log scale range) of the vertical axis. Displayed only when trace is Spectrum or Power vs Time.
	Lin Scale Division	This is displayed when Lin is selected for F1 Scale. Sets the scale range (Lin scale range) of the vertical axis. Displayed only when trace is Spectrum or Power vs Time.
F3	Log Scale Line (10/12)	This is displayed only when Log is selected for F1 Scale. Sets the number of scale lines for Log scale. Displayed only when trace is Spectrum or Power vs Time.

(1) Setting the Log scale

Example: To set Log Scale Division to 20 dB/Div and the number of scale lines to 12

<Procedure>

1. Press Amplitude.
2. Press F6 (Scale).
3. Press F1 (Scale Log/Lin) and select Log.
4. Press F2 (Log Scale Division).
5. After pressing 2 0, press F1 (dB/Div) to set the Log Scale Division.
6. Press F3 (Log Scale Line) and set the number of scale lines by selecting 12.

Setting range and resolution for Log scale

Setting range:	0.1 to 20 dB/Div
Minimum resolution:	0.1 dB/Div
Rotary knob resolution:	1-2-5 sequence
Step key resolution:	1-2-5 sequence

(2) Setting the Lin scale

Example: To set Lin Scale Division to 5%/Div

<Procedure>

1. Press Amplitude.
2. Press F6 (Scale).
3. Press F1 (Scale Log/Lin) and select Lin.
4. Press F2 (Lin Scale Division).
5. After pressing 5, press F1 (%/Div) to set the Lin Scale Division.

Setting range and resolution for Lin scale

Setting range:	1 to 10%/Div.
Minimum resolution:	1%/Div.
Rotary knob resolution:	1-2-5 sequence
Step key resolution:	1-2-5 sequence

2.3.4 Setting reference level unit

Note:

This function can be set only when the scale mode is Log.

In the Log scale, there are 7 types of units for the reference level: dBm, dBμV, dBmV, dBμV (emf), V, W, and dBμV/m.

Example: To set the reference level to 10 dBmV

<Procedure>

1. Press Amplitude.
2. Press F6 (Scale).
3. Press F1 (Scale Log/Lin) and select Log.
4. Return to the Amplitude function menu, press F5 (Log Scale Unit), and then press F3 (dBmV) to select the unit.
5. After pressing 1 0, press F1 (dBmV) to set the reference level.

In the case of the Lin scale, no selection item is provided because the reference level unit is fixed to V for the Lin scale.

If V (W) is selected and a measurement result is more than 99.999 GV (GW), 99.999 GV (GW) is displayed.

2.3.5 Setting reference level offset

The reference level and waveform trace can be displayed with any offset value added.

Reference level: 0 dBm
Measured results: –20 dBm
Waveform display

When offset value of +10 dB is specified:

Reference level: 10 dBm
Measured results: –10 dBm
Waveform display with added +10 dB

Figure 2.3.5-1 Adding an offset value

Example: To set the reference level offset value to 10 dB
<Procedure>

1. Press [Amplitude].
2. Press [F8] (Offset Value).
3. After pressing [1] [0], press [F7] (Set) to set the reference level offset value.

When a value is input, [F7] (Offset On/Off) is set to On.

Setting range and resolution for reference level offset

Setting range:	–100 to 100 dB
Minimum resolution:	0.01 dB
Rotary knob resolution:	1 dB
Step key resolution:	10 dB

2.3.6 Pre-Amp

Note:

This function can be set when MS2830A-008/108/068/168 or MS2840A-008/108/068/168/069/169, MS2850A-068/168 Preamplifier is installed.

The level sensitivity can be increased by setting Pre-Amp to On.

Example: To set Pre-Amp to On

<Procedure>

1. Press Amplitude.
2. Press F4 (Pre-Amp) to set to On.

2.4 Setting IQ Data Capture Time Range

The IQ data capture time range of this application can be set. Normally set the auto setting to obtain the optimal value.

Pressing F7 (Capture) from the main function menu displays the Capture function menu.

Table 2.4-1 Capture function menu

Function key	Menu Display	Function
F1	Capture Time (Auto/Manual)	Switches the capture time of the RF input signal between auto setting and manual setting. 2.4.1 "Setting capture time"
F2	Capture Time Length	Sets the capture time length of the RF input signal. 2.4.1 "Setting capture time"
F3	Save Captured Data	Saves the captured IQ data. 5.1 "Saving IQ Data"
F4	Replay	Replays the saved IQ data. 5.2 "Replay Function"
F5	Stop Replaying	Stops replaying the saved IQ data. 5.2.5 "Stopping Replay function"
F6	Capture & Playback	Performs settings to convert the saved IQ data into waveform patterns and to output them from vector signal generator option. 5.3 "Playback Function"

2.4.1 Setting capture time

The capture time length can be set.

(1) Auto

The required time range for the shortest measurement time is automatically set based on the current setting. Upon parameter changes, no re-analysis of the captured IQ data is performed, and capture of the RF signal is started again.

In the Signal Analyzer function, the initial value is Auto mode.

(2) Manual

In normal measurement, measurement can be executed without any special setting if Capture Time is set to Auto. However, to perform the following analysis for the same captured IQ data, set Capture Time to Manual.

- Changing the time range to analyze the same IQ data
- Analyzing the same IQ data with a different trace

Table 2.4.1-1 shows the setting range when Capture Time is set to Manual.

Table 2.4.1-1 Frequency span, resolution, and setting range when Capture Time is Manual

Frequency Span	Resolution	Minimum Value	Minimum Sample Number	Maximum Value	Maximum Sample Number
1 kHz	500 μs	50 ms	74100	2000 s	100074000
2.5 kHz	200 μs	20 ms	160100	2000 s	100160000
5 kHz	100 μs	10 ms	310100	2000 s	100310000
10 kHz	50 μs	5 ms	610100	2000 s	100610000
25 kHz	20 μs	2 ms	730100	2000 s	100730000
50 kHz	10 μs	1 ms	730100	1000 s	100730000
100 kHz	5 μs	500 μs	730100	500 s	100730000
250 kHz	2 μs	200 μs	730100	200 s	100730000
500 kHz	1 μs	100 μs	730100	100 s	100730000
1 MHz	500 ns	50 μs	730100	50 s	100730000
2.5 MHz	200 ns	20 μs	730100	20 s	100730000
5 MHz	100 ns	10 μs	730100	10 s	100730000
10 MHz	50 ns	5 μs	730100	5 s	100730000
25 MHz*1	20 ns	2 μs	730100	2 s	100730000
31.25 MHz*1	20 ns	2 μs	730100	2 s	100730000
50 MHz*1	10 ns	1 μs	730100	500 ms	100730000
62.5 MHz*1	10 ns	1 μs	730100	500 ms	100730000
100 MHz*1	5 ns	500 ns	730100	500 ms	100730000
125 MHz*1	5 ns	500 ns	730100	500 ms	100730000

*1: 25 MHz and 31.25 MHz can be set when either MS2830A-005/105/007/009/109, MS2840A -005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when the frequency span is 50 MHz or higher.

The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 2.4.1-1 Frequency span, resolution, and setting range when Capture Time is Manual (Cont'd)

Frequency Span	Resolution	Minimum Value	Minimum Sample Number	Maximum Value	Maximum Sample Number
50 MHz	160 ns	1600 ns	730130	48 s	3900730000
62.5 MHz	160 ns	1600 ns	730130	48 s	3900730000
100 MHz	80 ns	800 ns	730130	24 s	3900730000
125 MHz	80 ns	800 ns	730130	24 s	3900730000
255 MHz	40 ns	400 ns	730130	12 s	3900730000
510 MHz*2	20 ns	200 ns	730130	6 s	3900730000
1 GHz*2	10 ns	100 ns	730130	3 s	3900730000

*2: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set only when the MS2850A-034/134 is installed.

Example: To set the capture time length to 50 ms

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F2 (Capture Time Length).
3. After pressing 5 0, press F2 (ms) to set the capture start time length.

2.4.2 Recapture and Reanalysis

The signal analyzer can capture and save IQ data for a certain time interval to analyze the data many times. This can be used for analysis of the same IQ data with different parameters.

Reanalysis

In Capture Time Manual, when the setting is changed after the obtained IQ data is analyzed with the setting, analysis is performed again, using the same IQ data with newly set parameters. For the Signal Analyzer function, this operation is called “reanalysis.”

However, when some parameters are changed, analysis may not be performed with the captured IQ data. In this case, data recapture is performed.

Recapture

If the conditions change from the ones in which the IQ data was obtained due to parameter changes, or if the obtained IQ data length is not sufficient for the analysis, IQ data must be obtained again. For the Signal Analyzer function, this operation is called “re-capture.”

Time setting and recapture

Recapture may or may not be performed depending on the setting of Capture Time (Auto/Manual).

When the Capture Time is Auto, when data required for calculation changes according to the setting of each trace, the Capture Time is not changed, but the data length actually required for analysis is changed, so recapture is performed.

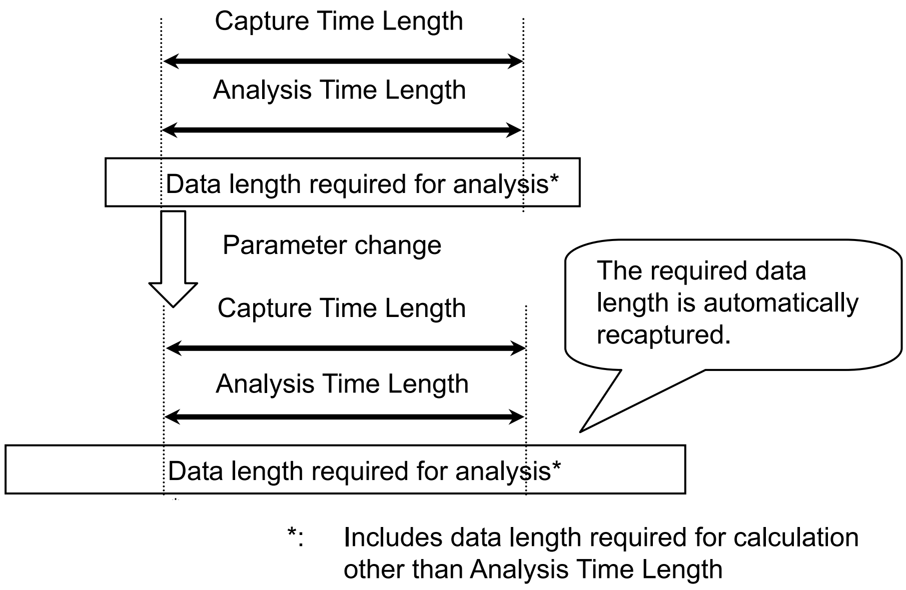


Figure 2.4.2-1 When Capture Time = Auto and Analysis Time = Auto

Also, when the Analysis Time is set manually, the Capture Time is automatically changed and the IQ data is recaptured.

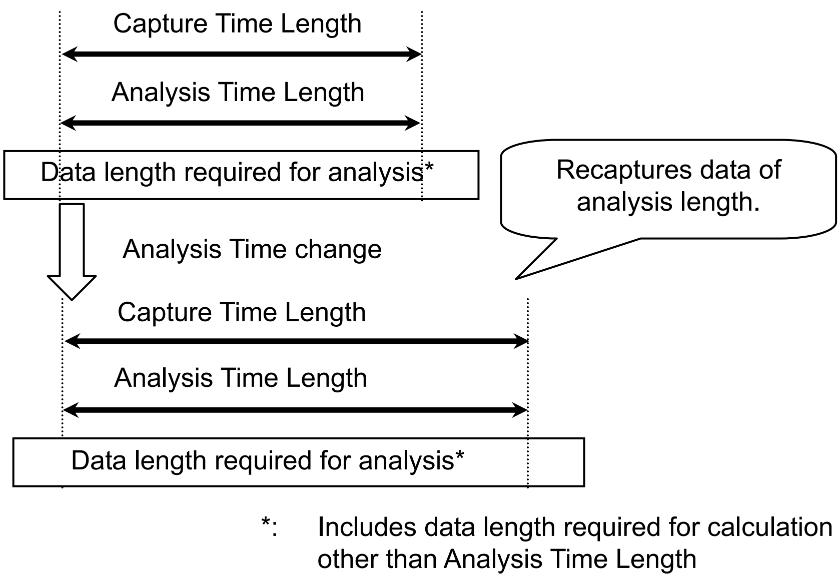


Figure 2.4.2-2 When Capture Time = Auto and Analysis Time = Manual

In addition, recapture is always performed, even if the data length is sufficient, such as the shorter Analysis Time.

On the other hand, when the Capture Time is Manual, the maximum value required for calculation is always captured. Therefore, reanalysis can be performed without recapture, except for changes of the specific parameters.

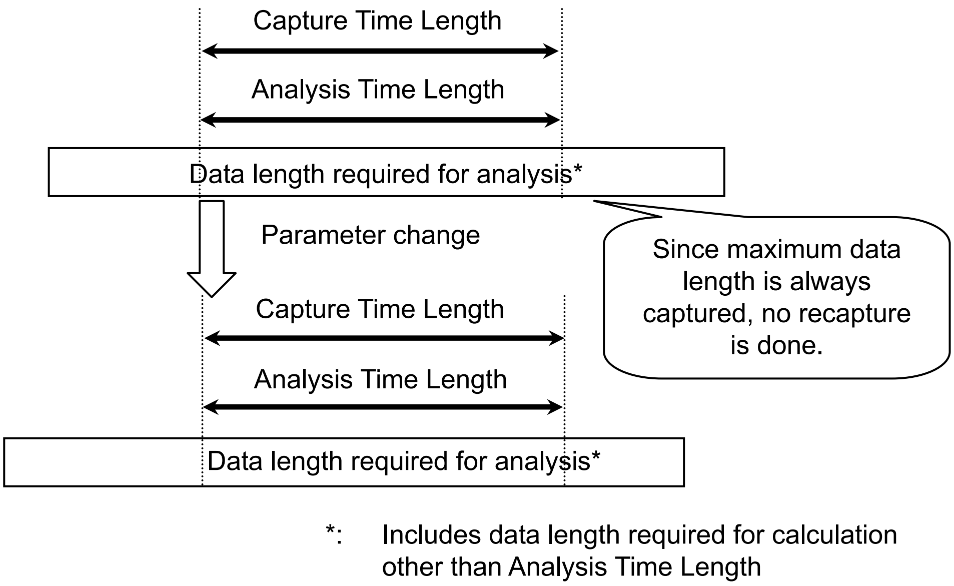


Figure 2.4.2-3 When Capture Time = Manual and Analysis Time = Auto

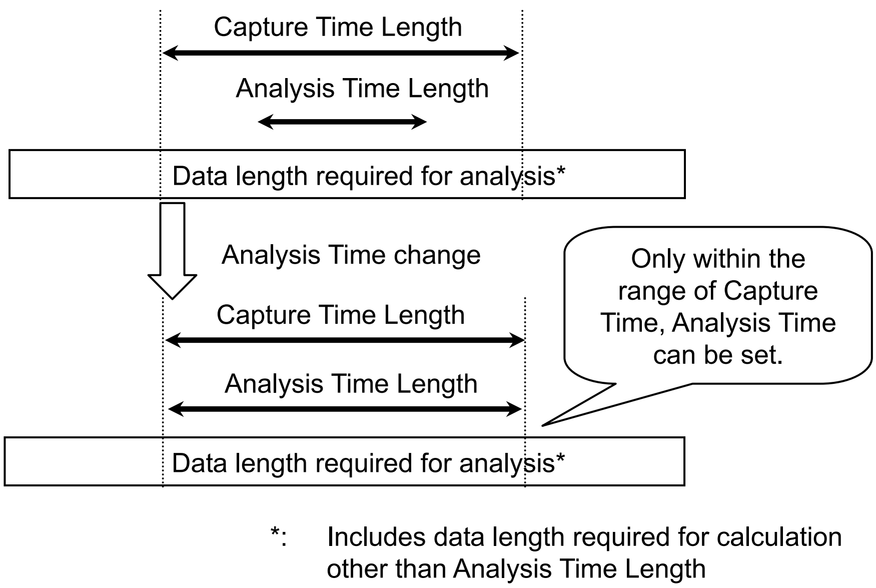


Figure 2.4.2-4 When Capture Time = Manual and Analysis Time = Manual

2.4.3 Parameters recaptured when Capture Time is set to Manual

Some parameters may be recaptured and/or reanalyzed when they are changed.

Tables 2.4.3-1 through 2.4.3-7 list the parameters that are recaptured upon a change.

Table 2.4.3-1 Common parameters recaptured upon a change

Parameter
Center Frequency
Start Frequency
Stop Frequency
Frequency Span
Frequency Band Spurious Mode
Reference Level
Pre-Amp
Attenuator
Trigger Switch
Trigger Source
Trigger Slope
Trigger Level (Video)
Trigger Level (Wide IF Video)
Trigger Delay
Capture Time
Capture Time Length
Reference Clock
Reference Clock Preset

Table 2.4.3-2 Common parameters recaptured upon a change in spectrum trace

Parameter
Marker to Center Freq.
Marker to Ref. Level
Standard
Load Standard Parameter
Noise Cancel

Table 2.4.3-3 Common parameters recaptured upon a change in Power vs Time

Parameter
Standard
Load Standard Parameter
Noise Cancel

Table 2.4.3-4 Common parameters recaptured upon a change in Frequency vs Time

Parameter
None

Table 2.4.3-5 Common parameters recaptured upon a change in Phase vs Time

Parameter
None

Table 2.4.3-6 Common parameters recaptured upon a change in CCDF

Parameter
None

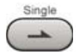
Table 2.4.3-7 Common parameters recaptured upon a change in Spectrogram

Parameter
Marker to Center Freq
Marker to Ref. Level

Chapter 3 Selecting Waveform Capture Method

This chapter describes waveform capture methods and capture methods using triggers.

3.1 Single/Continuous Measurement

The capture mode of this application is determined by pressing 

.

Figure 3.1-1 Single key and Continuous key

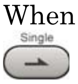
3.1.1 Continuous measurement mode

When the trigger function is Off, measurement is executed continuously.

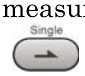
When the trigger function is On, measurement is executed each time the trigger conditions are met.
The Continuous Measurement mode is set by pressing 

(the Continuous Measurement mode is set in the initial state).

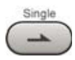
3.1.2 Single measurement mode

When the trigger function is Off, measurement is executed once when 

is pressed.

When the trigger function is “Triggered”, measurement is executed once when the trigger conditions are met after 

is pressed.

The Single Measurement mode is set by pressing 

(measurement starts).

3.2 Trigger Function

The trigger functions of the Signal Analyzer function include normal measurement and trigger measurement.
For trigger measurement, Video, Wide IF Video, SG Marker, Frame and External can be selected as a trigger source.

Pressing F3 (Trigger) from the main function menu, or pressing Trigger/Gate displays the Trigger function menu.

Figure 3.2-1 Trigger/Gate key

Table 3.2-1 Trigger function menu

Function Key	Menu Display	Function
F1	Trigger Switch (On/Off)	Sets the capture start condition. ☞ 3.2.1 “Normal measurement”
F2	Trigger Source	Selects the trigger source. ☞ 3.2.2 “Trigger measurement”
F3	Trigger Slope (Rise/Fall)	Selects the edge where the trigger is generated (rise or fall). ☞ 3.2.2 “Trigger measurement”
F4	Trigger Level (Video)	Sets the trigger level for the video trigger. ☞ 3.2.2 “Trigger measurement”
F5	Trigger Level (Wide IF Video)	Selects the trigger level for the wide IF video trigger. ☞ 3.2.2 “Trigger measurement”
F6	Trigger Hold (On Off)	Sets whether to enable or disable the function for disabling trigger input for a fixed time from when the first trigger is input until the next trigger is input. This function is not available when Video is selected for Trigger Source.
F7	Trigger Hold	Sets the fixed time for the above function. This function is not available when Video is selected for Trigger Source.
F8	Trigger Delay	Sets the delay time from the trigger input until capture is started. ☞ 3.2.2 “Trigger measurement”

The display items related to the trigger parameters are described below.

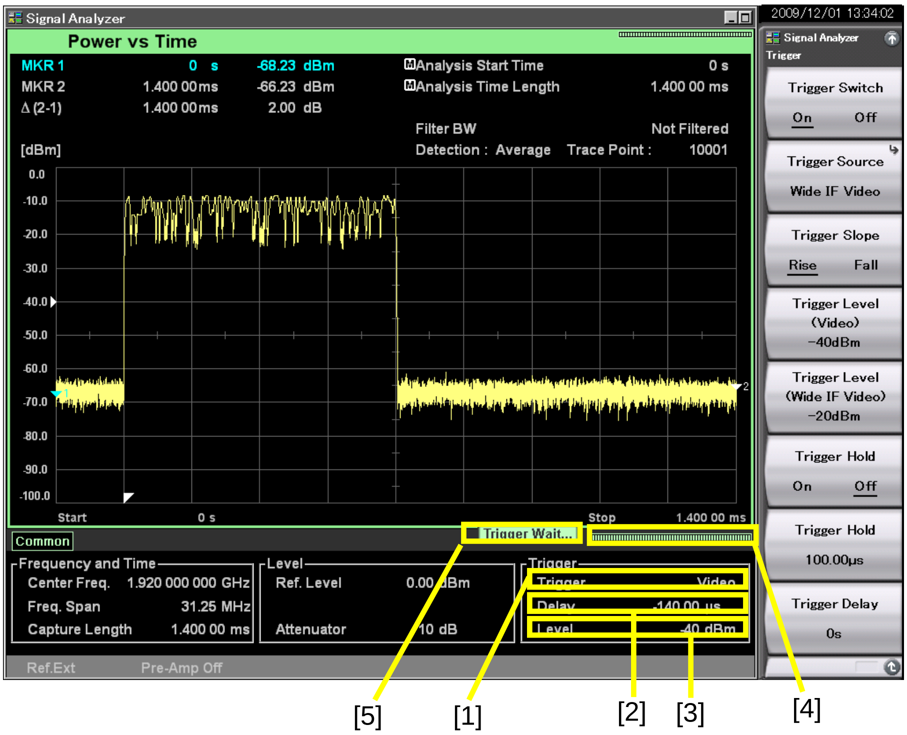
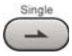


Figure 3.2-2 Display items related to trigger parameters

Table 3.2-2 Display items related to trigger parameters

No.	Display	Description
[1]	Trigger	Displays the trigger source. "Free Run" is displayed in normal measurement.
[2]	Delay	Displays the trigger delay time. It is not displayed in normal measurement.
[3]	Level	Displays the trigger level. It is not displayed in normal measurement and when the trigger source is other than Video or Wide IF Video.
[4]	Capture Indicator	Displays the progress rate in capturing IQ data for each measurement.
[5]	Capture Status	Displays the Capture Status. "Trigger Wait..." is displayed when waiting for trigger input.

3.2.1 Normal measurement

In the continuous measurement mode, waveforms are captured repeatedly and continuously. In the single measurement mode, a waveform is captured when  is pressed.

<Procedure>

1. Press .
2. Press  (Trigger Switch On/Off) and select Off to set the normal capture.

Note:

Digitizing should be executed after a single sweeping has been executed and ended, even when trigger function is used.

3.2.2 Trigger measurement

Measurement starts when the conditions for the selected trigger source are met.

The following five types of triggers are available:

- Video trigger
- Wide IF video trigger
- SG marker trigger (When any of the MS2830A-020/120/021/121 or MS2840A-020/120/021/121 is installed.)
- External trigger
- Frame trigger

Pressing Trigger/Gate, and then pressing F2 (Trigger Source) displays the Trigger Source function menu.

Table 3.2.2-1 Trigger Source function menu

Function Key	Menu Display	Function
F1	Video	Selects Video for Trigger Source.
F2	Wide IF Video	Selects Wide IF Video for Trigger Source.
F3	External*1	Selects External (1) for Trigger Source.
F4	External 2*2	Selects External 2 for Trigger Source.
F5	Frame	Selects Frame for Trigger Source.
F6	SG Marker	Selects SG Marker for Trigger Source.
F8	Frame Sync Setup	Specifies the trigger start source for Frame Trigger if Frame is specified for Trigger Source/Gate Source. Table 3.2.2-3

*1: External 1 is displayed only on the MS2850A.
*2: External 2 is selectable only on the MS2850A.

(1) Video trigger
Waveform capture starts in synchronization with the rise or fall of the waveform.

Operation example: Setting the trigger level to –40 dBm, trigger delay to 2 s, and trigger slope to Rise

<Procedure>

1. Press [Trigger/Gate].
2. Press [F2] (Trigger Source) and then press [F1] (Video).
3. After pressing [−/+] [4] [0], press [F1] (dBm) to set the trigger level.
4. Press  to return to the original menu.
5. Press [F8] (Trigger Delay).
6. After pressing [2], press [F1] (s) to set the trigger delay.
7. Press [F3] (Trigger Slope) and select Rise.

Setting range and resolution for trigger level (video)

Setting range:	–150 to +50 dBm (Log scale)
	0 to 100% (Lin scale)
Minimum resolution:	1 dBm (Log scale)
	1% (Lin scale)
Rotary knob resolution:	1 dBm (Log scale)
	1% (Lin scale)
Step key resolution:	10 dBm (Log scale)
	10% (Lin scale)

Setting range and resolution for trigger delay

Table 3.2.2-2 shows the setting range and resolution for the trigger delay.

Table 3.2.2-2 Resolution and setting range for trigger delay

Frequency Span	Resolution	Minimum Value	Maximum Value
1 kHz	500 μs	–2000 s	2000 s
2.5 kHz	200 μs	–2000 s	2000 s
5 kHz	100 μs	–2000 s	2000 s
10 kHz	50 μs	–2000 s	2000 s
25 kHz	20 μs	–2000 s	2000 s
50 kHz	10 μs	–1000 s	1000 s
100 kHz	5 μs	–500 s	500 s
250 kHz	2 μs	–200 s	200 s
500 kHz	1 μs	–100 s	100 s
1 MHz	500 ns	–50 s	50 s
2.5 MHz	200 ns	–20 s	20 s
5 MHz	100 ns	–10 s	10 s
10 MHz	50 ns	–5 s	5 s
25 MHz*	20 ns	–2 s	2 s
31.25 MHz*	20 ns	–2 s	2 s
50 MHz*	10 ns	–500 ms	500 ms
62.5 MHz*	10 ns	–500 ms	500 ms
100 MHz*	5 ns	–500 ms	500 ms
125 MHz*	5 ns	–500 ms	500 ms

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when the frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 3.2.2-2 Resolution and setting range for trigger delay (Cont'd)

Frequency Span	Resolution	Minimum Value	Maximum Value
50 MHz	160/13 ns	–25.6 s	2 s
62.5 MHz	160 ns	–25.6 s	2 s
100 MHz	80 ns	–12.8 s	2 s
125 MHz	80 ns	–12.8 s	2 s
255 MHz	40 ns	–6.4 s	1.2 s
510 MHz*	20 ns	–3.2 s	0.6 s
1 GHz*	10 ns	–1.6 s	0.3 s

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

(2) Wide IF video trigger
An IF signal with a wide passing band of about 50 MHz or greater is detected, and waveform capture starts in synchronization with the rise or fall of the detected signal.

Operation example: Setting the trigger level to –30 dBm and trigger slope to Fall

<Procedure>

1. Press Trigger/Gate.
2. Press F2 (Trigger Source) , then press F2 (Wide IF Video) and pressing returns to the Trigger menu.
3. Press F5 (Trigger Level Wide IF Video).
4. After pressing −/+ 3 0, press F1 (dBm) to set the trigger level.
5. Press F3 (Trigger Slope) and select Fall.

Setting range and resolution for trigger level (wide IF video)

Setting range:	–60 to 50 dBm
Minimum resolution:	1 dBm
Rotary knob resolution:	1 dBm
Step key resolution:	10 dBm

Setting range and minimum resolution for trigger delay
As shown in Table 3.2.2-2.

(3) External trigger
Measurement starts in synchronization with the rise or fall of the waveform of the signal input via the Ext 1 Input connector or Ext 2 Input connector on the rear panel.

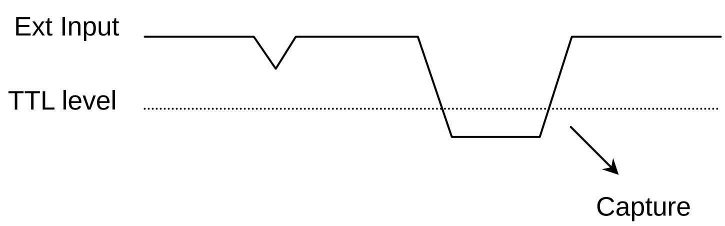


Figure 3.2.2-1 When Trigger Slope = Rise

Operation example: Setting the external 2 trigger

<Procedure>

1. Press [Trigger/Gate].
2. Press [F2] (Trigger Source) and select External 2.
3. Press [F3] (Trigger Slope) to select either Rise or Fall.

Setting range and resolution for trigger delay

As shown in Table 3.2.2-2.

(4) Frame trigger

This equipment-internal trigger signal is used to start waveform capturing. The generation period (Period) and offset time (Offset) for the trigger signal can be set. It is also possible to resynchronize the trigger signal with the Wide IF Video signal or an external trigger.

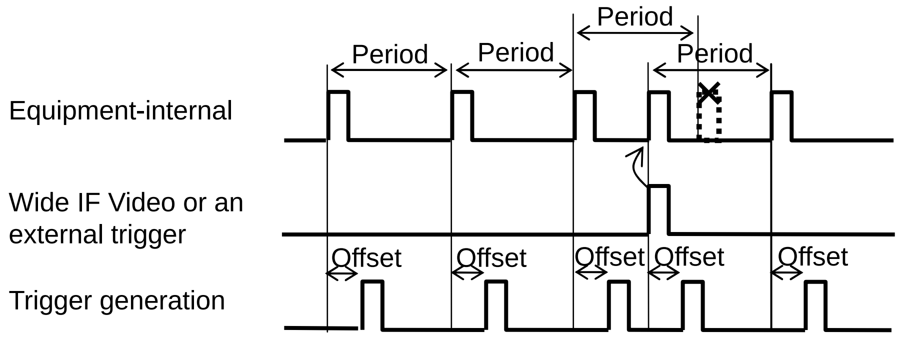


Figure 3.2.2-2 Frame Trigger

Example: To set the wide IF video trigger and frame trigger period to 100 μs and the frame sync offset to 300 μs.

<Procedure>

1. Press [Trigger/Gate].
2. Press [F2] (Trigger Source) on the Trigger function menu, and then press [F4] (Frame).
3. Press [F8] (Frame Sync Setup), and then press [F2] (Wide IF Video).
4. Press [F7] (Frame Trigger Period), and then press [1] [0] [0], and then press [F3] (μs) to set frame trigger period.
5. Press [F8] (Frame Sync Offset), and then press [3] [0] [0], and then press [F3] (μs) to set frame sync offset.

Setting range and resolution for trigger delay

As shown in Table 3.2.2-2.

Pressing 

(Frame Sync Setup) on the Trigger Source function menu displays the Frame Sync Setup function menu.

Table 3.2.2-3 Frame Sync Setup function menu

Function Key	Menu Display	Function
F1	Off	Captures waveforms according to the equipment-internal trigger signal.
F2	Wide IF Video	Captures waveforms according to the equipment-internal trigger signal. The trigger signal is resynchronized according to the Wide IF Video signal.
F3	External*1	Captures waveforms according to the equipment-internal trigger signal. The trigger signal is resynchronized according to an external trigger (1).
F4	External 2*2	Captures waveforms according to the equipment-internal trigger signal. The trigger signal is resynchronized according to the external trigger 2.
F7	Frame Trigger Period	Sets the generation period for the frame trigger signal.
F8	Frame Sync Setup	Sets the offset time from when a trigger signal (the equipment-internal trigger signal, Wide IF Video signal, or external trigger signal) is generated until a trigger actually occurs.

*1: External 1 is displayed only on the MS2850A.

*2: External 2 is selectable only on the MS2850A.

(5) SG marker trigger

Note:

This function can be set when MS2830A-020/120/021/121 or MS2840A-020/120/021/121 Vector Signal Generator (SG option) is installed.

The measurement of the signal analyzer is started in synchronization with the rise or fall of the marker signal output of the Vector Signal Generator (SG option). This function allows measurement in sync with the output signal of the SG option. The marker signal setting and the meaning of the marker signal vary depending on the output signal selected in the SG option. For details, refer to *MS2830A/MS2840A Vector Signal Generator Operation Manual*.

Operation example: Setting the SG marker trigger

<Procedure>

1. Press Trigger/Gate.
2. Press F2 (Trigger Source) and then press F5 (SG Marker).

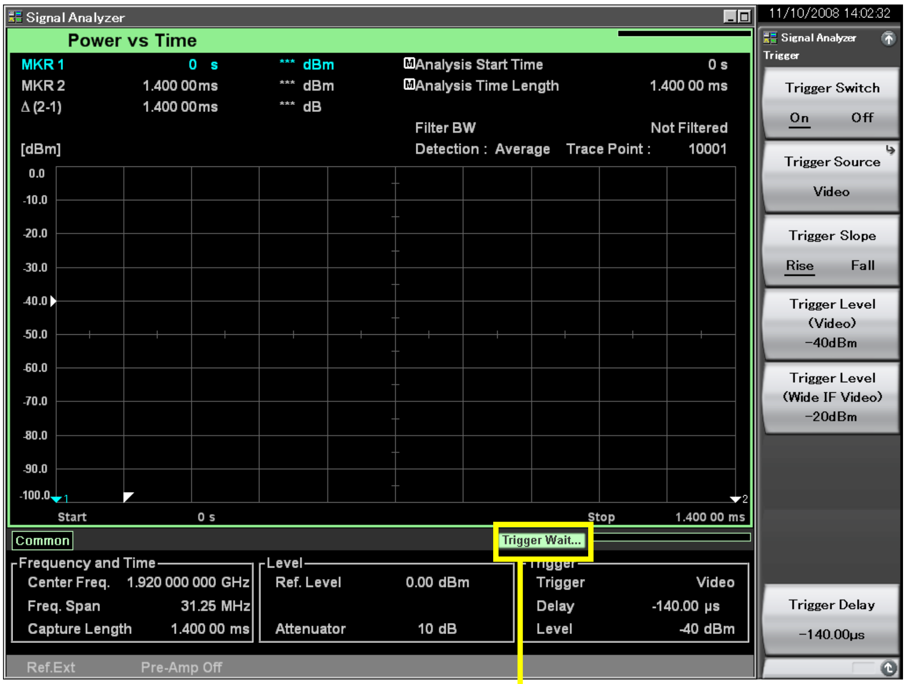
   Press ⟲ to return to the original menu.
3. Press F3 (Trigger Slope) to select either Rise or Fall.

Setting range and resolution for trigger delay

As shown in Table 3.2.2-2.

Displaying the trigger indicator

When waiting for a trigger input, the trigger indicator Trigger Wait... is displayed on the screen.



Trigger indicator

Figure 3.2.2-3 Waiting for Trigger Input

Chapter 4 Trace

This chapter describes the parameters and measurements for each trace.

4.1 Selecting Trace

Pressing F5 (Trace) on the main function menu, or pressing Trace and then F1 (Trace Mode) displays the Trace Mode function menu. The trace type can be selected from this menu.

Figure 4.1-1 Trace key

Table 4.1-1 Trace Mode function menu

Function Key	Menu Display	Function
F1	Spectrum	Spectrum trace. ☞ 4.2 “Spectrum”
F2	Power vs Time	Displays Power vs Time trace. ☞ 4.3 “Power vs Time”
F3	Frequency vs Time	Displays Frequency vs Time trace. ☞ 4.4 “Frequency vs Time”
F4	Phase vs Time	Displays Phase vs Time trace. ☞ 4.5 “Phase vs Time”
F5	CCDF	Displays CCDF trace. ☞ 4.6 “CCDF”
F6	Spectrogram	Displays Spectrogram trace. ☞ 4.7 “Spectrogram”
F8	No Trace	No trace. This function captures signals without executing analysis. ☞ 4.8 “No Trace”

4.2 Spectrum

4.2.1 What is Spectrum trace?

Spectrum trace is a screen that converts captured IQ data from time domain data to frequency domain data by fast Fourier transformation (FFT) processing to display a spectrum.

The display items for a spectrum trace are described below.

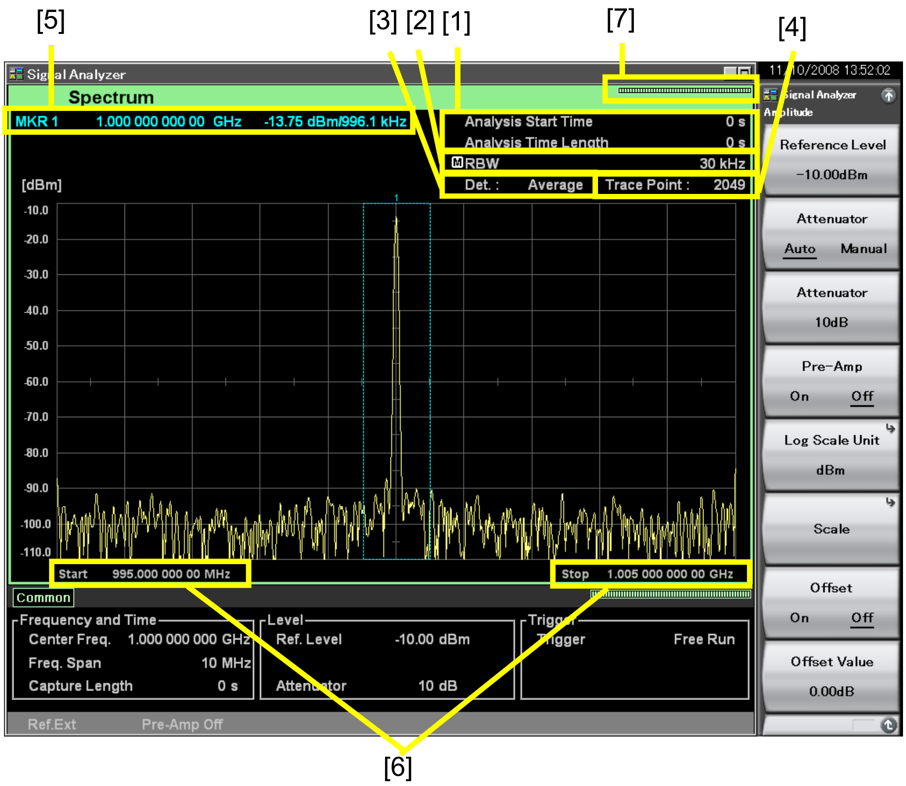


Figure 4.2.1-1 Display items for spectrum trace

Table 4.2.1-1 Display items for spectrum trace

No.	Display	Descriptions
[1]	Analysis Start Time/ Analysis Time Length	Displays the analysis start time and analysis time length.
[2]	RBW	Displays the resolution bandwidth (RBW).
[3]	Det.	Displays the detection mode.
[4]	Trace Point	Displays the trace point count (horizontal axis).
[5]	MKR*/ Δ(* – *)	Displays the marker result value and marker frequency.
[6]	Start/Stop	Displays the start frequency and stop frequency.
[7]	Indicator	Displays the indicator showing the analysis progress rate.

4.2.2 Setting spectrum parameters

After selecting Spectrum for Trace Mode, pressing F5 (Trace) from the main function menu or pressing Trace displays the Trace function menu.

The Trace function menu consists of 2 pages that are toggled by pressing ➔.

☞ 4.1 "Selecting Trace"

Table 4.2.2-1 Trace function menu

Function Key	Menu Display	Function
Page1	Trace	Press Trace (Trace) to display.
F1	Trace Mode	Sets the trace type. ☞ 4.1 "Selecting Trace"
F2	Analysis Time	Used for setting related to analysis time. ☞ 4.2.3 "Setting analysis time"
F3	Scale	Used for setting related to the scale. ☞ 4.2.4 "Setting scale"
F4	Storage	Used for setting related to the update and display of trace data. ☞ 4.2.6 "Setting storage mode"
F5	RBW	Used for setting related to RBW. ☞ 4.2.5 "Setting resolution bandwidth (RBW)"
F6	Return to Spectrogram	Used for executing Return to Spectrogram function. ☞ 4.2.11 "Executing Return to Spectrogram"

Table 4.2.2-1 Trace function menu (Cont'd)

Function Key	Menu Display	Function
F7	Time Detection	Used for setting related to detection. 4.2.7 "Setting detection mode"
F8	Sub Trace Setting	Used for setting related to sub-trace. 4.9 "Sub-Trace"
Page2	Trace	Press Trace (Trace), and then press → to display.
F1	Measure	Used for setting related to the Measure function. 4.2.10 "Measure measurement"
F2	Marker	Used for setting related to markers. 4.2.8 "Setting markers"
F3	Signal Search	Used for setting related to feature-point search within the measurement band. 4.2.9 "Setting marker search"

4.2.3 Setting analysis time

Pressing F2 (Analysis Time) on the Trace function menu, or pressing Time/Sweep displays the Analysis Time function menu.

Table 4.2.3-1 Analysis Time function menu

Function Key	Menu Display	Function
F1	Time (Main Trace) (Auto/Manual)	Switches between auto setting and manual setting for the analysis start time and analysis time length .
F2	Start Time (Main Trace)	Sets the analysis start time.
F3	Time Length (Main Trace)	Sets the analysis time length.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto setting and manual setting of the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

Setting analysis time

Analysis time is the target time range for spectrum trace analysis. The analysis time is specified with the analysis start position (Analysis Start Time) and analysis time length (Analysis Time Length).

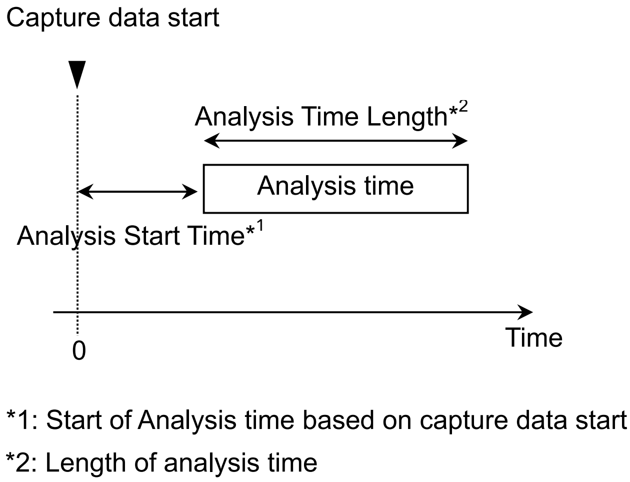


Figure 4.2.3-1 Analysis time

The Auto mode and Manual mode can be specified for setting the analysis time. The following describes the differences between the Auto and Manual modes.

(1) Auto mode

When Capture Time is set to Auto, the analysis start time and analysis time length are automatically set to make the measurement time shortest. The Auto mode sets the minimum analysis time so that the analysis speed is the fastest. While the speed is the highest, variations of measurement values become greater in the measurement of modulation signals and noises where sufficient averaging of spectrum measurement is required. Therefore, to perform sufficient averaging of spectrum measurement, use the Manual mode.

When Capture Time is set to Manual, the capture time set in Capture Time Length is set as the analysis time length. Therefore, all of the captured IQ data is used for analysis.

Table 4.2.3-2 Setting analysis time in Auto mode

Capture Time	Analysis Start Time [s]	Analysis Time Length [s]
Auto	0	0
Manual	0	x_1

x_1 : Capture time length [s]

☞ 2.4 "Setting IQ Data Capture Time Range"

(2) Manual mode

The analysis start time and analysis time length are set manually. This is an effective method for averaging spectrum measurements of modulation signals and noises as well as measuring discontinuous signals, such as burst.

Analysis start time setting range

Table 4.2.3-3 Analysis start time setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length [s]

x_2 : Maximum value [s] of capture time length

☞ 2.4 "Setting IQ Data Capture Time Range"

x_3 : Capture time length [s]

☞ 2.4 "Setting IQ Data Capture Time Range"

Analysis time length setting range

Table 4.2.3-4 Analysis time length setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis start time [s]

x_2 : Maximum value [s] of capture time length

☞ 2.4 "Setting IQ Data Capture Time Range"

x_3 : Capture time length [s]

☞ 2.4 "Setting IQ Data Capture Time Range"

Analysis start time and analysis time length resolution

Table 4.2.3-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz *	20 ns
31.25 MHz *	20 ns
50 MHz*	10 ns
62.5 MHz*	10 ns
100 MHz*	5 ns
125 MHz*	5 ns

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.2.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Setting procedure for analysis time

Example: To switch the analysis time to the Manual mode, and to set the analysis start time to 20 ms and analysis time to 60 ms

<Procedure>

1. Press Time/Sweep.
2. Press F2 (Start Time).
3. Press 2 0, and then press F2 (ms) to set the analysis start time.
4. Press F3 (Time Length).
5. Press 6 0, and then press F2 (ms) to set the analysis time length.

4.2.4 Setting scale

Scale function menu

Pressing F5 (Trace) on the main function menu, or pressing Trace and then F3 (Scale) displays the Scale function menu.

Table 4.2.4-1 Scale function menu

Function Key	Menu Display	Function
F1	Vertical	Used for setting related to the vertical axis (level axis) scale.
F2	Horizontal	Used for setting related to the horizontal axis (frequency axis) scale.

Vertical function menu

Pressing F1 (Vertical) on the Scale function menu displays the Vertical function menu.

Table 4.2.4-2 Vertical function menu

Function Key	Menu Display	Function
F1	Log Scale Division	Sets the scale range (Log scale range) of the vertical axis.
F2	Lin Scale Division	Sets the scale range (Lin scale range) of the vertical axis.
F3	Log Scale Line (10/12)	Sets the number of scale lines when the Log scale is used.

Horizontal function menu

Pressing F2 (Horizontal) on the Scale function menu displays the Horizontal function menu.

Table 4.2.4-3 Horizontal function menu

Function Key	Menu Display	Function
F1	Center	Sets the center frequency of the horizontal axis scale.
F2	Width	Sets the frequency width of the horizontal axis scale.

(1) Setting the vertical axis scale

The scale range Log scale and Lin scale of the main trace level axis are set.

Example: To set the Log scale to 2 dB/Div and scale line to 12

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F1 (Vertical).
4. Press F1 (Log Scale Division).
5. Press 2, and then press F1 (dB/Div) to set Log Scale Division.
6. Press F3 (Log Scale Line), and then select “12” to set the scale line.

Setting range and resolution for vertical axis scale range

Setting range:	0.1 to 20 dB/Div (log scale)
	1 to 10%/Div (linear scale)
Minimum resolution:	0.1 dB/Div (log scale)
	1%/Div (linear scale)
Rotary knob resolution:	1-2-5-10 sequence
Step key resolution:	1-2-5-10 sequence

☞ 2.3.3 “Setting scale”

(2) Setting the horizontal axis scale

In a spectrum trace, the display frequency range (horizontal axis scale) can be changed freely within the range of the center frequency and frequency span. To set the display frequency range, the setting for Center (center of the display frequency range) and Width (frequency bandwidth of the display frequency range) are changed.

Example: To set the frequency bandwidth of the display frequency range to 25 MHz

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F2 (Horizontal).
4. Press F2 (Width).
5. Press 2 5, and then press F2 (MHz) to set the frequency bandwidth of the display frequency range.

Setting range and resolution for horizontal axis scale

Horizontal axis scale setting range: Refer to Table 4.2.4-4.

Horizontal axis scale minimum resolution: $\frac{x_1}{x_2}$ [Hz]

The resolution is 0.01 Hz.

x_1 : Sampling rate [Hz] 2.2.2 “Setting frequency span”
x_2 : Window function length (by RBW) Appendix D “FFT and RBW”

Table 4.2.4-4 Horizontal axis scale setting range

Zoom Center [Hz]		Zoom Width [Hz]	
Lower Limit	**Upper Limit**	**Lower Limit**	**Upper Limit**
$x_1 - \frac{x_2 - x_3}{2}$	$x_1 + \frac{x_2 - x_3}{2}$	$100 * x_4$	x_2

x_1 : Center frequency [Hz] 2.2.1 “Setting center frequency”
x_2 : Frequency span 2.2.2 “Setting frequency span”
x_3 : Horizontal axis scale frequency bandwidth [Hz]
x_4 : Minimum resolution [Hz]

4.2.5 Setting resolution bandwidth (RBW)

Pressing F5 (RBW) on the Trace function menu, or pressing BW displays the RBW function menu.

Table 4.2.5-1 RBW function menu

Function Key	Menu Display	Function
F1	RBW (Auto/Manual)	Selects auto setting or manual setting for the resolution bandwidth (RBW).
F2	RBW	Sets the resolution bandwidth (RBW).

(1) Auto mode

RBW is set to Auto in the initial state to automatically set to the optimal state so that no frequency or level measurement error occurs when the frequency span is changed.

(2) Manual mode

In normal measurement, a measurement can be performed without any special setting, if RBW is set to Auto. However, in the following cases, set RBW to Manual.

(a) General measurement
The frequency resolution can be increased by lowering RBW when observing neighboring 2 signals. At the same time, the noise level can be decreased. However, if it is too low, the spectrum waveform becomes too steep so that the response characteristics become poor. Also, the calculation time becomes longer. Determine the RBW value under practical calculation speed.

(b) Intermodulation distortion observation
Set a lower value of RBW via the Manual setting to measure intermodulation distortion of 2 signals with a relatively broad frequency span and low noise level.

Setting range and resolution for resolution bandwidth in Manual mode

Setting range:	Refer to Table 4.2.5-2.
Rotary knob resolution:	1-3 sequence
Bandwidth step key resolution:	1-3 sequence

Resolution bandwidth setting range

The setting range of the resolution bandwidth varies depending on the setting of Marker Result.

Table 4.2.5-2 Pattern of Marker Result

Integration	Density	Peak (Fast)	Peak (Accuracy)
[1]	[1]	[2]	[3]

Table 4.2.5-3 Setting range of resolution bandwidth

Frequency Span [Hz]	RBW [Hz]			
	Minimum in [1]	Minimum in [2]	Minimum in [3]	Maximum
1 k	1	1	1	30
2.5 k	1	1	1	100
5 k	1	1	1	100
10 k	1	1	1	300
25 k	1	1	3	1 k
50 k	1	3	10	1 k
100 k	3	10	10	3 k
250 k	10	10	30	10 k
500 k	10	30	100	10 k
1 M	30	100	100	30 k
2.5 M	100	100	300	100 k
5 M	100	300	300	300 k
10 M	300	300	1 k	300 k
25 M*	300	1 k	3 k	1 M
31.25 M*	300	1 k	3 k	1 M
50 M*	3k	3k	10k	3M
62.5 M*	3k	3k	10k	3M
100 M*	10k	10k	30k	10M
125 M*	10k	10k	30k	10M
255 M*	10k	10k	30k	10M
510 M*	10k	10k	30k	10M
1 G*	10k	30k	100k	10M

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
255 MHz can be set for the MS2850A-032.

510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

RBW is set with the 1-3 sequence.

(3) Setting the resolution bandwidth

Example: To set the resolution bandwidth to 100 kHz

<Procedure>

1. Press BW.
2. Press F2 (RBW).
3. Press 1 0 0, and then press F3 (kHz) to set the resolution bandwidth.

In the Manual mode, the M icon is displayed.

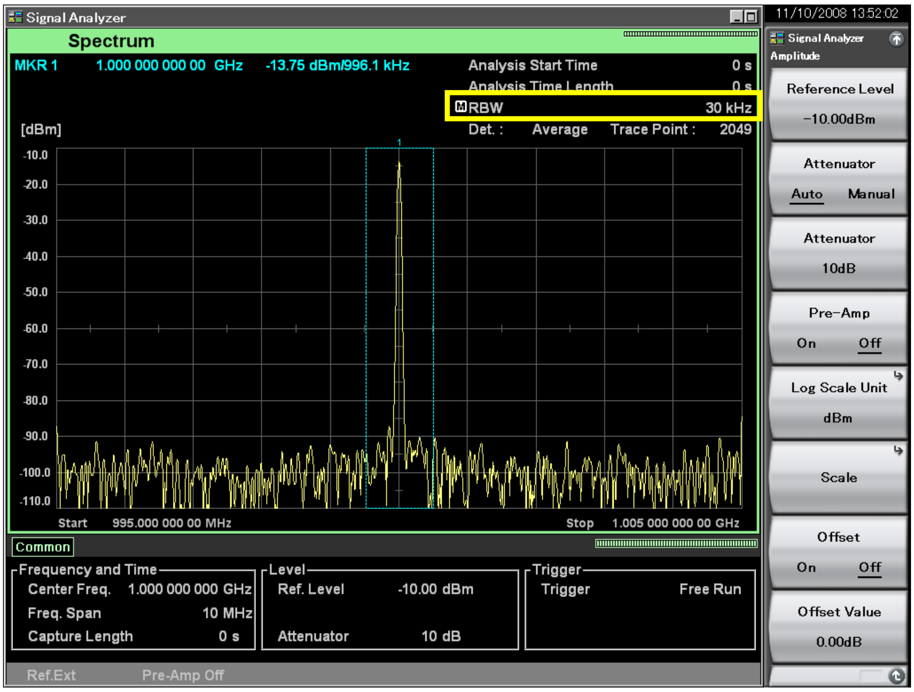


Figure 4.2.5-1 "Manual" icon

4.2.6 Setting storage mode

Pressing Trace and then F4 (Storage) displays the Storage function menu.

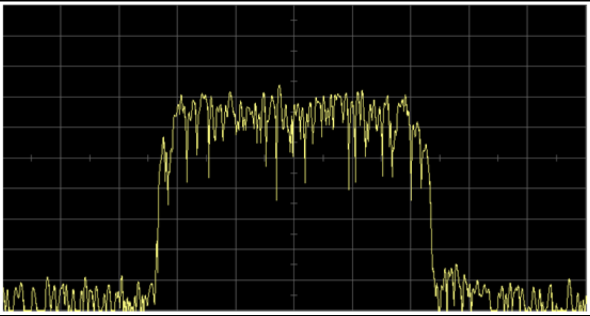
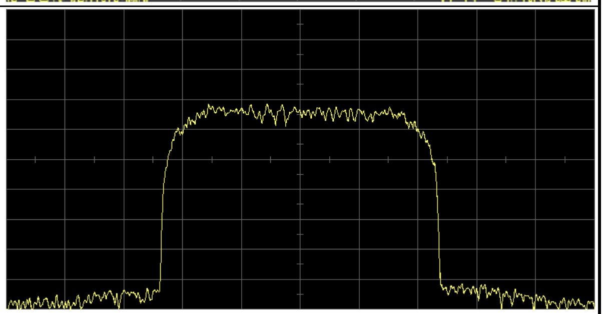
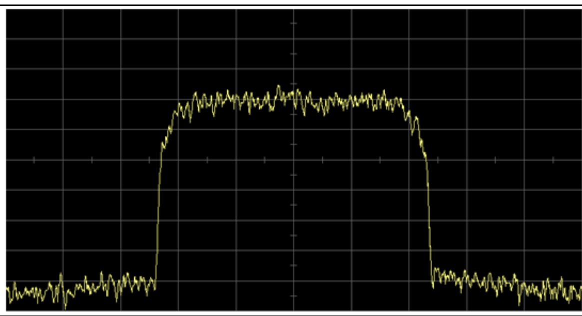
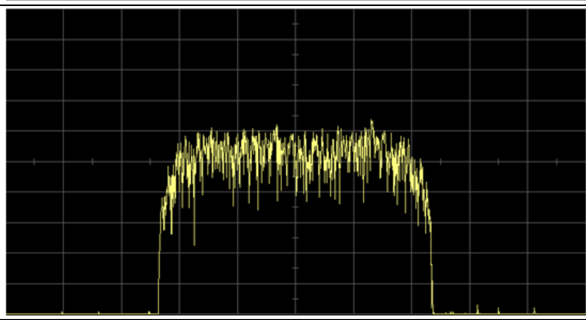
Table 4.2.6-1 Storage function menu

Function Key	Menu Display	Function
F1	Mode	Used for setting related to the updating and displaying of trace data.
F2	Count	Sets the storage count.
F3	Stop	Stops the storage.

Storage mode types

In a spectrum trace, the following four storage mode types can be selected.

Table 4.2.6-2 Four storage mode types

Mode	Description	Display Example
Off	At each capture, the trace data are updated and displayed. These data are used for normal measurement.	
Lin Average	Performs averaging operation at each horizontal axis point for each capture and displays the results. Averaging is done with linear values even in Log display. Used for S/N improvement.	
Max Hold	At each capture, the previous and new trace data of each horizontal axis point are compared and the larger of the two is displayed.	
Min Hold	At each capture, the previous and new trace data of each horizontal axis point are compared and the smaller of the two is displayed.	

(1) Selecting the storage mode and storage count

Example: To set the storage mode to Lin Average and storage count to 100

<Procedure>

1. Press Trace.
2. Press F4 (Storage).
3. Press F1 (Mode) and select Lin Average.
4. Press F2 (Count).
5. Press 1 0 0, and then press F7 (Set) to set the storage count.

Setting range and resolution for storage count

Setting range:	2 to 9999
Minimum resolution:	1
Rotary knob resolution:	1 step
Step key resolution:	1 step at the highest 1st digit

(2) Averaging function

The digital averaging function, which performs an averaging operation at a point on the horizontal axis each time trace data is captured and displays the trace, can be executed by selecting Lin Average in the storage mode.

When the measurement mode is Single, measurement stops when capture for the storage count is completed. When the measurement mode is Continuous, averaging is continued even when capture for the storage count is completed. However, the average after completion of capture for the storage count is calculated as shown in Table 4.2.6-3, so the effect of old data becomes less as the storage count increases.

Table 4.2.6-3 Averaging

Capture Count n	Measurement Value M (n)	Displayed Value Y (n)
1	M (1)	$Y(1) = M(1)$
2	M (2)	$Y(2) = \frac{Y(1) + M(2)}{2}$
3	M (3)	$Y(3) = \frac{2 \times Y(2) + M(3)}{3}$
…	…	…
N – 1	M (N – 1)	$Y(N-1) = \frac{(N-2) \times Y(N-2) + M(N-1)}{N-1}$
N	M (N)	$Y(\mathrm{N}) = \frac{(N-1) \times Y(N-1) + M(N)}{N}$
Continuous only		
N + 1	M (N + 1)	$Y(\mathrm{N}+1) = \frac{(N-1) \times Y(N) + M(N+1)}{N}$
N + 2	M (N + 2)	$Y(\mathrm{N}+1) = \frac{(N-1) \times Y(N) + M(N+1)}{N}$
…	…	…

Note:

When Storage Count = N

Using the averaging function can improve S/N according to the storage count and capture count.

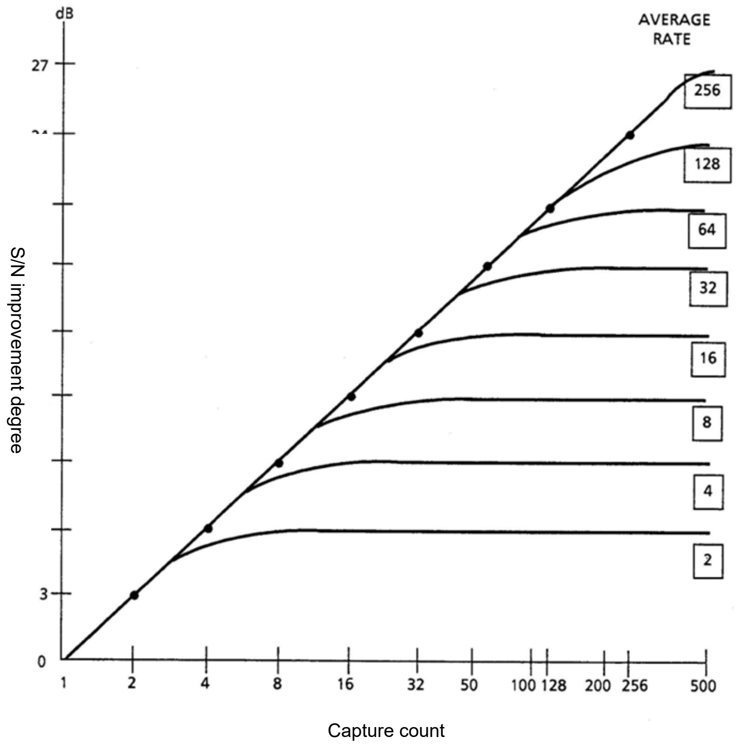


Figure 4.2.6-1 Averaging function

4
Trace

4.2.7 Setting detection mode

The detection mode can be selected by pressing [Trace] and then [F7] (Time Detection).

<u>Detection mode types</u>

The detection mode in the analysis range is set. The detection mode can be selected from the three types: Average, Positive, and Negative.

Table 4.2.7-1 Detection modes in analysis range

Detection Mode	Descriptions
Average	Traces the average value within the analysis range.
Positive	Traces the maximum value within the analysis range. The peak value of a signal near the noise level is measured in Positive mode.
Negative	Traces the minimum value within the analysis range. The lower envelope of the modulation waveform is measured in Negative mode.

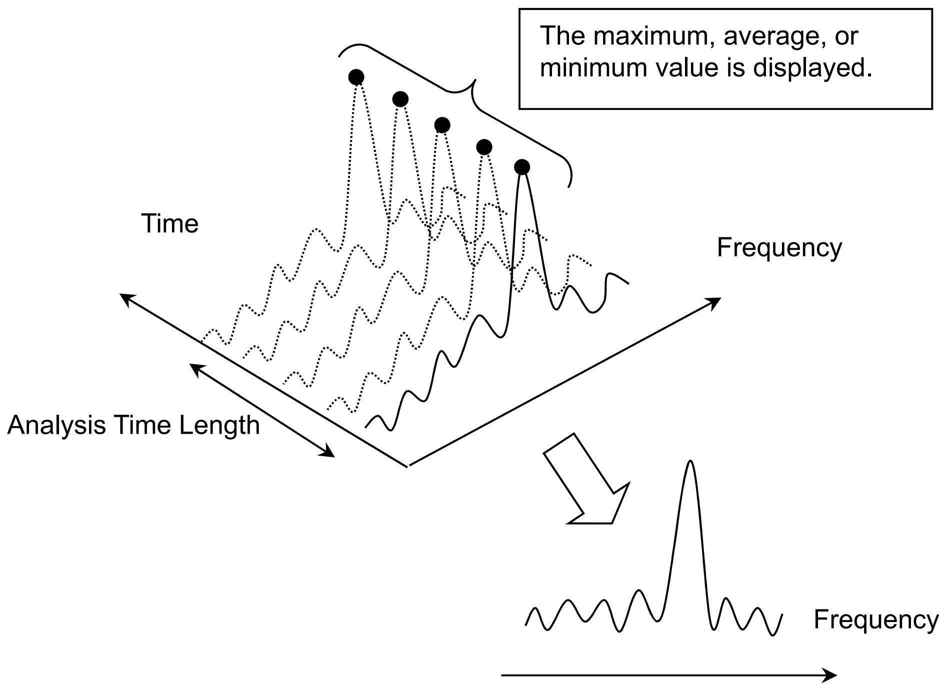


Figure 4.2.7-1 Waveform display by detection

Detection mode when Analysis Time is Auto

When Capture Time and Analysis Time are set to Auto, in the spectrum trace, the analysis time range is minimized (to one FFT) to make the measurement time fastest. Therefore, there is only one data for detection even when the detection mode is changed, so the same measurement results are displayed.

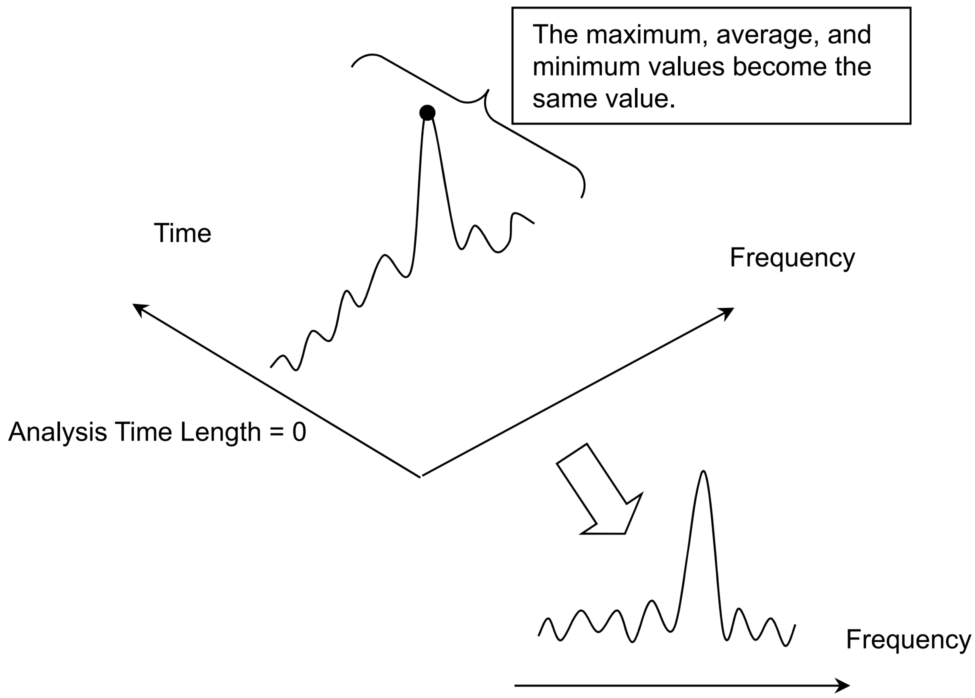


Figure 4.2.7-2 Waveform display when Capture Time is Auto

On the other hand, when Capture Time is set to Manual mode and Analysis Time is set to Auto, in the spectrum trace, the analysis time range is the time set in Capture Time Length. Therefore, detection is performed for the FFT spectrums of all the IQ data captured.

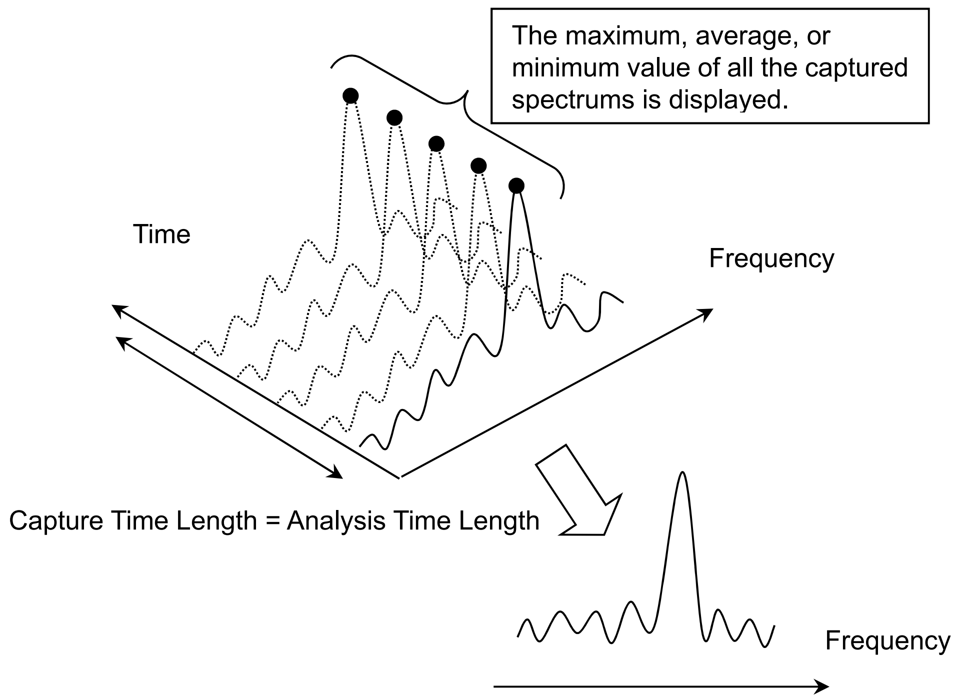


Figure 4.2.7-3 Waveform display when Capture Time is Manual

(1) Setting the detection mode

Example: To set the detection mode to Positive

<Procedure>

1. Press Trace.
2. Press F7 (Time Detection), and then select Positive.
3. Press Enter to set the detection mode.

4.2.8 Setting markers

This section describes various Marker functions provided by the zone marker, and the functions to improve measurement efficiency, such as marker search and parameter setting with marker values.

Pressing F2 (Marker) on page 2 of the Trace function menu, or pressing Marker displays the Marker function menu.

The Marker function menu consists of two pages, which can be toggled by pressing →.

Table 4.2.8-1 Marker function menu

Function Key	Menu	Function
Page1	Marker	Press [Marker] (Marker) to display.
F1	Active Marker	Sets the active marker.
F2	Normal	Sets the marker mode of the active marker to Normal. The frequency (Time) and the level are displayed on the screen. The normal marker is displayed as ▼ on the trace when Marker Result is Peak.
F3	Delta	Sets the marker mode of the active marker to Delta. The frequency and level at the marker are displayed as values relative to the reference point (marker set by Relative To). If the marker that is set by Relative To is set to Off, the marker is set to a Fixed marker.
F4	Fixed	Sets the marker mode of the active marker to Fixed. The Fixed marker is displayed as □ on the screen. It is fixed on the screen and has a fixed value.
F5	Off	Sets the marker mode of the active marker to Off.
F6	Zone Width	Opens the Zone Width function menu. Set the frequency width for the zone marker.
F7	Relative To	Sets the reference marker when the active marker is Delta. The frequency and level of the active marker are displayed as values relative to the reference point (marker set by Relative To).
F8	Next Peak	Searches for the second biggest peak after the active marker, and moves the marker so that the marker becomes the center frequency of the zone marker.

Table 4.2.8-1 Marker function menu (Cont'd)

Function Key	Menu	Function
Page2	Marker	Press  (Marker), and then press  to display.
F1	Marker List (On/Off)	Sets the marker list display On/Off.
F2	Marker Result	Opens the Marker Result function menu. Set the display type of the marker value.
F4	Zoom	Expands and displays the specified range of the zone marker of the active marker.
F5	Zoom Out	Compresses and displays the current screen display data in the zone of the active marker.
F6	Marker to Center Freq.	Sets the marker center frequency of the active marker to the center frequency in the measurement band.
F7	Marker to Ref. Level	Sets the integral values within the zone width of the active marker to the reference level.
F8	All Marker Off	Sets all the markers to Off.

Zone Width function menu

On the Marker function menu, press F6 (Zone Width) to display the Zone Width function menu.

Table 4.2.8-2 Zone Width function menu

Function Key	Menu	Function
F1	Type (Zone/Spot)	Switches between the spot marker and the zone marker.
F2	Zone Width	Sets the zone marker width of the frequency domain.
F3	Couple Zone (On/Off)	Sets the Zone Width common setting On/Off. The settings of Zone Width Type and Zone Width are shared when set to On.
F4	Spot Line (On/Off)	Sets the line display of the spot marker to On/Off.

Marker Result function menu

On page 2 of the Marker function menu, press F2 (Marker Result) to display the Marker Result function menu.

Table 4.2.8-3 Marker Result function menu

Function Key	Menu	Function
F1	Integration	Displays the total power in the zone band.
F2	Density	Displays the power per 1 Hz in the zone band.
F3	Peak (Fast)	Displays the peak power in the zone (emphasis on speed).
F4	Peak (Accuracy)	Displays the peak power in the zone (emphasis on accuracy).

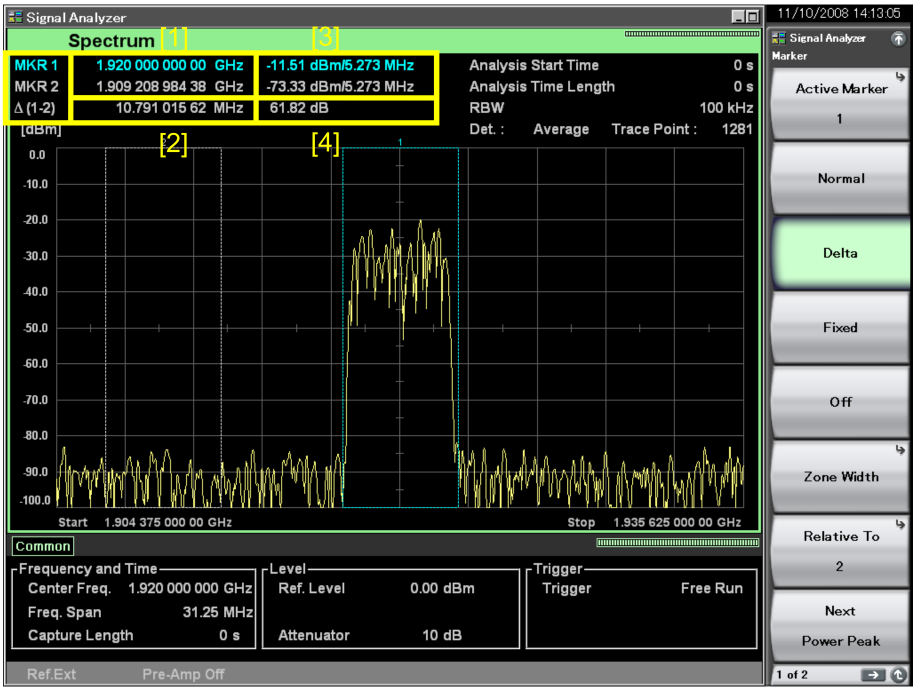


Figure 4.2.8-1 Display items of marker result

Table 4.2.8-4 Display items of marker result

No.	Display	Descriptions
[1]	Frequency	Displays the frequency of each marker.
[2]	Frequency difference	The frequency difference between the active marker and the marker set by Relative To is displayed when the active marker is Delta. The difference between the frequencies of the markers (the active marker and the marker set by Relative To) is displayed.
[3]	Marker value	The average power in the zone band, the integral power in the zone band, or the peak power is displayed. You can switch the display contents by using the Marker Result function menu.
[4]	Marker value difference	The power difference between the active marker and the marker set by Relative To is displayed when the active marker is Delta. The difference between the powers of the markers (the active marker and the marker set by Relative To) is displayed.

Changing position and width of zone marker

The area enclosed by the dashed lines at the center of the screen in Figure 4.2.8-2 is called a zone marker. The integral power, average power, or peak power is displayed as a marker value.

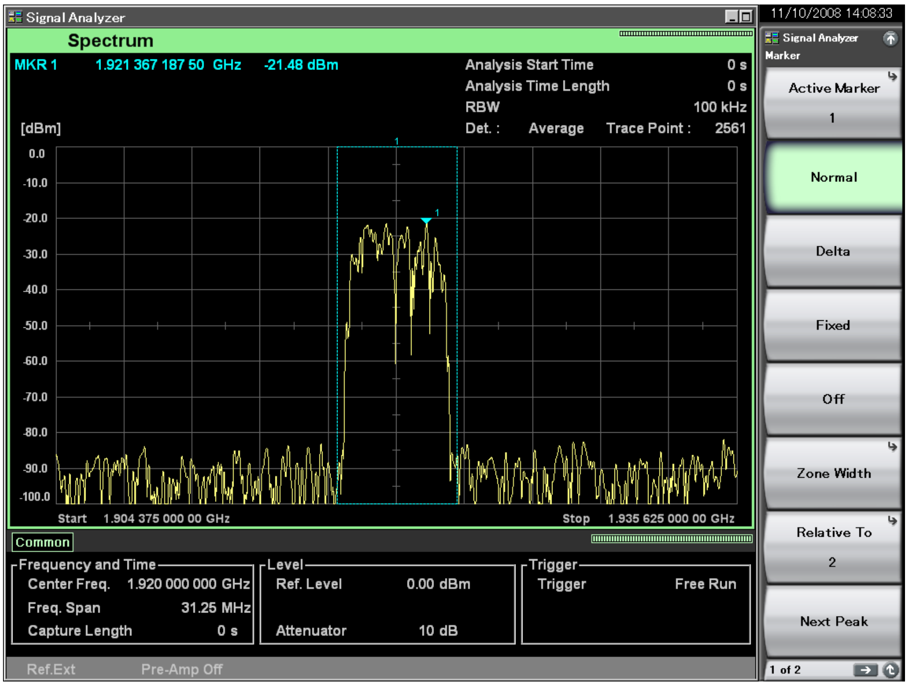


Figure 4.2.8-2 Zone width, zone center frequency, and marker value

(1) Changing Zone Center, Zone Width

Set the zone center frequency and zone width. You can configure a setting per marker.

Setting Couple Zone to On sets all the markers in a lump sum.

Example: To set the marker 1 to 5.9875 GHz and set Zone Width to 1 MHz
<Procedure>

1. Press Marker.
2. Press F1 (Active Marker) and then press F1 (Marker 1) to set the active marker to 1.
3. Press 5 . 9 8 7 5 and then press F1 (GHz) after the Marker main function menu has been displayed, in order to set the zone center frequency.
4. Press F6 (Zone Width) after the Marker main function menu has been displayed.
5. Press 1 and then press F2 (MHz) to set the zone width.

The other markers can be set in the same way.

Setting range and resolution for Zone Center and Zone Width

Setting range: Refer to Table 4.2.8-5.

Zone Center minimum resolution: $\frac{x_1}{x_2}$ [Hz]

The resolution is 0.01 Hz.

Zone Width minimum resolution: Trace Frequency Resolution unit

x_1 : Sampling rate [Hz] ☞ 2.2.2 “Setting frequency span”

x_2 : Window function length (by RBW) ☞ Appendix D “FFT and RBW”

Table 4.2.8-5 Zone Center, Zone Width setting range

Zone Center [Hz]		Zone Width [Hz]	
Lower Limit	Upper Limit	Lower Limit	Upper Limit
$x_1 - \frac{x_2}{2}$	$x_1 + \frac{x_2}{2}$	$\frac{x_3}{x_4} \times 32$	x_2

x_1 : Horizontal axis scale center frequency [Hz]

x_2 : Horizontal axis scale frequency bandwidth [Hz]

x_3 : Sampling Rate [Hz] ☞ 2.2.2 “Setting frequency span”

x_4 : Window function length (by RBW) ☞ Appendix D “FFT and RBW”

(2) Type of Marker Result

Select one of the following marker result types.

Integration	Displays the integral power in the zone marker band.
Density	Displays the power per 1 Hz in the zone marker band.
Peak (Fast)	Displays the peak power in the zone marker band(emphasis on speed).
Peak (Accuracy)	Displays the peak power in the zone marker band(emphasis on accuracy).

Example: To select the type of the marker result

<Procedure>

1. Press Marker.
2. Press F8 (Marker Result) on page 2 of the function menu then select Integration, Density, Peak (Fast), and Peak (Accuracy) to set the marker result type.

(3) Zoom In Display Setting

Example: To enlarge the zone range of the active zone marker

<Procedure>

1. Press Marker.
2. Press → to display the page 2 of Marker function menu.
3. Press F4 (Zoom) to enlarge the specified range.

As shown in Figure 4.2.8-3, when the Zoom function is performed after setting the range with the zone marker, Center (center of the display frequency range) and Width (frequency bandwidth of the display frequency range) are changed to the zone marker range.

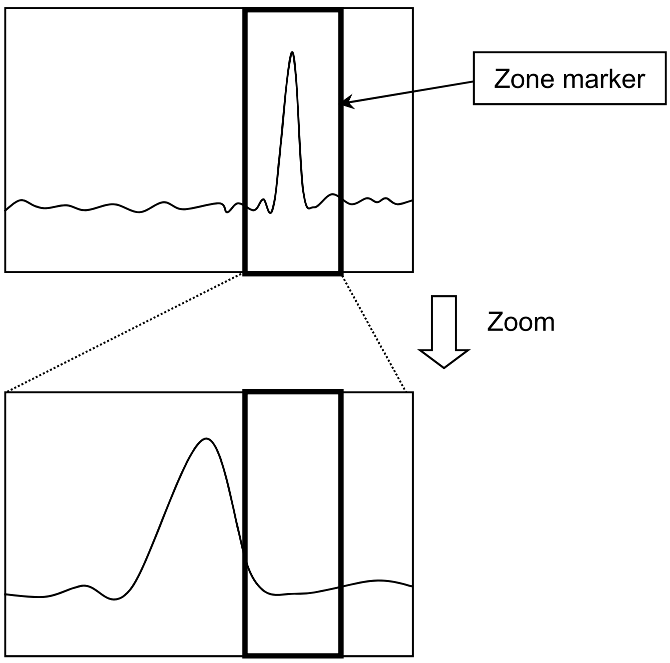


Figure 4.2.8-3 Zoom

(4) Zoom Out Display Setting

Example: To reduce the current screen display data into the zone of the active zone marker

<Procedure>

1. Press Marker.

Press ➔ to display the page 2 of Marker function menu.

Press F5 (Zoom Out) to downsize the entire screen to fit in the active zone of the zone marker.

As shown in Figure 4.2.8-4, when Zoom Out is performed after setting the range with the zone marker, the zone marker range changes to Center (center of the display frequency range) and Width (frequency bandwidth of the display frequency range).

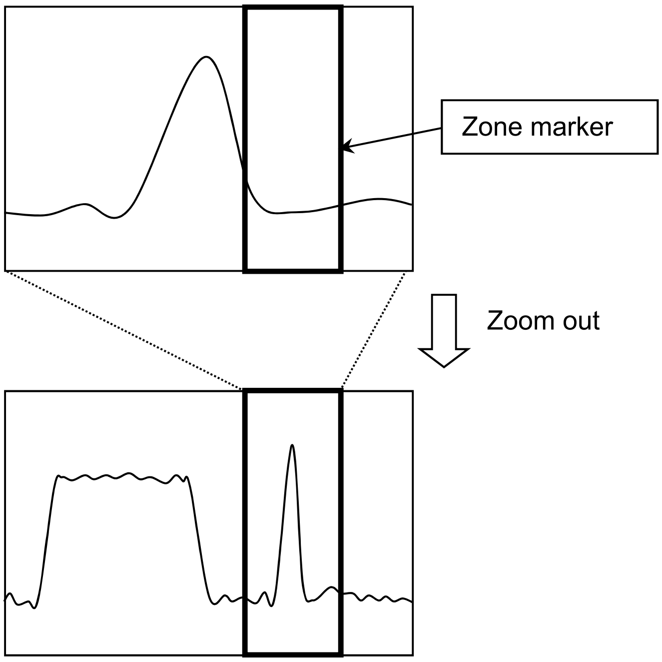


Figure 4.2.8-4 Zoom out

(5) Displaying marker list

Displays the list of the marker result. The marker frequency and the power are displayed on the list.

Example: To set the marker display to On

<Procedure>

1. Press Marker.
2. Press ➔ to move to page 2 of the Marker function menu, and set F1 (Marker List) to On.

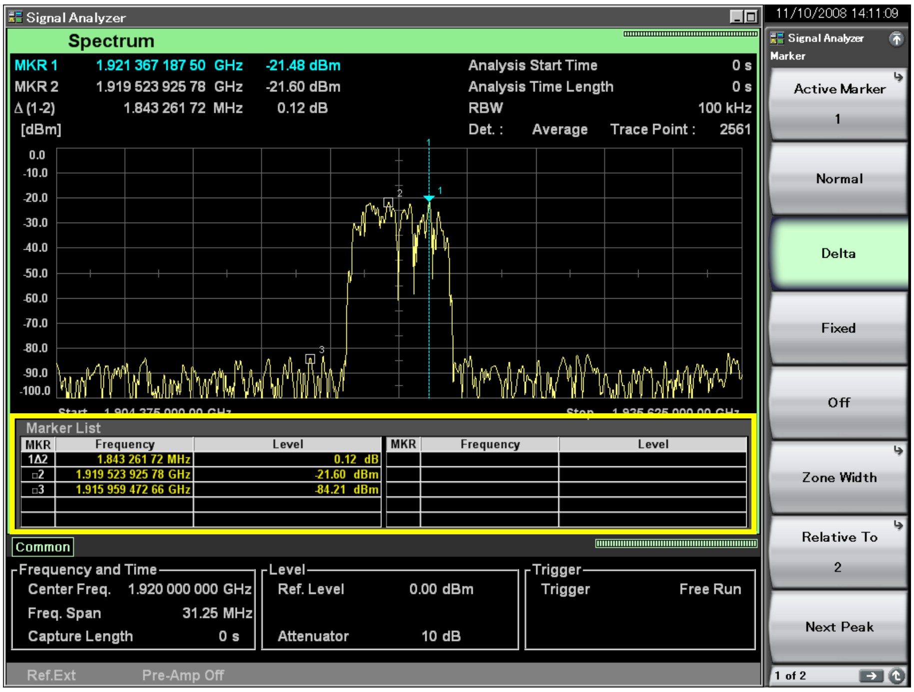


Figure 4.2.8-5 Displaying marker list

Table 4.2.8-6 Marker List Display Items

Item	Descriptions
MKR	Displays the marker number. When a number is displayed, it indicates a marker number. When Δ is displayed, it indicates the level or frequency difference between the active marker and the marker set by Relative To. When □ is displayed, it indicates a Fixed marker.
Frequency	Displays the marker frequency.
Level	Displays the marker level. The result selected in Marker Result is displayed in the units specified in Scale Unit. When Δ is displayed, the level of the active marker is displayed as a relative value to the marker set in Relative To.

4.2.9 Setting marker search

The marker search functions include Peak search and Next Peak search.

Signal Search function menu

Pressing F3 (Signal Search) on page 2 of the Trace function menu, or pressing Peak Search displays the Signal Search function menu.

Table 4.2.9-1 Signal Search function menu

Function Key	Menu Display	Function
F1	Peak Search	Moves the active marker to the point where the integral power of the zone width of the active marker becomes maximal in the measurement band. If two or more such points exist, the point with the lowest frequency (toward the left of the scale) is selected.
F2	Next Peak	Detects the second highest integral power of the zone width of the active marker in the measurement band and moves the active marker to that point. If two or more such points exist, the point with the lowest frequency (toward the left of the scale) is selected.
F3	Marker Search Function	Opens the Marker Search function menu. Sorts the markers by frequency (time) or level. This is available when Marker Result setting is set to Peak (Fast) or Peak (Accuracy).
F5	Resolution	Sets the resolution for Next Peak search.
F6	Threshold	Used for setting related to the threshold value to restrict level points to be searched.
F7	Marker to Center Freq.	Reflects the marker center frequency of the active marker to the center frequency within the measurement band.
F8	Marker to Ref. Level	The value of the active marker (integral power in the zone width when Marker Result is density) is used as reference level.

Threshold function menu

Pressing F6 (Threshold) from the Signal Search function menu displays the Threshold function menu.

Table 4.2.9-2 Threshold function menu

Function Key	Menu Display	Function
F1	Threshold (On/Off)	Selects On/Off for the detection threshold function for integral peak power detection of the zone width.
F2	Threshold (Above/Below)	Selects whether integral peak power detection of the zone width is to be performed Above (upper detection) or Below (lower detection) the threshold.
F3	Threshold Level	Sets the detection threshold for integral peak power detection of the zone width.

Marker Search function menu

Pressing F3 (Marker Search Function) on the Signal Search function menu displays the Marker Search function menu.

Table 4.2.9-3 Marker Search function menu

Function Key	Menu	Function
F1	Search Peaks Sort Y	Sets the markers in the order of level in relation to the peaks on the trace of the number specified in Search Peaks Number.
F2	Search Peaks Sort X	Sets the markers in the order of frequency (time) in relation to the peaks on the trace of the number specified in Search Peaks Number.
F6	Search Peaks Number	Sets the number of searches when Search Peaks Sort Y/X is executed.
F7	Resolution	Specifies the resolution of the search.
F8	Threshold	Sets the threshold to limit the level point targeted for searching.

(1) Executing Peak search

The zone of the active marker is moved to the position where the marker value becomes the maximum in the measurement band. If two or more marker values exist, it is moved to the point with the lower marker frequency. When Marker Result is Integration or Density, the function menu is displayed as “Power Peak Search. Executing Power Peak Search moves the zone of the active marker to the point where the integral power of the zone bandwidth becomes the highest.

Example: To execute a Peak search

<Procedure>

1. Press [Peak Search].
2. Press [F1] (Peak Search) to execute a Peak search.

(2) Executing Next Peak search

The zone of the active marker is moved to the position with the next highest peak power for the marker value of the current active marker. If two or more marker values exist, it is moved to the point with the lower marker frequency. When Marker Result is Integration or Density, the function menu is displayed as “Next Peak Power”. Executing Next Power Peak detects the next highest integral power to the current integral power of the zone bandwidth, and then moves the zone of the active marker to that point.

Example: To execute a Next Peak search

<Procedure>

1. Press [Peak Search].
2. Press [F2] (Next Peak) to execute a Next Peak search.

When Next Peak search is executed in succession, peak values with high marker values are sequentially detected to which the marker is moved.

(3) Setting the search resolution

The Next Peak search resolution is set. Trace data with slopes greater than the resolution at both ends is to be searched.

Example: To set the search resolution value to 1.23 dB

<Procedure>

1. Press [Peak Search].
2. Press [F5] (Resolution).
3. Press [1] [.] [2] [3], and then press [F1] (dB) to set the search resolution.

Setting range and resolution for search resolution

Setting range:	0.01 to 50.00 dB
Minimum resolution:	0.01 dB
Rotary knob resolution:	0.1 dB
Step key resolution:	1 dB

(4) Setting the search threshold

The threshold to restrict marker values to be searched is set. A search is performed for marker values above or below the threshold.

Example: To set threshold limitation to On and a threshold below –20 dBm

<Procedure>

1. Press [Peak Search].
2. Press [F6] (Threshold).
3. Press [F1] (Threshold On/Off) to switch to On.
4. Press [F2] (Threshold Above/Below) to switch to Below.
5. Press [F3] (Threshold Level).
6. Press [–/+] [2] [0], and then press [F1] (dBm) to set the threshold.

(5) Executing Marker to Center Freq.

The marker center frequency (Zone Center) is set to the center frequency (Center Frequency).

Example: To detect the peak power position in the measurement band and setting it to the center frequency

<Procedure>

1. Press [Peak Search].
2. Press [F7] (Marker to Center Freq.).

(6) Executing Marker to Ref. Level

The zone width integral power (Total Power) of the marker is set to the reference level (Reference Level).

Example: To detect the peak power position in the measurement band and setting it to the reference level

<Procedure>

1. Press [Peak Search].
2. Press [F8] (Marker to Ref. Level).

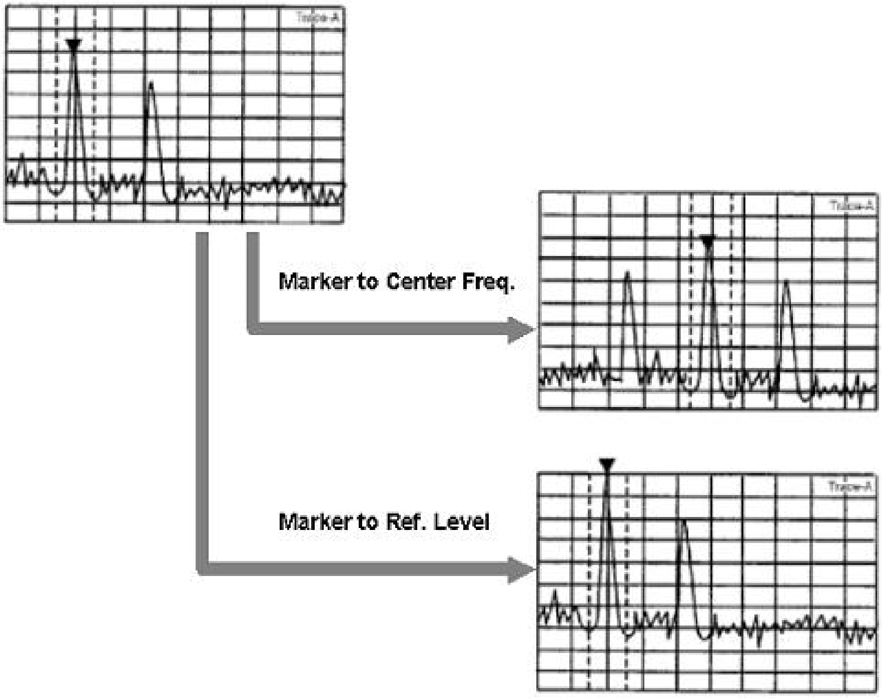


Figure 4.2.9-1 Marker to Center Freq. / Marker to Ref. Level

(7) Setting Marker Search Function

Sorts the markers set in Search Peaks Number by frequency (time) or level.

Note Marker Search Function can be executed when Marker Result is set to Peak (Fast) or Peak (Accuracy).

Example: To sort four markers by level

<Procedure>

1. Press Peak Search.
2. Press F6 (Search Peaks Number) after pressing F3 (Marker Search Function), and then press 4 to set the number of markers to 4.
3. Press F1 (Search Peaks Sort Y) to sort the markers by level.

Example: To sort the markers by frequency

<Procedure>

1. Press Peak Search.
2. Press F3 (Marker Search Function).
3. Press F2 (Search Peaks Sort X) to sort the markers by frequency.

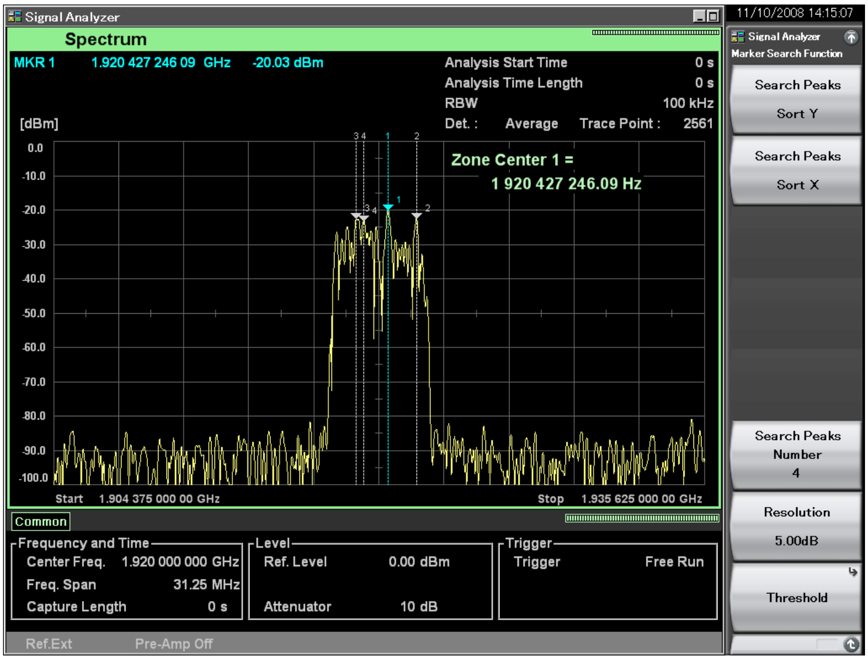
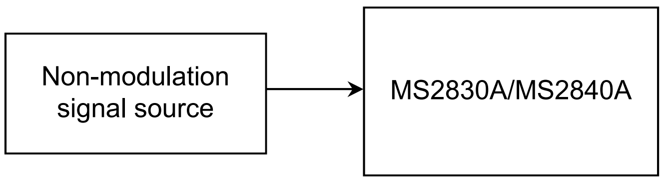


Figure 4.2.9-2 Setting markers sorted by level

Measurement example: Measuring the CN ratio

<Measurement block>



Center frequency: 1.9 GHz

Offset frequency: 100 kHz

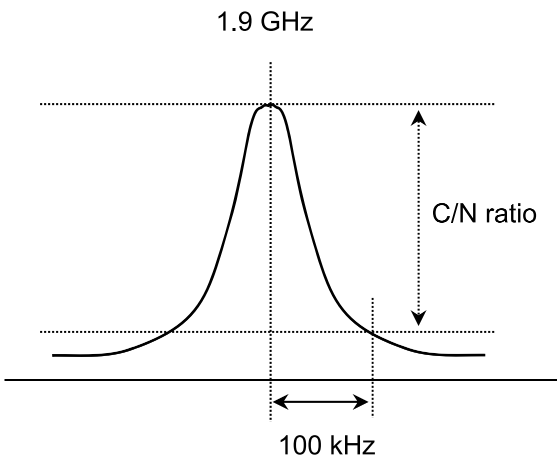


Figure 4.2.9-3 Measurement block diagram

<Procedure>

1. Press [Preset] and then press [F1] (Preset).
2. Press [Span].
3. Press [5] [0] [0] and then press [F3] (kHz) to set the frequency span.
4. Press [Frequency].
5. Press [1] [.] [9] and then press [F1] (GHz) to set the center frequency.
6. Press [Marker] and then press [F3] (Delta) to set the marker mode to Delta.
7. Press [→] to display page 2 of the Marker function menu.
8. Press [F2] (Marker Result) and then press [F4] (Peak (Accuracy)).
9. Press [Marker] to display the Marker function menu.
10. Press [F1] (Active Marker) and then press [F2] (Marker 2).
11. After the Marker function menu has been displayed, press [F2] (Normal) to set the marker mode to Normal.
12. Press [F6] (Zone Width) to display the Zone Width function menu.
13. Press [F3] (Couple Zone) to select Off.
14. Press [F1] (Type) to select Spot.
15. Press [1] [.] [9] [0] [0] [1] [0] [0] [0] and then press [F1] (GHz) to set the center frequency of Marker 2.
16. Press [Marker] to display the Marker function menu.
17. Press [F1] (Active Marker) and then press [F1] (Marker 1).
18. Return the reading for the difference marker value Δ (1 – 2).

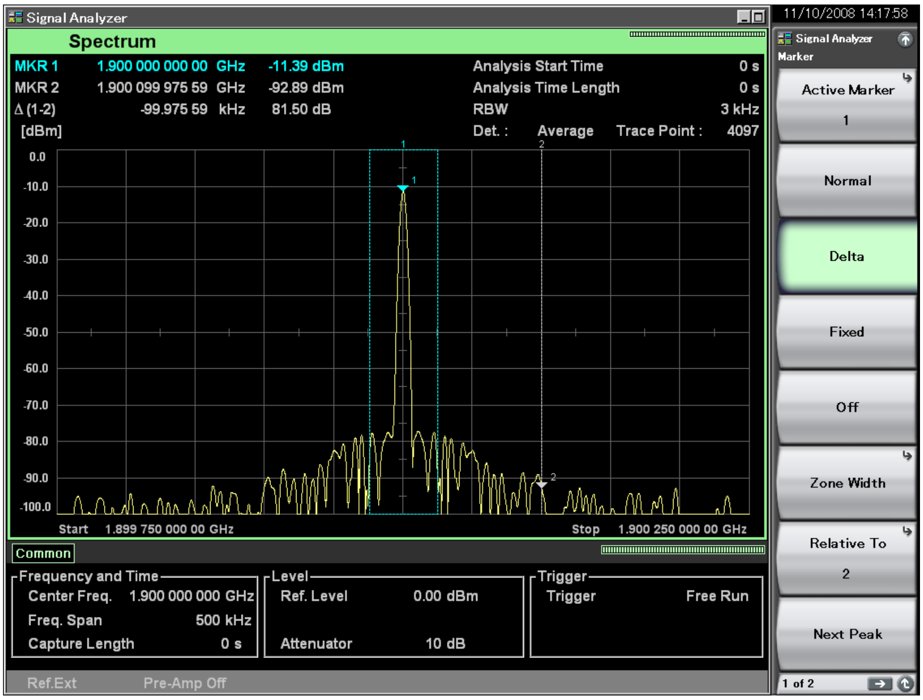


Figure 4.2.9-4 Measurement results

The measurement values can be converted to values in dBc/Hz units by the following formula:

$$CN = M + 10\log(RBW)$$

where:

CN	C/N measurement value [dBc/Hz]
M	Difference marker value [dB]
RBW	RBW setting value [Hz]

Change the RBW value to select the best C/N measurement value.

4.2.10 Measure measurement

Measure function menu

Pressing F1 (Measure) on page 2 of the Trace function menu, or pressing Measure displays the Measure function menu.

Table 4.2.10-1 Measure function menu

Function Key	Menu Display	Function
F1	ACP	Performs adjacent channel leakage power measurement. Select the reference power, offset channel bandwidth, carrier bandwidth, carrier center frequency, offset channel to measure, and bandlimiting filter.
F2	Channel Power	Performs power measurement in the specified frequency band. Sets the channel center frequency, channel bandwidth, and filter.
F3	OBW	Measures the occupied bandwidth. Sets the dB value with the method, % power of the N% method, and X dB method.
F8	Standard	This function is available only when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109, or MS2850A-032 is installed. Specify the communication method of the input signals to automatically set the parameters corresponding to the communication method. Disables the parameter load function (Load Standard Parameter) corresponding to the communication method. Appendix C "Standard Parameter List" When moving to the function menu of each measure function that has been set to Off, the parameters corresponding to the communication method are automatically loaded. When moving to the function menu of each measure function that has been set to On, no parameter is automatically loaded.

ACP function menu

Pressing F1 (ACP) on the Measure function menu displays the ACP function menu.

Table 4.2.10-2 ACP function menu

Function key	Menu Display	Function
F1	ACP (On/Off)	When it is set to On, other measure functions of the same trace are set to Off.
F2	ACP Reference	Sets the reference power. Span Total: Uses the integral power on the entire screen as a reference. Carrier Total: Uses the total value of all carrier power as a reference. Both Sides of Carriers: The carrier power of the largest carrier number is used as a reference for the upper offset, while the carrier power of the smallest carrier number is used as reference. Carrier Select: Carrier number used as a reference when the reference of the relative level display for Adjacent Channel Power measurement is set to Carrier.
F3	In Band Setup	Performs a setting for In-Band.
F4	Offset Setup	Performs a setting for Offset Channel
F5	Power Result Type (Carrier/Ofs.)	Switches Power Result Display. Displays Carrier Power Result when Carrier is selected, and displays Offset Channel Power Result when Ofs. is selected.
F6	Noise Cancel (On/Off)	Sets On/Off for the noise canceling function. When executed, it measures the internal noise of this instrument and the measured noise is deducted from the measurement value. This function is available only when Standard Parameter is set. ***Note:*** The internal noise may not be measured properly when the input signal level is high.
F7	Load Standard Parameter	Loads the measurement parameters corresponding to the communication method selected in Standard when anything other than Off is set for Standard in the Measure function menu. Appendix C “Standard Parameter List”

In Band Setup function menu

Press [F3] (In Band Setup) on the ACP function menu to display the In Band Setup menu.

Table 4.2.10-3 In Band Setup function menu

Function Key	Menu display	Function
F1	Carrier Number	Sets the number of carriers.
F2	In-Band Center	Sets the center frequency of In-Band.
F3	Carrier Spacing	Sets an interval between carriers.
F4	Carrier BW	Sets a bandwidth of a carrier.
F7	Filter Type	Sets a filter type of a carrier. Selects the type from Rectangular, Nyquist, and Root Nyquist.
F8	Roll-off Factor	Sets a roll-off factor. Available only when Nyquist or Root Nyquist is selected in Filter Type.

Offset Setup function menu

Pressing F4 (Offset Setup) on the ACP function menu displays the Offset Setup function menu.

The Offset Setup function menu consists of two pages. Press ➔ to change the page.

Table 4.2.10-4 Offset Setup Function Menu

Function Key	Menu display	Function
Page1	Offset Setup	Press F4 (Offset Setup) to display this page.
F1	Ch BW	Sets a bandwidth of the Offset Channel.
F7	Filter Type	Sets a filter type of the Offset Channel. Selects a filter type from Rectangular, Nyquist, and Root Nyquist.
F8	Roll-off Factor	Sets a roll-off factor. Available only when either Nyquist or Root Nyquist is selected in Filter Type.
Page2	Offset Setup	Press F4 (Offset Setup), and then press ➔ to display page 2.
F1	Offset-1 (On/Off)	Sets Offset Channel 1 to On/Off.
F2	Offset-1	Sets an offset frequency of Offset Channel 1.
F3	Offset-2 (On/Off)	Sets Offset Channel 2 On/Off
F4	Offset-2	Sets an offset frequency of Offset Channel 2.
F5	Offset-3 (On/Off)	Sets Offset Channel 3 to On/Off.
F6	Offset-3	Sets an offset frequency of Offset Channel 3.

(1) Measuring the adjacent channel leakage power

The leakage power of the adjacent channel is measured.

The display items for the measurement results when Power Result Type is set to Offset are described below.

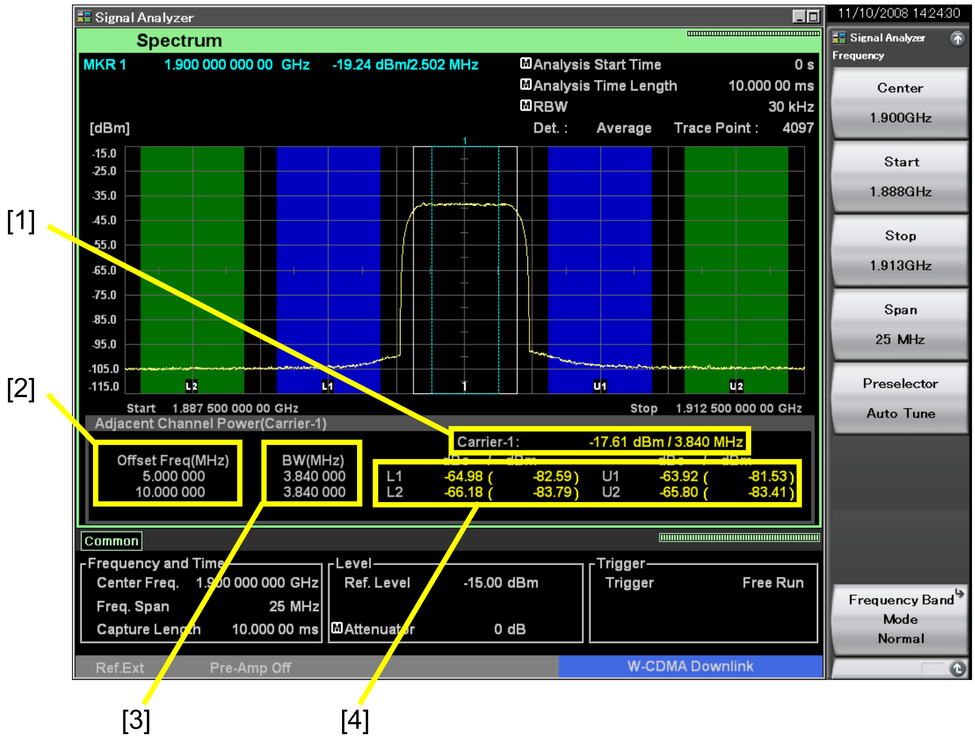


Figure 4.2.10-1 Display items for measurement results

Table 4.2.10-5 Display items for measurement results

No.	Display	Descriptions
[1]	Span Total/ Carrier Total/ Carrier-X	Displays the integral power in the screen display band when “ACP Reference” is “Span Total,” or the integral power in In-Band when “ACP Reference” is “Carrier Total.” Displays the selected carrier power when “ACP Reference” is “Carrier Select”. Displays the carrier power on both sides when “ACP Reference” is “Both Sides of Carriers”.
[2]	Offset Freq	Displays the setting of the offset frequency.
[3]	BW	Displays the setting of the channel bandwidth.
[4]	L1/L2/U1/U2	Displays the relative value of the total power of the Offset Channel bandwidth around Offset-1 to 3 and the reference power selected in “ACP Reference”. It also displays the total power of the Offset Channel bandwidth around Offset-1 to 3 in parentheses.

The display items for the measurement results when Power Result Type is set to Carrier are described below.

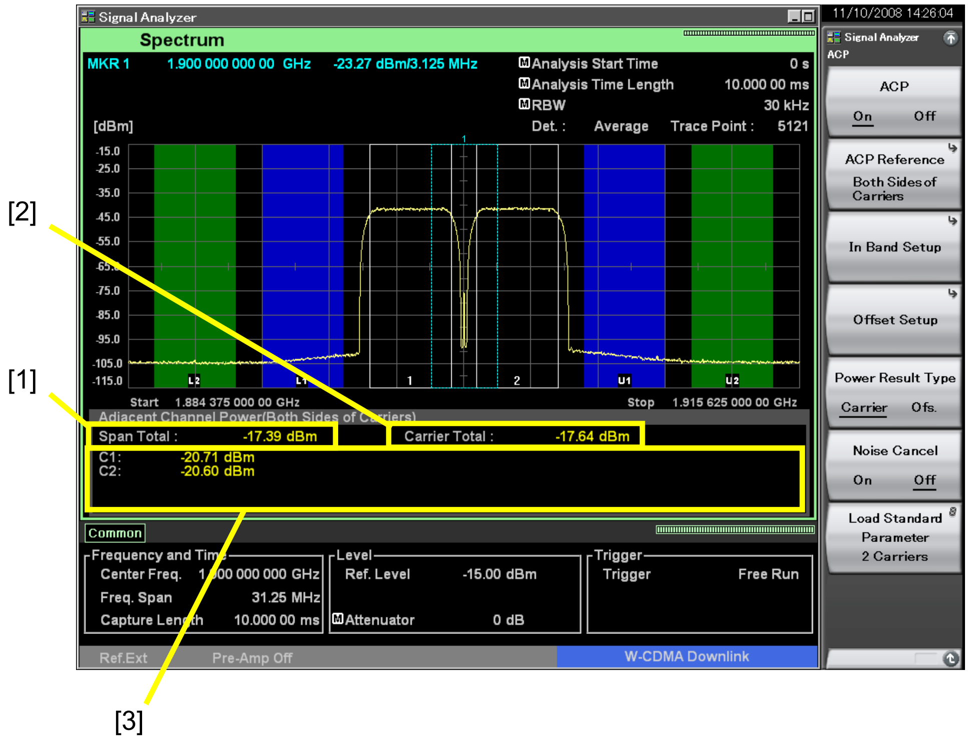


Figure 4.2.10-2 Display items for measurement results

Table 4.2.10-6 Display items for measurement results

No.	Display	Descriptions
[1]	Span Total	Displays the integral power in the screen display band. Displays it irrespective of the ACP Reference setting.
[2]	Carrier Total	Displays the integral power of the carrier set in Carrier Number. Does not display it when the ACP reference is set to Span Total.
[3]	Cx (x:Carrier Number)	Displays all the carrier powers set in Carrier Number. Does not display any of them when ACP Reference is set to Span Total.

4 Trace

Channel Power function menu

Pressing F2 (Channel Power) on the Measure function menu displays the Channel Power function menu.

Table 4.2.10-7 Channel Power function menu

Function Key	Menu Display	Function
F1	Channel Power (On/Off)	When it is set to On, other measure functions of the same trace are set to Off.
F2	Channel Center	Sets the channel center frequency.
F3	Channel Width	Sets the channel bandwidth.
F4	Filter Type	Sets the filter shape. Selected the shape from “Rect,” “Nyquist,” and “Root Nyquist.”
F5	Roll-off Factor	Sets the roll-off factor. It is effective only if “Nyquist” or “Root Nyquist” is selected for Filter Type.
F7	Load Standard Parameter	Loads the measurement parameters corresponding to the communication method selected in Standard when anything other than Off is set in Standard. ☞ Appendix C “Standard Parameter List”

(2) Measuring the channel power

The channel power is measured.

The display items for the measurement results are described below.

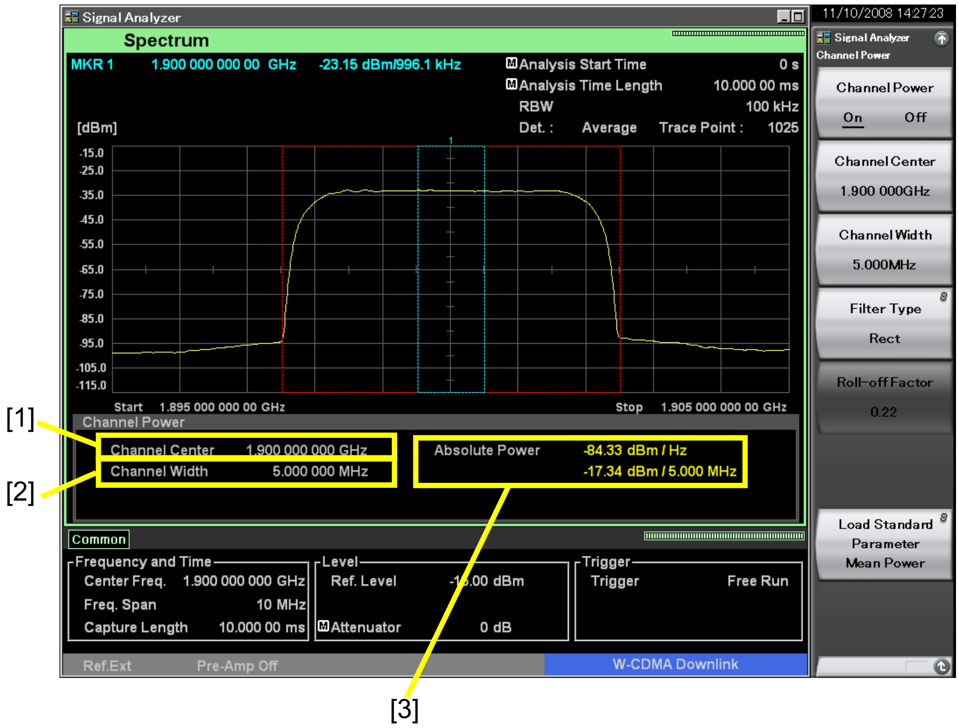


Figure 4.2.10-3 Display items for measurement results

Table 4.2.10-8 Display items for measurement results

No.	Display	Descriptions
[1]	Channel Center	Displays the setting value of the channel center frequency.
[2]	Channel Width	Displays the setting value of the channel bandwidth.
[3]	Absolute Power	Displays the absolute power per 1 Hz in the channel band and the integral power in the channel band.

OBW function menu

Pressing F3 (OBW) on the Measure function menu displays the OBW function menu.

Table 4.2.10-9 OBW function menu

Function Key	Menu Display	Function
F1	OBW (On/Off)	When this is set to On, other measure functions of the same trace are set to Off.
F2	Method (N%/XdB)	Selects the measurement method. X dB Down mode or N% of Power mode can be selected. • XdB Down mode OBW is the width between 2 points below XdB from the peak point of the trace data. • N% of Power mode OBW is the width between 2 points with the power equivalent to (100 – N/2)% when power is added by 1 point from both ends of the screen, assuming the power total of the trace data in the screen is 100%.
F3	N% Ratio	Inputs the % power in the N% of Power mode.
F4	XdB Value	Inputs the dB value in the X dB Down mode.
F7	Load Standard Parameter	Loads the measurement parameters corresponding to the communication method selected in Standard when anything other than Off is set in Standard. Appendix C "Standard Parameter List"

(3) Measuring the occupied bandwidth

The occupied bandwidth is measured.

The display items for the measurement results are described below.

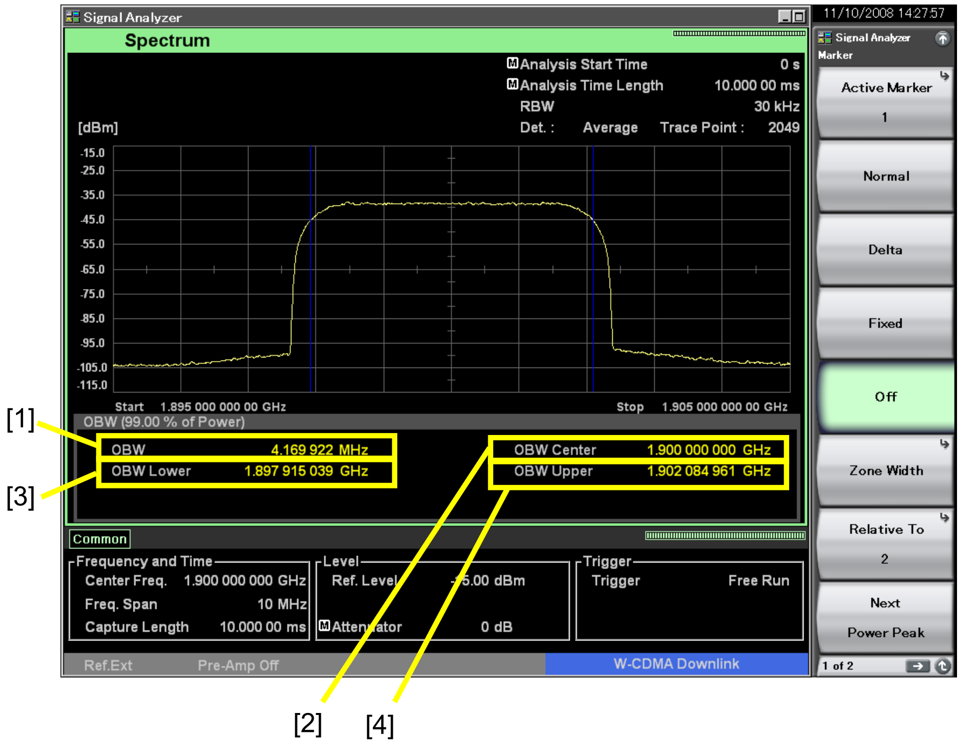


Figure 4.2.10-4 Display items for measurement results

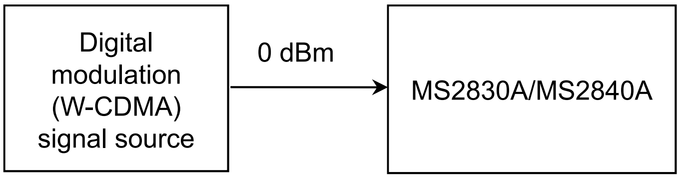
Table 4.2.10-10 Display items for measurement results

No.	Display	Description
[1]	OBW	Displays the occupied bandwidth.
[2]	OBW Center	Displays the center frequency of the occupied bandwidth.
[3]	OBW Lower	Displays the left frequency of the occupied bandwidth.
[4]	OBW Upper	Displays the right frequency of the occupied bandwidth.

(4) Example of adjacent channel leakage power measurement

For measurement of the adjacent channel leakage power of the W-CDMA modulation method signal, the detection mode is set to Average.

<Measurement block>



Center frequency:	1.92 GHz
Frequency span:	25 MHz
RBW:	30 kHz

Figure 4.2.10-5 Measurement block diagram

<Procedure>

1. Press Preset, and then press F1 (Preset).
2. Press Span.
3. Press 2 5, and then press F2 (MHz) to set the frequency span.
4. Press Frequency.
5. Press 1 . 9 2, and then press F1 (GHz) to set the center frequency.
6. Press BW.
7. Press 3 0, and then press F3 (kHz) to set the resolution bandwidth.
8. Press Amplitude, and then press F1 (Reference Level).
9. Press 0, and then press F7 (Set) to set the reference level.
10. Press Trace, and then press F7 (Time Detection) to select Average.
11. Press Time/Sweep, and then press F3 (Time Length).
12. Press 1 0, and then press F2 (ms) to set the analysis time length.
13. Press Measure, and then press F1 (ACP).
14. Press F4 (Offset Setup).
15. Press F1 (Ch BW).
16. Press 3 . 8 4, and then press F2 (MHz) to set the offset channel bandwidth.
17. Press F7 (Filter Type) to select Root Nyquist.
18. Press F8 (Roll-off Factor).

19. Press 0 . 2 2, and then press F7 (Set) to set a Roll-Off factor.
20. Press ➔ to switch the function menu to page 2.
21. Press F2 (Offset-1).
22. Press 5, and then press F2 (MHz) to set Offset frequency-1.
23. Press F4 (Offset-2).
24. Press 1 0, and then press F2 (MHz) to set Offset frequency-2.
25. Press Measure, and then press F1 (ACP).
26. Press F3 (In-Band Setup).
27. Press F3 (Carrier BW).
28. Press 3 . 8 4, and then press F2 (MHz) to set the carrier bandwidth.
29. Press F7 (Filter Type) to select Root Nyquist.
30. Press F8 (Roll-off Factor).
31. Press 0 . 2 2, and then press F7 (Set) to set a Roll-Off factor.
32. Press Measure, and then press F1 (ACP).
33. Press F2 (ACP Reference), and then press F2 (Carrier Total).
34. Press Measure, and then press F1 (ACP).
35. Press F1 (ACP On/Off) to select On.

Note:

The relative level reference value for each calculation method is as follows:

Span Total method:	Total of the power of all waveform data on the screen
Carrier Total method:	Total of the carrier power
Both Sides of Carriers method:	The strongest power of the carrier number is used as a reference for the upper offset, whereas the weakest power is used as a reference for the lower offset.
Carrier Select method:	Selected carrier power

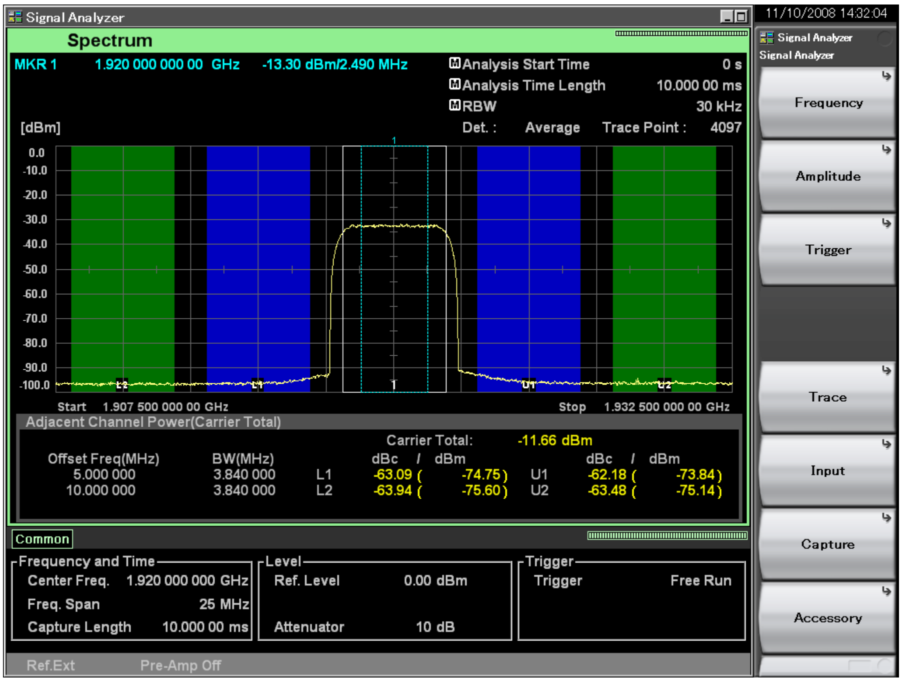
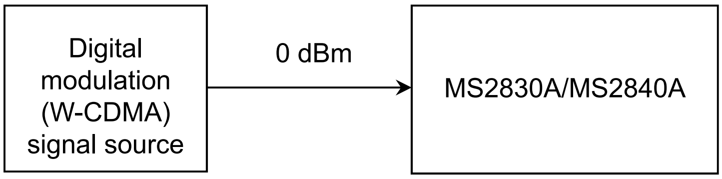


Figure 4.2.10-6 Results of measurement example

(5) Example of channel power measurement

<Measurement block>



Center frequency:	1.92 GHz
Frequency span:	10 MHz
RBW:	100 kHz

Figure 4.2.10-7 Measurement block diagram

<Procedure>

1. Press Preset, and then press F1 (Preset).
2. Press Span.
3. Press 1 0, and then press F2 (MHz) to set the frequency span.
4. Press Frequency.
5. Press 1 . 9 2, and then press F1 (GHz) to set the center frequency.
6. Press BW.
7. Press 1 0 0, and then press F3 (kHz) to set the resolution bandwidth.
8. Press Amplitude, and then press F1 (Reference Level).
9. Press 0, and then press F7 (Set) to set the reference level.
10. Press Trace, and then press F7 (Time Detection) to select Average.
11. Press Time/Sweep, and then press F3 (Time Length).
12. Press 1 0, and then press F2 (ms) to set the analysis time length.
13. Press Measure.
14. Press F2 (Channel Power), and then press F3 (Channel Width).
15. Press 5, and then press F2 (MHz) to set the channel bandwidth.
16. Press F4 (Filter Type), select “Rect”, and then press Enter.
17. Press F1 (Channel Power On/Off) to select On.

Note:

Weighting can be done with the filter.

Rect: Rectangular filter

Nyquist: Nyquist filter

Root Nyquist: Root Nyquist filter

For the Nyquist filter and Root Nyquist filter, set the roll-off factor.

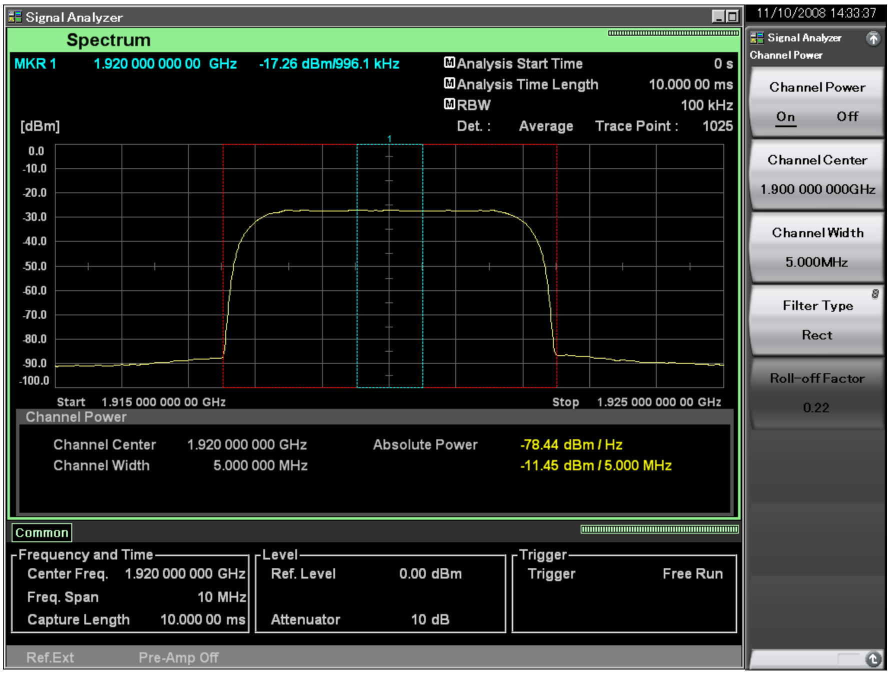
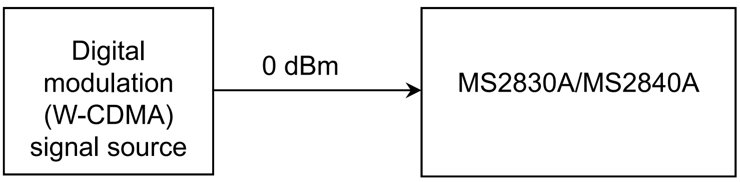


Figure 4.2.10-8 Measurement results

(6) Example of occupied frequency bandwidth measurement

For a signal source of the W-CDMA modulation method, the detection mode is set to Average.

<Measurement block>



Center frequency: 1.92 GHz

Frequency span: 10 MHz

RBW: 30 kHz

Figure 4.2.10-9 Measurement block diagram

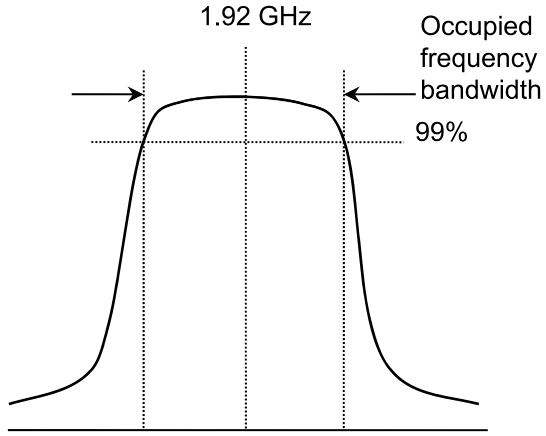


Figure 4.2.10-10 Occupied Bandwidth

<Procedure>

1. Press Preset, and then press F1 (Preset).
2. Press Span.
3. Press 1 0, and then press F2 (MHz) to set the frequency span.
4. Press Frequency.
5. Press 1 . 9 2, and then press F1 (GHz) to set the center frequency.
6. Press BW.
7. Press 3 0, and then press F3 (kHz) to set the resolution bandwidth.
8. Press Amplitude, and then press F1 (Reference Level).
9. Press 1 0, and then press F1 (dBm) to set the reference level.
10. Press Time/Sweep, and then press F3 (Time Length).
11. Press 1 0, and then press F2 (ms) to set the analysis time length.
12. Press Measure.
13. Press F3 (OBW), and then press F2 (Method) to select N% of Power.
14. Press F3 (N% Ratio).
15. Press 9 9, and then press F1 (%) to set % Power.
16. Press F1 (OBW On/Off) to select On.

4

Trace

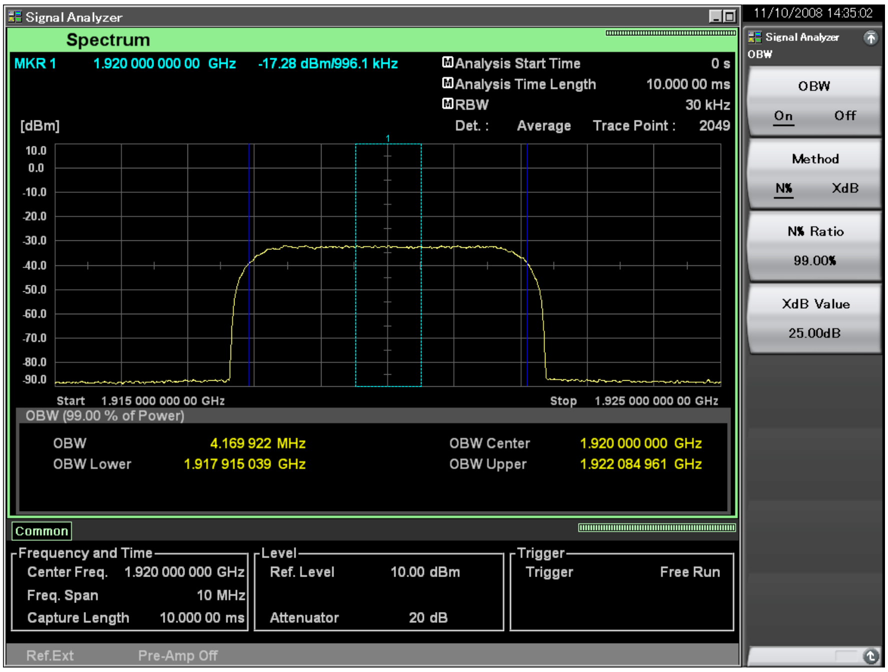


Figure 4.2.10-11 Measurement results

4.2.11 Executing Return to Spectrogram

After Analyze with Spectrum Trace has been executed on the Spectrogram trace, move on to the Spectrum trace, and press Trace and, F6 (Return to Spectrogram). Then you can return to the Spectrogram trace.

If you move on to Spectrogram trace by executing Return to Spectrogram, then the current analysis length parameters are changed to the same as the analysis length parameters set before executing Analyze with Spectrum on Spectrogram trace. Table 4.2.11-1 describes the parameters after executing Return to Spectrogram.

However, the settings are invalid if any analysis length parameter has been changed after executing Analyze with Spectrum. (See Table 4.2.11-2)

Table 4.2.11-1 Parameters after executing Return to Spectrogram

Parameter on Spectrogram trace	Setting value
RBW Auto/Manual	RBW Auto/Manual before executing Analyze with Spectrum Trace
RBW	RBW before executing Analyze with Spectrum Trace
Marker Type	Marker Type before executing Analyze with Spectrum Trace
Marker Result	Marker Result before executing Analyze with Spectrum Trace
Time Detection	Detection before executing Analyze with Spectrum Trace
Analysis Start Time	Analysis Start Time before executing Analyze with Spectrum Trace
Analysis Time Length	Analysis Time Length before executing Analyze with Spectrum Trace
Storage Mode	Storage Mode before executing Analyze with Spectrum Trace
Storage Count	Storage Count before executing Analyze with Spectrum Trace
Frequency Zone Center	Zone Center before executing Analyze with Spectrum Trace
Frequency Zone Width	Zone Width before executing Analyze with Spectrum Trace
Analysis Time Auto/Manual	Analysis Time Auto/Manual before executing Analyze with Spectrum Trace

Table 4.2.11-2 Analysis Length Parameter

Analysis Length Parameter
The setting of Capture Time Auto/Manual was changed.
Center Frequency was changed.
The setting of Capture Time Length was changed when Capture Time = Manual.
The setting of Span was changed.
The setting of Terminal was changed.
Preset was executed.
Parameter Recall was executed.
The application was restarted.
Trace Mode was switched.
Load Standard Parameter was executed.
Signal Analyzer function was transmitted from another application.

4.3 Power vs Time

4.3.1 What is Power vs Time trace?

Power vs Time trace is a screen to observe the time fluctuations of power of the obtained measured signal.

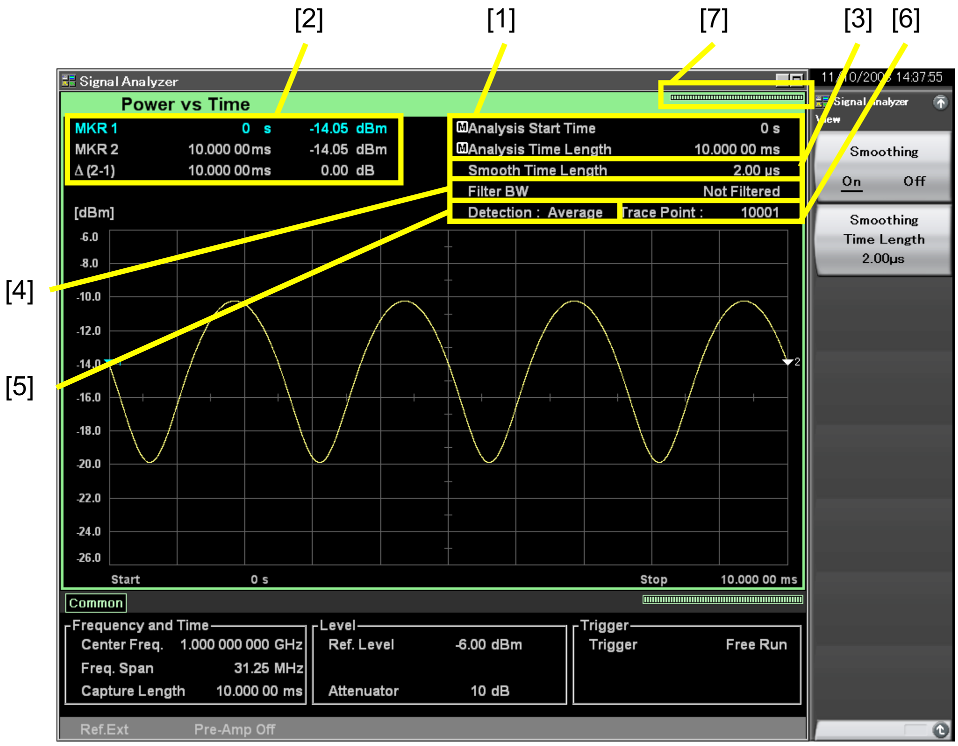


Figure 4.3.1-1 Display items for Power vs Time trace

Table 4.3.1-1 Display items for Power vs Time trace

No.	Display	Descriptions
[1]	Analysis Start Time/ Analysis Time Length	Displays the analysis start time and analysis time length.
[2]	MKR1/MKR2/ Δ(2 – 1)	Displays the marker result value and marker time position.
[3]	Smooth Time Length	Displays the smoothing time length when Smoothing is On.
[4]	Filter BW	Displays the filter bandwidth. "Not Filtered" is displayed when the filter is Off.
[5]	Detection	Displays the detection mode.
[6]	Trace Point	Displays the trace point count (horizontal axis).
[7]	Indicator	Displays the indicator indicating the analysis progress rate.

4.3.2 Setting Power vs Time parameters

After selecting "Power vs Time" for Trace Mode, pressing F5 (Trace) from the Main function menu or pressing Trace displays the Trace function menu.

The Trace function menu consists of two pages, which can be toggled by pressing ➔.

☞ 4.1 "Selecting Trace"

Table 4.3.2-1 Trace function menu

Function Key	Menu Display	Function
Page 1	Trace	Press Trace (Trace) to display this page.
F1	Trace Mode	Sets the trace type. ☞ 4.1 "Selecting Trace"
F2	Analysis Time	Used for setting related to the time. ☞ 4.3.3 "Setting analysis time"
F3	Scale	Used for setting related to the scale. ☞ 4.3.4 "Setting scale"
F4	Storage	Used for setting related to update and display of trace data. ☞ 4.3.7 "Setting storage mode"
F5	View	Sets the smoothing. ☞ 4.3.6 "Setting smoothing"
F6	Filter	Selects the filter type. ☞ 4.3.5 "Setting filter"
F7	Detection	Used for setting related to detection. ☞ 4.3.8 "Setting detection mode"
F8	Sub Trace Setting	Used for setting related to sub-trace. ☞ 4.9 "Sub-Trace"
Page 2	Trace	Press Trace (Trace), and then press ➔ to display page 2.
F1	Measure	Used for setting related to the Measure function. ☞ 4.3.11 "Measure measurement"
F2	Marker	Used for setting related to the marker. ☞ 4.3.9 "Setting markers"
F3	Signal Search	Used for setting related to feature-point search within the measurement band. ☞ 4.3.10 "Setting marker search"

4.3.3 Setting analysis time

Pressing F2 (Analysis Time) from the Trace function menu, or pressing Time/Sweep displays the Analysis Time function menu.

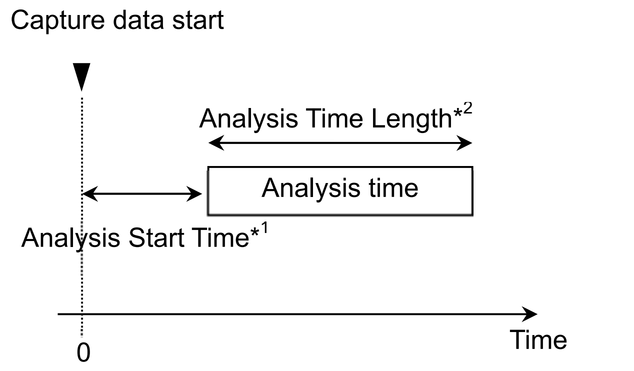
Setting Analysis Time on the Power vs Time trace normalizes a set time that exceeds five valid digits in addition to rounding up by time resolution.

Table 4.3.3-1 Analysis Time function menu

Function Key	Menu Display	Function
F1	Time (Main Trace) (Auto/Manual)	Switches between auto setting and manual setting for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length).
F2	Start Time (Main Trace)	Sets the analysis start time.
F3	Time Length (Main Trace)	Sets the analysis time length.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto setting and manual setting for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

Setting the analysis time

Analysis time is the time to be analyzed. The analysis time can be specified with the analysis start position (Analysis Start Time) and analysis time length (Analysis Time Length).



*1: Start of Analysis time based on capture data start

*2: Length of analysis time

Figure 4.3.3-1 Analysis time

(1) Auto mode

When Capture Time is set to Auto, the analysis time length is set to 100 ms for measurement. When Capture Time is set to Manual, the analysis time length is set to the capture time for measurement.

Table 4.3.3-2 Setting analysis time in the Auto mode

Capture Time	Analysis Start Time [s]	Analysis Time Length [s]
Auto	0	0.1
Manual	0	x_1

x_1 : Capture time length [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

The analysis start time and analysis time length are set manually. This is an effective method to perform measurement of discontinuous signals such as burst.

Analysis start time setting range

Table 4.3.3-3 Analysis start time setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length [s]

x_2 : Capture time length [s], capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

Analysis time length setting range

Table 4.3.3-4 Analysis time length setting range

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1 : Analysis start time [s]

x_2 : Capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

x_4 : Capture time length minimum value [s]

2.4 “Setting IQ Data Capture Time Range”

Note:

The maximum value may be less than this value because of the restrictions imposed by the resolution of the analysis time length.

Analysis start time resolution

Table 4.3.3-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz*	20 ns
31.25 MHz*	20 ns
50 MHz*	10 ns
62.5 MHz*	10 ns
100 MHz*	5 ns
125 MHz*	5 ns

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.3.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Setting procedure for Analysis Time

Example: To switch the analysis time to Manual setting, and setting the analysis start time to 20 ms and analysis time to 2 ms

<Procedure>

1. Press Time/Sweep.
2. Press F2 (Start Time).
3. Press 2 0, and then press F2 (ms) to set the analysis start time.
4. Press F3 (Time Length).
5. Press 2, and then press F2 (ms) to set the analysis start time length.

4.3.4 Setting scale

Scale function menu

Pressing [Trace] and then [F3] (Scale) displays the Scale function menu.

Table 4.3.4-1 Scale function menu

Function Key	Menu Display	Function
F1	Vertical	Used for setting related to the vertical axis (level axis) scale.

Vertical function menu

Pressing [F1] (Vertical) on the Scale function menu displays the Vertical function menu.

Table 4.3.4-2 Vertical function menu

Function Key	Menu Display	Function
F1	Log Scale Division	Sets the scale range (Log scale range) of the vertical axis.
F2	Lin Scale Division	Sets the scale range (Lin scale range) of the vertical axis.
F3	Log Scale Line (10/12)	Sets the number of scale lines when the Log scale is used.

(1) Vertical axis scale

The scale range Log scale and Lin scale of the level axis are set.

Example: To set the vertical axis scale range (Log scale) to 0.1 dB/Div

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F1 (Vertical), and then press F1 (Log Scale Division).
4. Press 0 . 1, and then press F1 (dB/div) to set the 0.1 dB/Div scale.

Setting range and resolution for scale range of vertical axis

Setting range:	0.1 to 20 dB/Div (log scale)
	1 to 10%/Div (linear scale)
Minimum resolution:	0.1 dB/Div (log scale)
	1%/Div (linear scale)
Rotary knob resolution:	1-2-5 sequence
Step key resolution:	1-2-5 sequence

4.3.5 Setting filter

Pressing F6 (Filter) on the Trace function menu, or pressing BW displays the Filter function menu.

Table 4.3.5-1 Filter function menu

Function Key	Menu Display	Function
F1	Type	Selects the filter type.
F2	Roll-off Factor	Sets the roll-off factor.
F3	Band Width	Sets the filter band.
F4	Freq. Offset	Sets the frequency offset for the filter.

Setting range and resolution for roll-off factor

Setting range:	0.01 to 1
Minimum resolution:	0.01
Rotary knob resolution:	0.01
Step key resolution:	0.1

Setting range and resolution for filter band

Setting range:	Refer to Table 4.3.5-2 (Rect). Refer to Table 4.3.5-3 (Gauss, Nyquist, Root Nyquist).
Minimum resolution:	1 kHz 1 Hz (SPAN = 2.5 kHz, Filter Type = Gauss)
Rotary knob resolution:	$x/100$ Hz
Step key resolution:	$x/10$ Hz
x:	Frequency span [Hz]

Setting range and resolution for filter offset

Setting range:	$-x$ to x
Minimum resolution	1 Hz
Rotary knob resolution:	$x/100$ Hz
Step key resolution:	$x/10$ Hz
x:	Frequency span [Hz]

Table 4.3.5-2 Filter band setting range (Rect)

Frequency Span	Minimum Value	Maximum Value
1 kHz	N/A	
2.5 kHz	1 kHz	2 kHz
5 kHz	1 kHz	4 kHz
10 kHz	1 kHz	9 kHz
25 kHz	1 kHz	23 kHz
50 kHz	2 kHz	47 kHz
100 kHz	4 kHz	95 kHz
250 kHz	8 kHz	238 kHz
500 kHz	16 kHz	476 kHz
1 MHz	32 kHz	952 kHz
2.5 MHz	79 kHz	2.38 MHz
5 MHz	157 kHz	4.761 MHz
10 MHz	313 kHz	9.523 MHz
25 MHz*	782 kHz	23.809 MHz
31.25 MHz*	977 kHz	29.761 MHz
50 MHz*	1.563 MHz	47.619 MHz
62.5 MHz*	1.953 MHz	59.523 MHz
100 MHz*	3.126 MHz	95.238 MHz
125 MHz*	3.907 MHz	119.047 MHz
255 MHz*	7.969 MHz	242.857 MHz
510 MHz*	15.938 MHz	485.714 MHz
1 GHz*	31.25 MHz	952.380 MHz

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
255 MHz can be set for the MS2850A-032.
510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table 4.3.5-3 Filter band setting range (Gauss, Nyquist, Root Nyquist)

Frequency Span	Minimum Value	Maximum Value
1 kHz	N/A	
2.5 kHz	1 kHz 1 Hz (Gauss only)	1 kHz
5 kHz	1 kHz	2 kHz
10 kHz	1 kHz	4 kHz
25 kHz	1 kHz	10 kHz
50 kHz	2 kHz	20 kHz
100 kHz	4 kHz	40 kHz
250 kHz	8 kHz	100 kHz
500 kHz	16 kHz	200 kHz
1 MHz	32 kHz	400 kHz
2.5 MHz	79 kHz	1 MHz
5 MHz	157 kHz	2 MHz
10 MHz	313 kHz	4 MHz
25 MHz*	782 kHz	10 MHz
31.25 MHz*	977 kHz	12.5 MHz
50 MHz*	1.563 MHz	20 MHz
62.5 MHz*	1.953 MHz	25 MHz
100 MHz*	3.126 MHz	40 MHz
125 MHz*	3.907 MHz	50 MHz
255 MHz*	7.969 MHz	102 MHz
510 MHz*	15.938 MHz	204 MHz
1 GHz*	31.25 MHz	400 MHz

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
255 MHz can be set for the MS2850A-032.
510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

(1) Gauss filter

Example: To set the filter shape to Gaussian, filter bandwidth to 3.84 MHz, and filter frequency offset to 1 MHz

<Procedure>

1. Press BW.
2. Press F1 (Type) and select Gaussian.
3. Press F3 (Band Width).
4. Press 3 . 8 4, and then press F2 (MHz) to set the filter band.
5. Press F4 (Freq. Offset).
6. Press 1, and then press F2 (MHz) to set the filter frequency offset.

(2) Rectangular filter

Example: To set the filter shape to "Rect," filter bandwidth to 3.84 MHz, and filter frequency offset to 1 MHz

<Procedure>

1 Press BW.

2. Press F1 (Type) and select Rect.
3. Press F3 (Band Width).
4. Press 3 . 8 4, and then press F3 (MHz) to set the filter band.
5. Press F4 (Freq. Offset).
6. Press 1, and then press F2 (MHz) to set the filter frequency offset.

(3) Nyquist filter

Example: To set the filter shape to Nyquist, filter bandwidth to 3.84 MHz, filter frequency offset to 1 MHz, and roll-off factor to 0.22

<Procedure>

1. Press BW.
2. Press F1 (Type) and select Nyquist.
3. Press F3 (Band Width).
4. Press 3 . 8 4, and then press F2 (MHz) to set the filter band is set.
5. Press F4 (Freq. Offset).
6. Press 1, and then press F2 (MHz) to set the filter frequency offset.
7. Press F2 (Roll-off Factor).
8. Press 0 . 2 2, and then press F7 (Set) to set the roll-off factor.

(4) Root Nyquist filter

Example: To set the filter shape to Root Nyquist, filter bandwidth to 3.84 MHz, filter frequency offset to 1 MHz, and roll-off factor to 0.22

<Procedure>

1. Press BW.
2. Press F1 (Type) and select Root Nyquist.
3. Press F3 (Band Width).
4. Press 3 . 8 4, and then press F2 (MHz) to set the filter band.
5. Press F4 (Freq. Offset).
6. Press 1, and then press F2 (MHz) to set the filter frequency offset.
7. Press F2 (Roll-off Factor).
8. Press 0 . 2 2, and then press F7 (Set) to set the roll-off factor.

The table below shows the setting of filter type that complies with the ETSI EN 300 113 V2.2.1 Annex C1.1 IF filter.

Table 4.3.5-4 Filter Setting Examples

Channel Separation [kHz]	Filter Setting		
	Filter Type	Roll-off Factor	Band Width [kHz]
12.5	Root Nyquist	0.19	8
20	Nyquist	0.10	14
25	Nyquist	0.10	16

4.3.6 Setting smoothing

Pressing Trace and then F5 (View) displays the View function menu.

Table 4.3.6-1 View function menu

Function Key	Menu Display	Function
F1	Smoothing (On/Off)	Sets smoothing to On/Off.
F2	Smoothing Time Length	Sets the smoothing time length.

(1) Setting smoothing

Smoothing processing is performed. To lower the trace noise, the Smoothing function is set to On.

Example: To set the Smoothing function to On and smoothing time length to 50 μs

<Procedure>

1. Press Trace.
2. Press F5 (View).
3. Press F1 (Smoothing On/Off) and select On.
4. Press F2 (Smoothing Time Length).
5. Press 5 0, and then press F3 (μs) to set the smoothing time length.

Setting range and minimum resolution for smoothing time length

Setting range:	Time Resolution to 10000 × Time Resolution
Minimum resolution:	Time Resolution

4.3.7 Setting storage mode

Pressing Trace and then F4 (Storage) displays the Storage function menu.

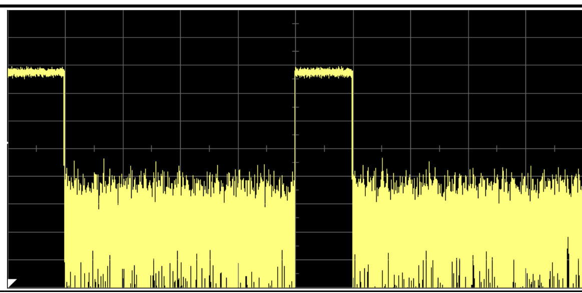
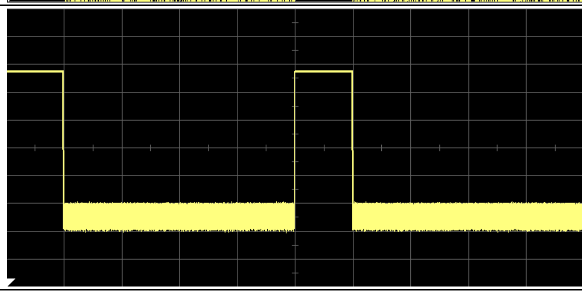
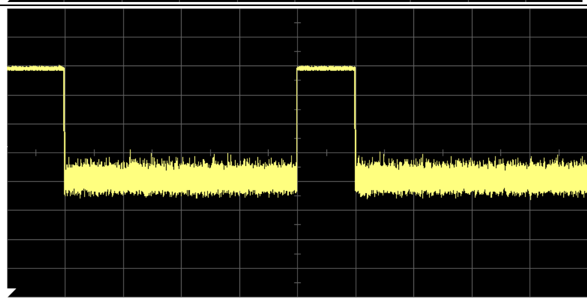
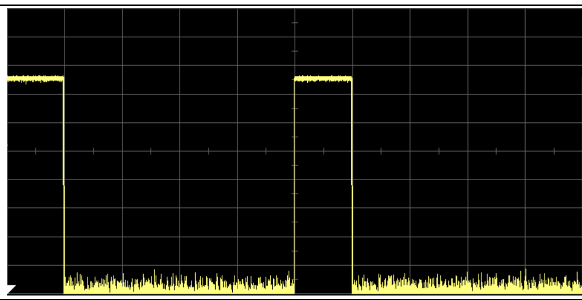
Table 4.3.7-1 Storage function menu

Function Key	Menu Display	Function
F1	Mode	Used for setting related to update and display of trace data.
F2	Count	Sets the storage count.
F3	Stop	Stops the storage.

Storage mode types

In a Power vs Time trace, the following four storage mode types can be selected.

Table 4.3.7-2 Four storage mode types

Mode	Description	Display Example
Off	At each capture, the trace data are updated and displayed. These data are used for normal measurement.	
Lin Average	Performs averaging operation at each X axis point for each capture and displays the results. Averaging is done with linear values even in Log display. Used for S/N improvement.	
Max Hold	At each capture, the previous and new trace data of each X axis point are compared and the larger of the two is displayed. Used for recording signals with frequency drift.	
Min Hold	At each capture, the previous and new trace data of each X axis point are compared and the smaller of the two is displayed.	

(1) Selecting the storage mode and storage count

Example: To set the storage mode to Average and storage count to 100

<Procedure>

1. Press [Trace].
2. Press [F4] (Storage).
3. Press [F1] (Mode) and select Lin Average.
4. Press [F2] (Count).
5. Press [1] [0] [0], and then press [F7] (Set).

Setting range and minimum resolution for storage count

Setting range:	2 to 9999
Minimum resolution:	1
Rotary knob resolution:	1 step
Step key resolution:	1 step at the highest 1st digit

(2) Averaging function

The digital averaging function, which performs an averaging operation at a point on the horizontal axis each time trace data is captured and displays the trace, can be executed by selecting Lin Average in the storage mode.

When the measurement mode is set to Single, measurement stops when capture for the storage count is completed. When the measurement mode is set to Continuous, averaging is continued even when capture for the storage count is completed. However, the average after completion of the storage count is calculated as shown in Table 4.3.7-3, so the effect of old data becomes less as the storage count increases.

Table 4.3.7-3 Averaging

Capture Count n	Measurement Value M(n)	Displayed Value Y(n)
1	M (1)	$Y(1) = M(1)$
2	M (2)	$Y(2) = \dfrac{Y(1) + M(2)}{2}$
3	M (3)	$Y(3) = \dfrac{2 \times Y(2) + M(3)}{3}$
…	…	…
N – 1	M (N – 1)	$Y(N-1) = \dfrac{(N-2) \times Y(N-2) + M(N-1)}{N-1}$
N	M (N)	$Y(\mathrm{N}) = \dfrac{(N-1) \times Y(N-1) + M(N)}{N}$
Continuous only		
N + 1	M (N + 1)	$Y(\mathrm{N}+1) = \dfrac{(N-1) \times Y(N) + M(N+1)}{N}$
N + 2	M (N + 2)	$Y(\mathrm{N}+1) = \dfrac{(N-1) \times Y(N) + M(N+1)}{N}$
…	…	…

Note:

When Storage Count = N

Using the averaging function can improve S/N according to the storage count and capture count.

4

Trace

4.3.8 Setting detection mode

The detection mode can be selected by pressing Trace and then F7 (Detection).

Detection mode types

The detection mode in the analysis range (Detection) is set. The detection mode can be selected from the 4 types: Average, Positive, Negative, and Pos & Neg.

Table 4.3.8-1 Detection mode

Detection mode	Description
Pos&Neg	Displays the line connecting the maximum and minimum values of the sampling points within the analysis range. Used for normal measurement.
Positive	Displays the maximum value of the sampling points within the analysis range.
Negative	Displays the minimum value of the sampling points within the analysis range. The lower envelope of the modulation waveform is measured in “Negative” mode.
Average	Displays the average value of the sampling points within the analysis range.

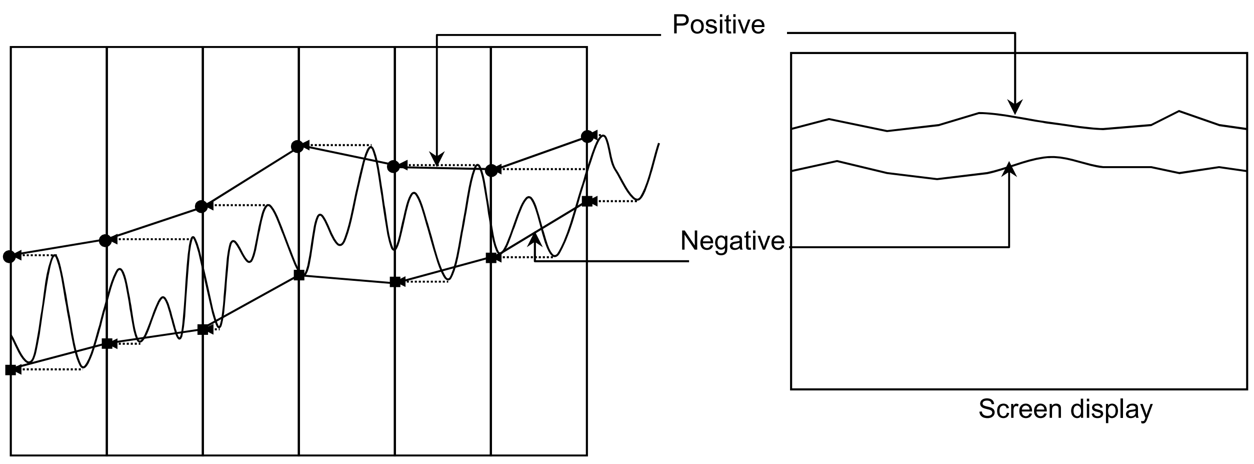


Figure 4.3.8-1 Display example of Detection mode

(1) Setting the detection mode

Example: To set the detection mode to Positive

<Procedure>

1. Press Trace.
2. Press F7 (Detection), select Positive, and then press Enter.

4.3.9 Setting markers

This section describes various functions as well as the functions to improve measurement efficiency, such as marker search and parameter setting with marker values.

For the Marker's setting range and resolution, refer to the setting ranges and resolutions in 4.3.3 "Setting analysis time".

Pressing F2 (Marker) on page 2 of the Trace function menu, or pressing Marker displays the Marker function menu.

Table 4.3.9-1 Marker function menu

Function Key	Menu Display	Function
F1	Marker1 (On/Off)	Sets whether to display time marker 1.
F2	Marker1	Sets the time marker 1.
F3	Marker2 (On/Off)	Sets whether to display time marker 2.
F4	Marker2	Sets time marker 2.
F5	Active Marker (1/2 /1&2)	Selects the active marker.
F6	Zoom	Zooms in on the range of Marker1 and Marker2.
F7	Zoom Out	Reduces the current screen display data into the range of Marker1 and Marker2.
F8	Peak-Peak (On/Off)	Displays the AM modulation degree based on the maximum and minimum values in the marker range. This function is effective only when Scale Mode is set to Lin.

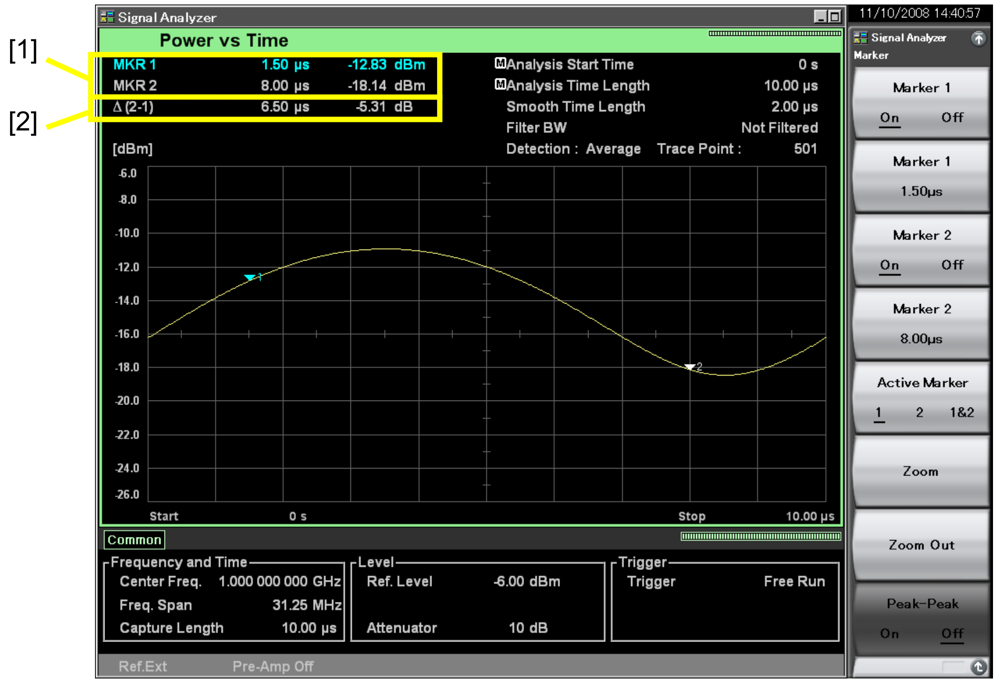


Figure 4.3.9-1 Display items for marker results

Table 4.3.9-2 Display items for marker results

No.	Display	Description
[1]	MKR1/MKR2	Displays the power at each marker time position.
[2]	Δ(2 – 1)	Displays the ratio of the power at the marker time positions (Marker 1 – Marker 2).

(1) Changing the marker position

Note:

The marker position of Power vs Time, Frequency vs Time, Phase vs Time synchronizes one another.

The power in the specified time can be measured by using the marker displayed in Figure 4.3.9-2.

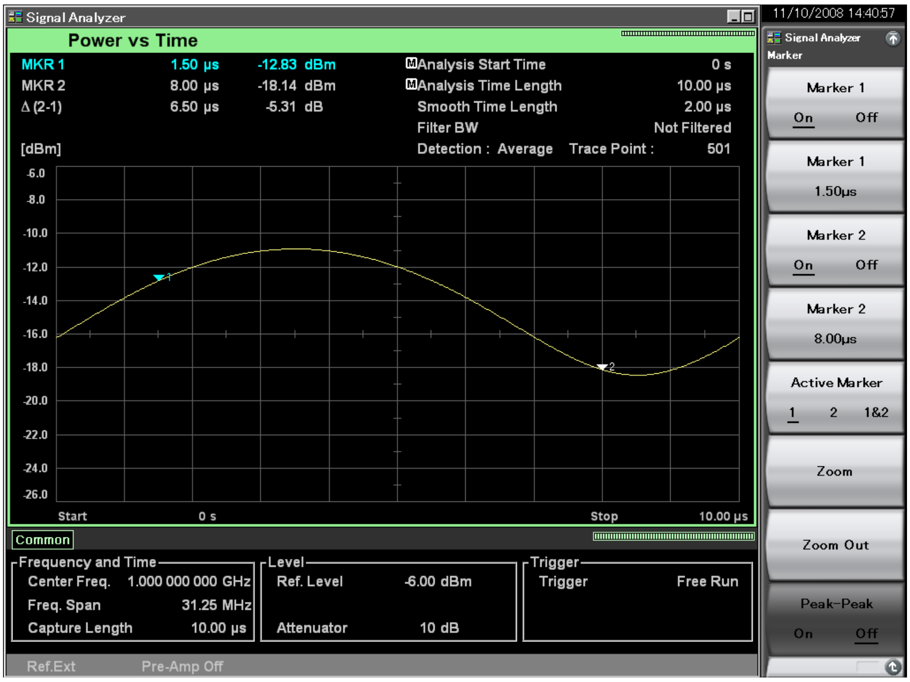


Figure 4.3.9-2 Marker

Example: To set 1.5 µs for Marker 1

<Procedure>

1. Press Marker, and then press F2 (Marker 1).
2. Press 1 . 5, and then press F3 (µs).

(2) Selecting the active marker

Note:

This setting is enabled when both Markers 1 and 2 are On.

The active marker is selected. The marker position of the active marker can be set with the rotary knob or step key.

Example: To set Markers 1 and 2 to On and to select the active marker

<Procedure>

1. Press Marker.
2. Press F1 (Marker 1 On/Off) and select On.

3. Press F3 (Marker 2 On/Off) and select On.
4. Press F5 (Active Marker 1/2/1&2) and select the active marker.

(3) Setting zooming in

The range from Marker 1 to Marker 2 can be zoomed in.

Example: To zoom in on Marker 1

<Procedure>

1. Press Marker.
2. Press F6 (Zoom) to zoom in on the range enclosed with Markers 1 and 2.

As shown in Figure 4.3.9-3, when Zoom is performed after setting the range with Markers 1 and 2, the Analysis Start Time and Analysis Time Length are changed to the range of Markers 1 and 2.

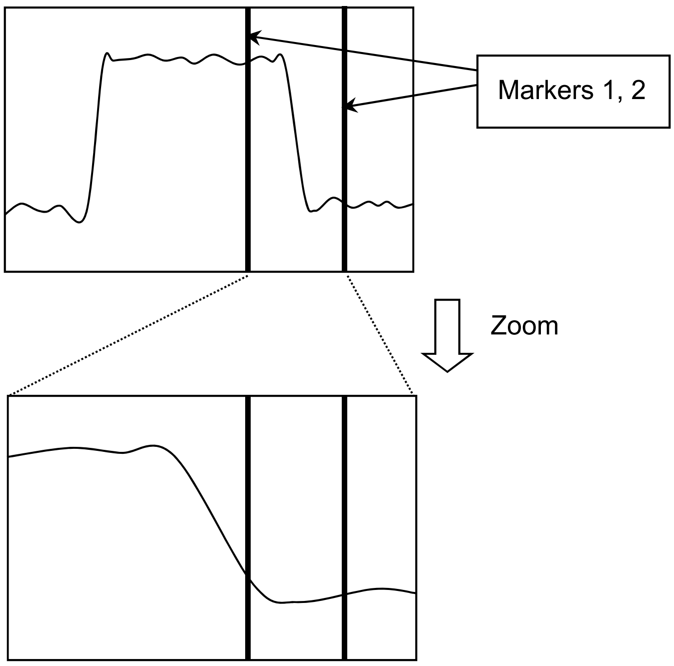


Figure 4.3.9-3 Zoom

(4) Setting zooming out

The analysis range can be zoomed out to the range from Marker 1 to Marker 2.

<Procedure>

1. Press Marker.
2. Press F7 (Zoom Out) to zoom out the displayed waveform data to the range enclosed with Markers 1 and 2.

As shown in Figure 4.3.9-4, when Zoom Out is performed after setting the range with Markers 1 and 2, the range of Markers 1 and 2 is changed to the Analysis Start Time and Analysis Time Length.

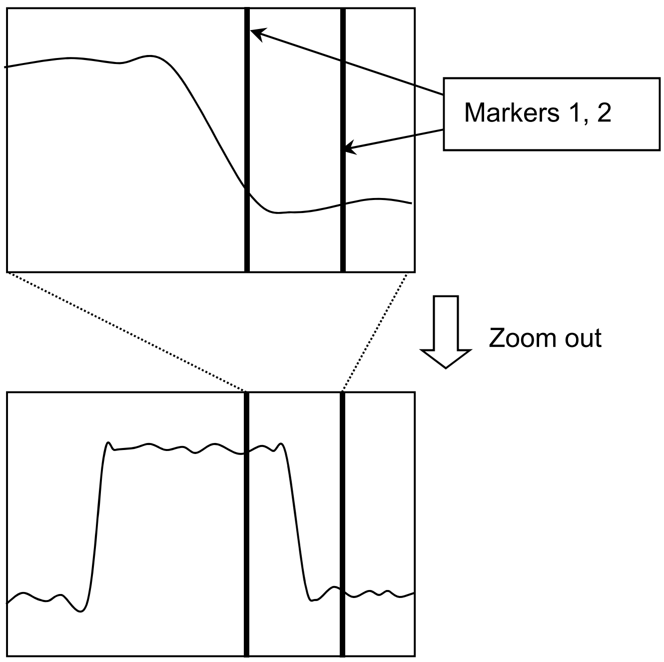


Figure 4.3.9-4 Zoom out

(5) Peak To Peak measurement

The AM modulation degree of the measured signal is measured based on the displayed trace data in the marker range. The measurement start and stop points are the trace points of the marker position. When the marker is Off, the entire analysis range becomes the target. This function can be used only when Scale is set to Lin.

The display items for measurement results are described below.

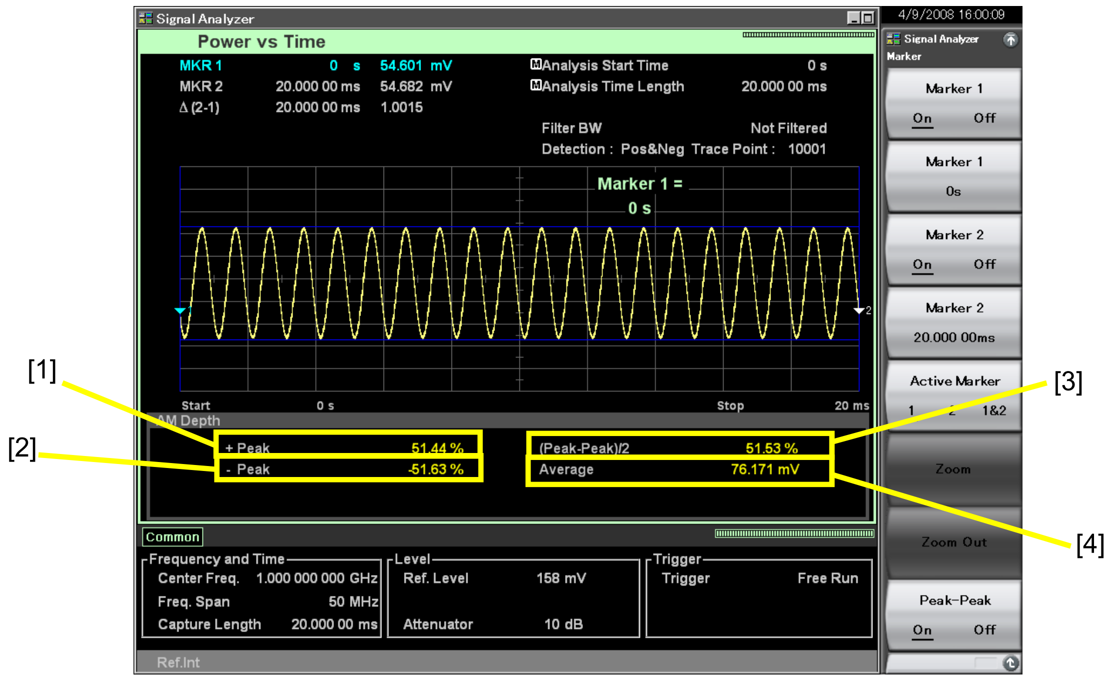


Figure 4.3.9-5 Display items for measurement results

Table 4.3.9-3 Display items for measurement results

No.	Display	Item
[1]	+Peak	Displays the positive peak AM modulation degree calculated from the following formula: $P_{Plus} = \frac{V_{Max} - V_{Ave}}{V_{Ave}} \times 100$ where P_{Plus}: +Peak [%] V_{Max}: maximum voltage [V] V_{Ave}: average voltage [V]
[2]	–Peak	Displays the negative peak AM modulation degree calculated from the following formula: $P_{Minus} = \frac{V_{Ave} - V_{Min}}{V_{Ave}} \times 100$ where P_{Minus}: –Peak [%] V_{Min}: minimum voltage [V] V_{Ave}: average voltage [V]
[3]	(Peak-Peak)/2	Displays (Peak-Peak)/2 calculated from the following formula: $P_{P-P} = \frac{P_{Plus} - P_{Minus}}{2}$ where P_{P_P}: (Peak-Peak)/2 [%] P_{Plus}: +Peak [%] P_{Minus}: –Peak [%]
[4]	Average	Displays the average voltage.

4.3.10 Setting marker search

The marker search functions include Peak search and Next Peak search.

Signal Search function menu

Pressing F3 (Signal Search) on page 2 of the Trace function menu, or pressing Peak Search displays the Signal Search function menu.

Table 4.3.10-1 Signal Search function menu

Function Key	Menu Display	Function
F1	Peak Search	Moves the active marker to the maximum level point in the measurement band. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F2	Next Peak	Searches for the second highest local maximum point next to the active marker in the measurement band and moves the active marker to the point. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F5	Resolution	Sets the resolution for Next Peak search.
F6	Threshold	Sets a threshold to restrict level points to be searched.

Threshold function menu

Pressing F6 (Threshold) on the Signal Search function menu displays the Threshold function menu.

Table 4.3.10-2 Threshold function menu

Function Key	Menu Display	Function
F1	Threshold (On/Off)	Selects On/Off for the detection threshold function for peak point detection.
F2	Threshold (Above/Below)	Selects whether peak point detection is to be performed Above (upper detection) or Below (lower detection) the threshold.
F3	Threshold Level	Sets the detection threshold for peak point detection.

(1) Executing Peak search

The active marker is moved to the position where the marker value becomes maximal in the measurement band. If two or more marker values exist, the point with the lower marker time is selected.

Example: To execute a Peak search

<Procedure>

1. Press [Peak Search].
2. Press [F1] (Peak Search) to execute a Peak search.

(2) Executing Next Peak search

The active marker is moved to the position with the second highest peak next to the marker value of the current active marker. If two or more marker values exist, the point with the lower marker time is selected.

Example: To execute a Next Peak search

<Procedure>

1. Press [Peak Search].
2. Press [F2] (Next Peak) to execute a Next Peak search.

(3) Setting the search resolution

The Next Peak search resolution is set. Trace data with slopes greater than the resolution at both ends is to be searched.

Example: To set the search resolution value to 10 dB

<Procedure>

1. Press [Peak Search].
2. Press [F5] (Resolution).
3. Press [1] [0], and then press [F7] (Set) to set the search resolution.

Setting range and resolution for search resolution

Setting range:	0.01 to 50.00 dB (Log)
	0.01 to 50.00% (Lin)
Minimum resolution:	0.01 dB (Log)
	0.01% (Lin)
Rotary knob resolution:	0.1 dB (Log)
	0.01% (Lin)
Step key resolution:	1 dB (Log)
	1% (Lin)

(4) Setting the search threshold

The threshold to restrict marker values to be searched is set. A search is performed for marker values above or below the threshold.

Example: To set threshold limitation to On and marker values below –10 dBm as search targets

<Procedure>

1. Press Peak Search.
2. Press F6 (Threshold).
3. Press F1 (Threshold On/Off) to switch to On.
4. Press F2 (Threshold Above/Below) to switch to Below.
5. Press F3 (Threshold Level).
6. Press –/+ 1 0, and then press F1 (dBm) to set the search threshold.

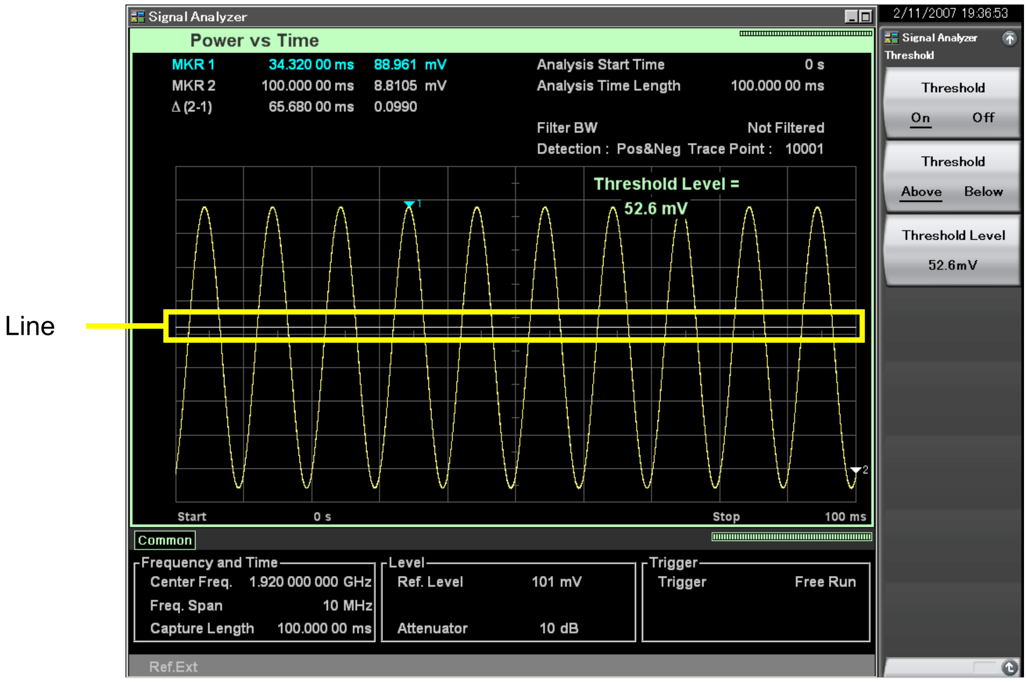


Figure 4.3.10-1 Threshold Level line of Signal Search

4.3.11 Measure measurement

Measure function menu

Pressing [F1] (Measure) on page 2 of the Trace function menu, or pressing [Measure] displays the Measure function menu.

Table 4.3.11-1 Measure function menu

Function Key	Menu Display	Function
F1	Burst Average Power	Measures the average power of the burst signal.
F2	AM Depth (On/Off)	Measures the AM modulation degree.
F8	Standard	This function is available when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109, or MS2850A-032 is installed. Parameters are automatically set, according to the communication method specified for the input signal. The parameter load function (Load Standard Parameter) corresponding to the communication method becomes available. • W-CDMA Uplink Sets parameters of the 3GPP W-CDMA Uplink standard. • W-CDMA Downlink Sets parameters of the 3GPP W-CDMA Downlink standard. • OFF Parameters are automatically set. ☞ Appendix C "Standard Parameter List" When moving to the function menu of each Measure function that has been set to Off, the parameters corresponding to the communication method are automatically loaded. When moving to the function menu of each Measure function that has been set to On, no parameter is automatically loaded.

Burst Average Power function menu

Press F1 (Burst Average Power) on the Measure function menu to display the Burst Average Power function menu.

Table 4.3.11-2 Burst Average Power function menu

Function Key	Menu Display	Function
F1	Burst Average Power (On/Off)	The other measure functions of the same trace are automatically set to Off when set to On.
F6	Noise Cancel (On/Off)	Sets On/Off for noise canceling function. When executed, it measures the internal noise of this instrument and the measured noise is deducted from the measurement value. This function is available only when Standard Parameter is set. ***Note:*** The internal noise may not be measured properly when the input signal level is high.
F7	Load Standard Parameter	Loads the measurement parameters corresponding to the communication method selected in Standard when anything other than Off is set in Standard. Appendix C "Standard Parameter List"

(1) Measuring the burst average power

The average power of the burst signal displayed on the screen is measured.
The measurement start and stop points are marker positions. When either of the markers is set to Off, the entire analysis range will be measured.

The display items for measurement results are described below.

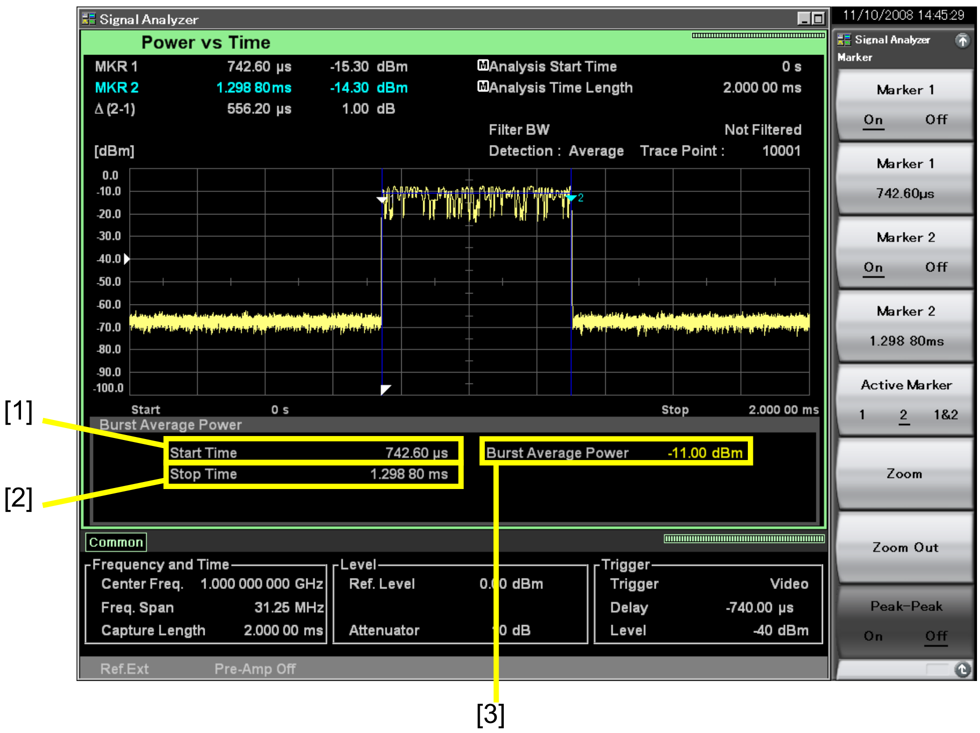


Figure 4.3.11-1 Display items for measurement results

Table 4.3.11-3 Display items for measurement results

No.	Display	Descriptions
[1]	Start Time	Displays the average power measurement start time.
[2]	Stop Time	Displays the average power measurement stop time.
[3]	Burst Average Power	Displays the average power of the burst signal.

Example: To obtain the effective average power within the range set by the marker

<Measurement block>

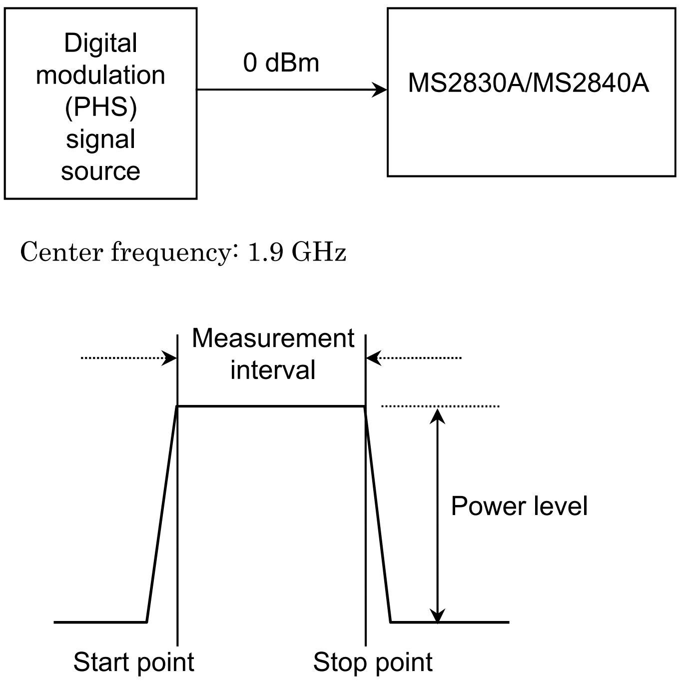


Figure 4.3.11-2 Measurement block and interval

<Procedure>

1. Press [Preset], and then select [F1] (Preset).
2. Press [Frequency].
3. Press [1] [.] [9], and then press [F1] (GHz) to set the center frequency.
4. Press [Trace].
5. Press [F1] (Trace Mode), and then press [F2] (Power vs Time) to set the trace type.
6. Set the Ref. Level 3 dB above the peak.
7. Press [Trigger/Gate], and then press [F2] (Trigger Source) to select Video.
8. Press to return to the original menu.
9. Press [F3] (Trigger Slope Rise/Fall) and select Rise.
10. Press [F4] (Trigger Level video).
11. Press [−/+] [4] [0], and then press [F1] (dBm) to set the trigger level.
12. Press [Trigger/Gate], and then press [F8] (Trigger Delay).
13. Press [−/+] [6], and then press [F3] (μs) to set the analysis start time.
14. Press [Time/Sweep], and then press [F3] (Time Length).
15. Press [8] [0] [0], and then press [F3] (μs) to set the analysis time length.
16. Set Marker 1 to the start position of the measurement interval.
17. Set Marker 2 to the stop position of the measurement interval.
18. Press [Measure].
19. Press [F1] (Burst Avg Power), press [F1] (Burst Avg Power On/Off), and then select On to set the power measurement.

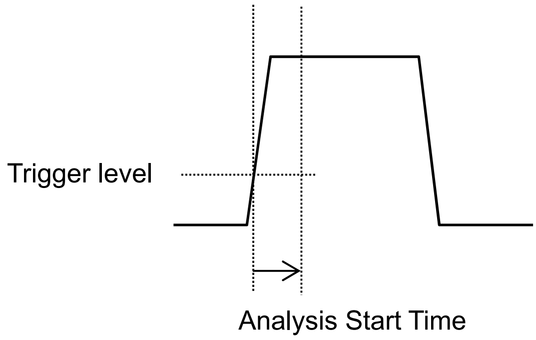


Figure 4.3.11-3 Trigger level

To obtain the average power between the burst frame, the measurement interval is set to the burst frame time for measurement.

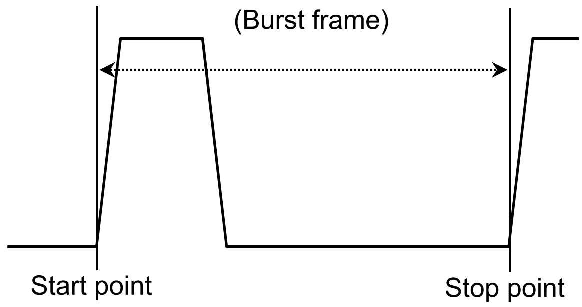


Figure 4.3.11-4 Measurement interval

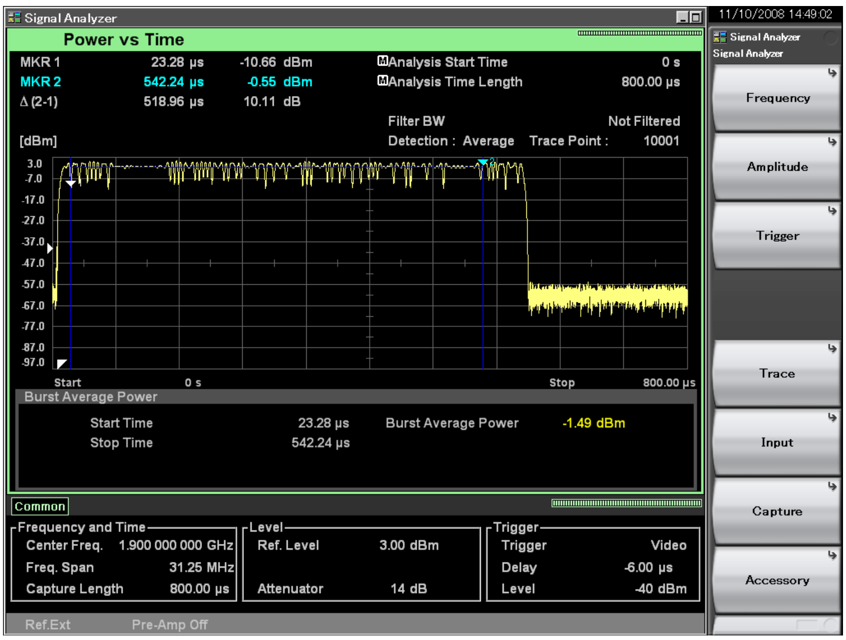


Figure 4.3.11-5 Measurement results

(2) AM Depth Measurement

Measures the AM modulation degree of the measured signal, based on the trace data within the marker range. The measurement range is between Marker 1 and 2 points on the trace. When either of the markers is set to Off, the measurement is performed throughout the range on the trace. If switched to On, Scale Mode is switched to Lin, Detection is switched to Pos & Neg, and Peak-Peak function is switched to On.

The display items for measurement results are described below.

Figure 4.3.11-6 AM Depth measurement result

Table 4.3.11-4 Description of displayed measurement result items

No.	Display	Item
[1]	+Peak	Displays the positive peak AM modulation degree. Calculated from the following formula: $P_{Plus} = \frac{V_{Max} - V_{Ave}}{V_{Ave}} \times 100$ However, P_{Plus}: +Peak[%] V_{Max}: Maximum voltage [V] V_{Ave}: Average voltage [V]
[2]	–Peak	Displays the negative peak AM modulation degree. Calculated from the following formula: $P_{Minus} = \frac{V_{Ave} - V_{Min}}{V_{Ave}} \times 100$ However, P_{Minus}: –Peak [%] V_{Min}: Minimum voltage [V] V_{Ave}: Average voltage [V]
[3]	(Peak-Peak)/2	Displays the (Peak-Peak/2). Calculated from the following formula: $P_{P-P} = \frac{P_{Plus} - P_{Minus}}{2}$ However, $P_{P\text{-}P}$: (Peak-Peak)/2 [%] P_{Plus}: +Peak [%] P_{Minus}: –Peak [%]
[4]	Average	Displays the average voltage.

4.4 Frequency vs Time

4.4.1 What is Frequency vs Time trace?

Frequency vs Time trace is a screen that displays time fluctuations of the frequency from the obtained IQ digital data.

The display items for a Frequency vs Time trace are described below.

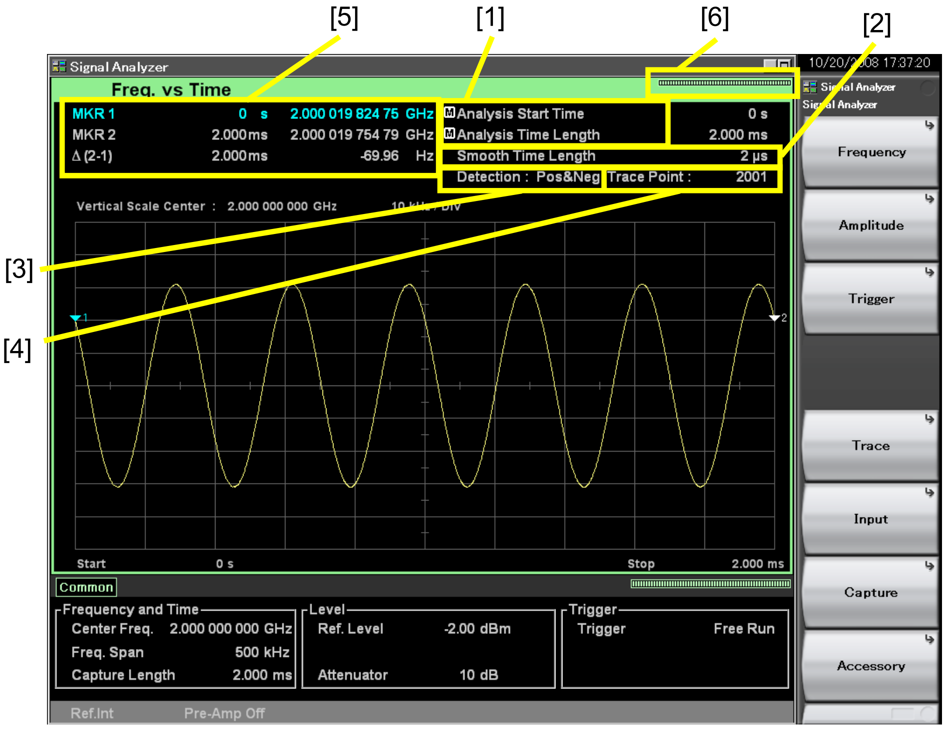


Figure 4.4.1-1 Display items for Frequency vs Time trace

Table 4.4.1-1 Display items for Frequency vs Time trace

No.	Display	Descriptions
[1]	Analysis Start Time /Analysis Time Length	Displays the analysis start time and analysis time length.
[2]	Smooth Time Length	Displays the smoothing time length when Smoothing is On.
[3]	Detection	Displays the detection mode.
[4]	Trace Point	Displays the trace point count (horizontal axis).
[5]	MKR1/MKR2/ Δ(2 – 1)	Displays the marker result value and marker frequency position.
[6]	Indicator	Displays the indicator indicating the analysis progress rate.

4.4.2 Setting Frequency vs Time parameters

After selecting Frequency vs Time for Trace Mode, pressing F5 (Trace) from the main function menu or pressing Trace displays the Trace function menu.

The Trace function menu consists of two pages, which can be toggled by pressing ➔.

4.1 "Selecting Trace"

Table 4.4.2-1 Trace function menu

Function Key	Menu Display	Function
Page1	Trace	Press Trace (Trace) to display this page.
F1	Trace Mode	Sets the trace type. 4.1 "Selecting Trace"
F2	Analysis Time	Used for setting related to the analysis time. 4.4.3 "Setting analysis time"
F3	Scale	Used for setting related to the scale. 4.4.4 "Setting scale"
F4	Storage	Used for setting related to update and display of trace data. 4.4.7 "Setting storage mode"
F5	View	Sets the smoothing. Calculation is done with the unit of the frequency axis scale. 4.4.6 "Setting smoothing"
F6	Filter	Sets the filter. 4.4.5 "Setting filter"
F7	Detection	Used for setting related to detection. 4.4.8 "Setting detection mode"
F8	Sub Trace Setting	Used for setting related to sub-trace. 4.9 "Sub-Trace"
Page2	Trace	Press Trace (Trace), and then press ➔ to display page 2.
F1	Measure	Used for setting related to Measure function. 4.4.11 "Measure measurement"
F2	Marker	Used for setting related to the marker. 4.4.9 "Setting markers"
F3	Signal Search	Moves the active marker to the maximum level point within the measurement time. 4.4.10 "Setting marker search"

4.4.3 Setting analysis time

Pressing F2 (Analysis Time) from the Trace function menu, or pressing Time/Sweep displays the Analysis Time function menu.

Setting Analysis Time on the Frequency vs Time trace normalizes a set time that exceeds five valid digits in addition to rounding up by time resolution.

Table 4.4.3-1 Analysis Time function menu

Function Key	Menu Display	Function
F1	Time (Main Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time and analysis time length.
F2	Start Time (Main Trace)	Sets the analysis start time.
F3	Time Length (Main Trace)	Sets the analysis time length.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

Setting the analysis time

Analysis time is the time to be analyzed. The analysis time can be specified with the analysis start position (Analysis Start Time) and analysis time length (Analysis Time Length).

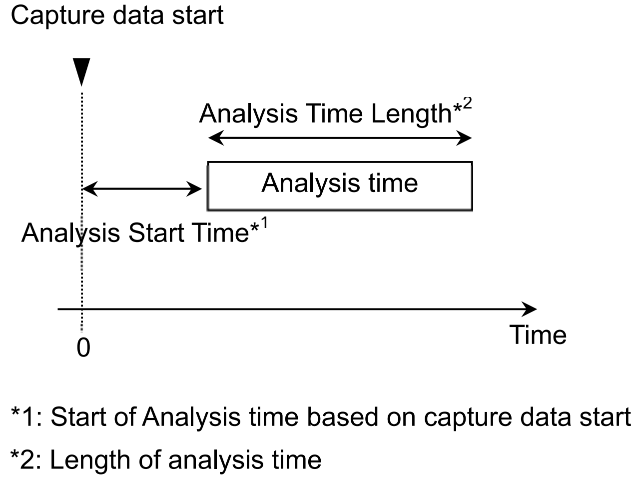


Figure 4.4.3-1 Analysis time

(1) Auto mode

When Capture Time is set to Auto, the analysis time length is set to 100 ms for measurement.

When Capture Time is set to Manual, the analysis time length is set to the capture time for measurement.

Table 4.4.3-2 Setting analysis time in the Auto mode

Capture Time	Analysis Start Time [s]	Analysis Time Length [s]
Auto	0	0.1
Manual	0	x_1

x_1 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

The analysis start time and analysis time length are set manually. This is an effective method for measuring discontinuous signals such as burst.

Analysis start time setting range

Table 4.4.3-3 Analysis start time setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length [s]

x_2 : Capture time length maximum value [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

Analysis time length setting range

Table 4.4.3-4 Analysis time length setting range

Time	Minimum Value [s]	Maximum Value [s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1 : Analysis start time [s]

x_2 : Capture time length maximum value [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_4 : Capture time length minimum value [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

Note:

The maximum value may be less than this value due to the restrictions imposed by the trace point.

Analysis start time resolution

Table 4.4.3-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz*	20 ns
31.25 MHz*	20 ns
50 MHz *	10 ns
62.5 MHz *	10 ns
100 MHz *	5 ns
125 MHz *	5 ns

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.4.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Setting procedure for analysis time

Example: To switch the analysis time to Manual setting, and setting the analysis start time to 20 ns and analysis time to 2 μs

<Procedure>

1. Press [Time/Sweep].
2. Press [F2] (Start Time).
3. Press [2] [0], and then press [F4] (ns) to set the analysis start time.
4. Press [F3] (Time Length).
5. Press [2], and then press [F3] (μs) to set the analysis time length.

4.4.4 Setting scale

Scale function menu

Pressing Trace and then F3 (Scale) displays the Scale function menu.

Table 4.4.4-1 Scale function menu

Function Key	Menu Display	Function
F1	Vertical	Used for setting related to the vertical axis (frequency axis) scale.

Vertical function menu

Pressing F1 (Vertical) on the Scale function menu displays the Vertical function menu.

Table 4.4.4-2 Vertical function menu

Function Key	Menu Display	Function
F1	Scale Unit	Sets the unit system of the vertical axis.
F2	Width	Sets the scale range of the vertical axis.

(1) Setting the vertical axis scale unit

In a Frequency vs Time trace, there are the following two types of units (Frequency Scale Units) for the vertical axis scale.

Hz: Measurement frequency data is displayed.
ΔHz: Difference from the center frequency is displayed.

Example: To set the vertical axis scale unit to ΔHz
<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F1 (Vertical).
4. Press F1 (Scale Unit), and then select F2 (ΔHz) to select the unit.

(2) Setting the vertical axis scale range

The vertical axis scale range is set. There are the following four types:

Span/2: Sets the scale range to 1/2 of the current frequency span.
Span/5: Sets the scale range to 1/5 of the current frequency span.
Span/10: Sets the scale range to 1/10 of the current frequency span.
Span/25: Sets the scale range to 1/25 of the current frequency span.

Example: To set the vertical axis scale range to 1/5 of the frequency span
<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F1 (Vertical).
4. Press F2 (Width), and then select F2 (Span/5) to select the unit.

4.4.5 Setting filter

Pressing F6 (Filter) on the Trace function menu, or pressing BW displays the Filter function menu.

Table 4.4.5-1 Filter function menu

Function Key	Menu Display	Function
F1	Filter Auto/Manual	Sets the filter band auto setting function. When it is set to Auto, the maximum filter bandwidth available is selected.
F2	Filter Bandwidth	Sets the filter band.

<u>Setting the filter</u>

The demodulation bandwidth of Frequency vs Time measurement is determined when the Filter Bandwidth is set. By default, the maximum available demodulation bandwidth is set.

High-frequency noise components of the demodulation signal can be reduced by restricting the demodulation signal band. If noise is a problem, restrict the band. When harmonic components of the demodulation signal are restricted, distortion may occur in the demodulation signal, and correct measurement values cannot be obtained. In this case, set a wider bandwidth.

Setting range and resolution for filter band

Setting range:	Refer to Table 4.4.5-2.
Rotary knob resolution:	1-3-10 sequence
Step key resolution:	1-3-10 sequence

Table 4.4.5-2 Filter band setting range

Frequency Span	Minimum Value	Maximum Value
1 kHz	30 Hz	300 Hz
2.5 kHz	100 Hz	1 kHz
5 kHz	100 Hz	1 kHz
10 kHz	300 Hz	3 kHz
25 kHz	1 kHz	10 kHz
50 kHz	1 kHz	10 kHz
100 kHz	3 kHz	30 kHz
250 kHz	10 kHz	100 kHz
500 kHz	10 kHz	100 kHz
1 MHz	30 kHz	300 kHz
2.5 MHz	100 kHz	1 MHz
5 MHz	100 kHz	1 MHz
10 MHz	300 kHz	3 MHz
25 MHz *	1 MHz	10 MHz
31.25 MHz *	1 MHz	10 MHz
50 MHz *	1 MHz	10 MHz
62.5 MHz *	1 MHz	10 MHz
100 MHz *	3 MHz	30 MHz
125 MHz *	3 MHz	30 MHz
255 MHz*	10 MHz	100 MHz
510 MHz*	10 MHz	100 MHz
1 GHz*	30 MHz	300 MHz

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
255 MHz can be set for the MS2850A-032.
510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Example: To set the filter bandwidth to 1 MHz

<Procedure>

1. Press BW.
2. Press F2 (Filter Bandwidth).
3. Press 1, and then press F2 (MHz) to set the filter band.

4.4.6 Setting smoothing

Pressing Trace and then F5 (View) displays the View function menu.

Table 4.4.6-1 View function menu

Function Key	Menu Display	Function
F1	Smoothing (On/Off)	Sets the smoothing to On/Off.
F2	Smoothing Time Length	Sets the smoothing time length.

(1) Setting the smoothing time length

Smoothing processing is performed. To lower the trace noise, the Smoothing function is set to On.

Example: To set the Smoothing function to On and smoothing value to 200 ns

<Procedure>

1. Press Trace.
2. Press F5 (View).
3. Press F1 (Smoothing On/Off) and select On.
4. Press F2 (Smoothing Time Length).
5. Press 2 0 0, and then press F4 (ns) to set the smoothing time length.

Setting range and resolution for smoothing time length

Setting range:	Time Resolution to 10000 × Time Resolution
Minimum resolution:	Time Resolution

4.4.7 Setting storage mode

Pressing Trace and then F4 (Storage) displays the Storage function menu.

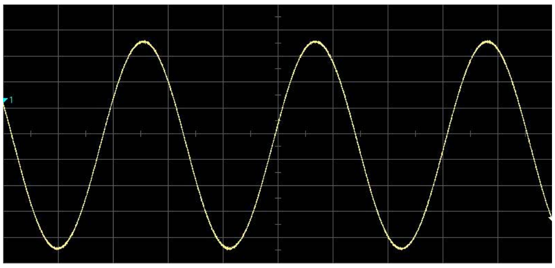
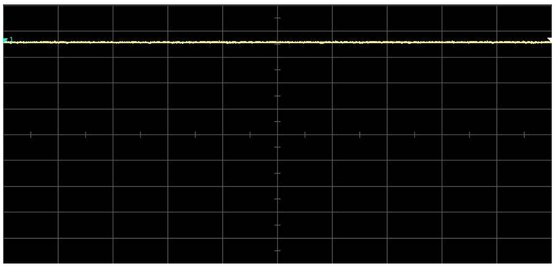
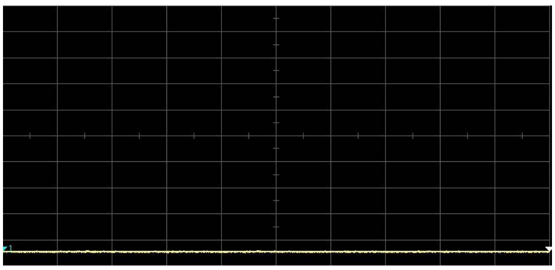
Table 4.4.7-1 Storage function menu

Function Key	Menu Display	Function
F1	Mode	Used for setting related to update and display of trace data.
F2	Count	Sets the storage count.
F3	Stop	Stops the storage.

<u>Storage mode types</u>

In a Frequency vs Time trace, the following three storage mode types can be selected.

Table 4.4.7-2 Three types of storage modes

Mode	Description	Display Example
Off	At each capture, the trace data are updated and displayed. These data are used for normal measurement.	
Max Hold	At each capture, the previous and new trace data of each X axis point are compared and the larger of the two is displayed.	
Min Hold	At each capture, the previous and new trace data of each X axis point are compared and the smaller of the two is displayed.	

(1) Selecting the storage mode and storage count

The setting procedure for the storage mode and storage count is as follows.

Example: To set the storage mode to Max Hold and storage count to 100
<Procedure>

1. Press Trace.
2. Press F4 (Storage).
3. Press F1 (Mode) and select Max Hold.
4. Press F2 (Count).
5. Press 1 0 0, and then press F7 (Set) to set the storage count.

Setting range and resolution for storage count

Setting range:	2 to 9999
Minimum resolution:	1
Rotary knob resolution:	1 step
Step key resolution:	1 step at the highest 1st digit

4.4.8 Setting detection mode

The detection mode can be selected by pressing Trace and then F7 (Detection).

Detection mode types

The detection mode in the analysis range (Detection) is set. The detection mode can be selected from four types: Average, Positive, Negative, and Pos&Neg.

Table 4.4.8-1 Detection mode

Detection Mode	Descriptions
Average	Traces the average value within the analysis range.
Positive	Traces the maximum value within the analysis range. "Positive" is used to measure the upper envelope of the modulation waveform.
Negative	Traces the minimum value within the analysis range. "Negative" is used to measure the lower envelope of the modulation waveform.
Pos&Neg	Displays the line connecting the maximum and minimum values of the sampling points within the analysis range. Used for normal measurement.

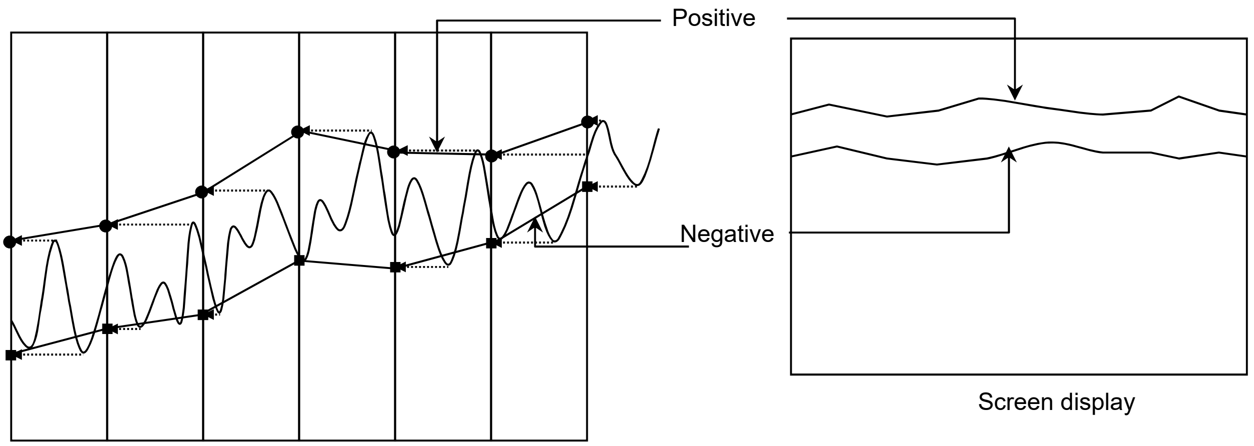


Figure 4.4.8-1 Display example of detection mode

(1) Setting the detection mode

Example: To set the detection mode to Negative

<Procedure>

1. Press Trace.
2. Press F7 (Detection) and select Negative.

4.4.9 Setting markers

This section describes various Marker functions as well as the functions to improve measurement efficiency, such as marker search and parameter setting with marker values.

For the Marker's setting range and resolution, refer to the setting ranges and resolutions in 4.4.3 "Setting analysis time".

Pressing F2 (Marker) on page 2 of the Trace function menu, or pressing Marker displays the Marker function menu.

The Marker function menu consists of two pages, which can be toggled by pressing ➔.

Table 4.4.9-1 Marker function menu

Function Key	Menu Display	Function
Page1	Marker	Press Marker (Marker) to display this page.
F1	Marker 1 (On/Off)	Sets whether to display time marker 1.
F2	Marker 1	Sets time marker 1.
F3	Marker 2 (On/Off)	Sets whether to display time marker 2.
F4	Marker 2	Sets time marker 2.
F5	Active Marker (1 / 2 / 1&2)	Selects the active marker.
F6	Zoom	Zooms in on the range of Marker 1 and Marker 2.
F7	Zoom Out	Reduces the current screen display data into the range of Marker 1 and Marker 2.
F8	Peak-Peak	Displays the difference between the maximum and minimum values in the marker range.
Page2	Marker	Press Marker (Marker), and then press ➔ to display page 2.
F1	Detection Mode 1	Selects the target trace data for Marker 1 when the detection mode is Pos&Neg. Pos: Displays the results of the trace data with Positive detection. Neg: Displays the results of the trace data with Negative detection. It is available only when the detection mode is Pos&Neg.
F2	Detection Mode 2	Selects the target trace data for Marker 2 when the detection mode is Pos&Neg. Pos: Displays the results of the trace data with Positive detection. Neg: Displays the results of the trace data with Negative detection. It is available only when the detection mode is Pos&Neg.

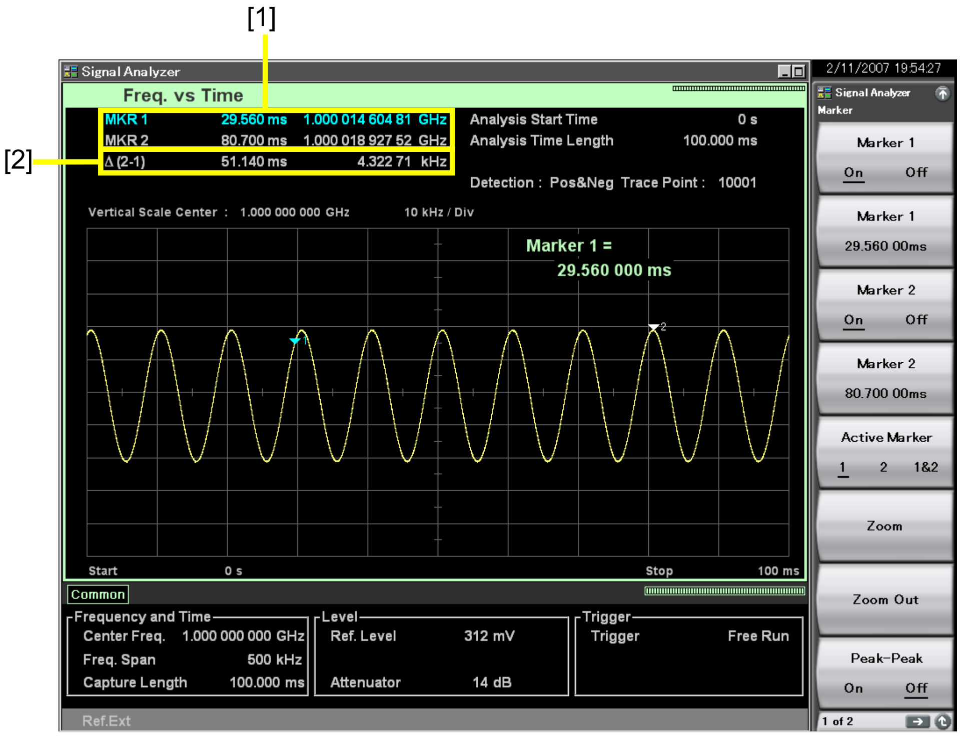


Figure 4.4.9-1 Display items for marker results

Table 4.4.9-2 Display items for marker results

No.	Display	Description
[1]	MRK1 / MRK2	Displays the frequency at each marker time position.
[2]	Δ(2 – 1)	Displays the frequency difference (Marker 2 – Marker 1) at the marker time position.

(1) Changing the marker position

Note:

The marker position of Power vs Time, Frequency vs Time, Phase vs Time synchronizes one another.

The frequency in the specified time can be measured by using the marker displayed in Figure 4.4.9-2.

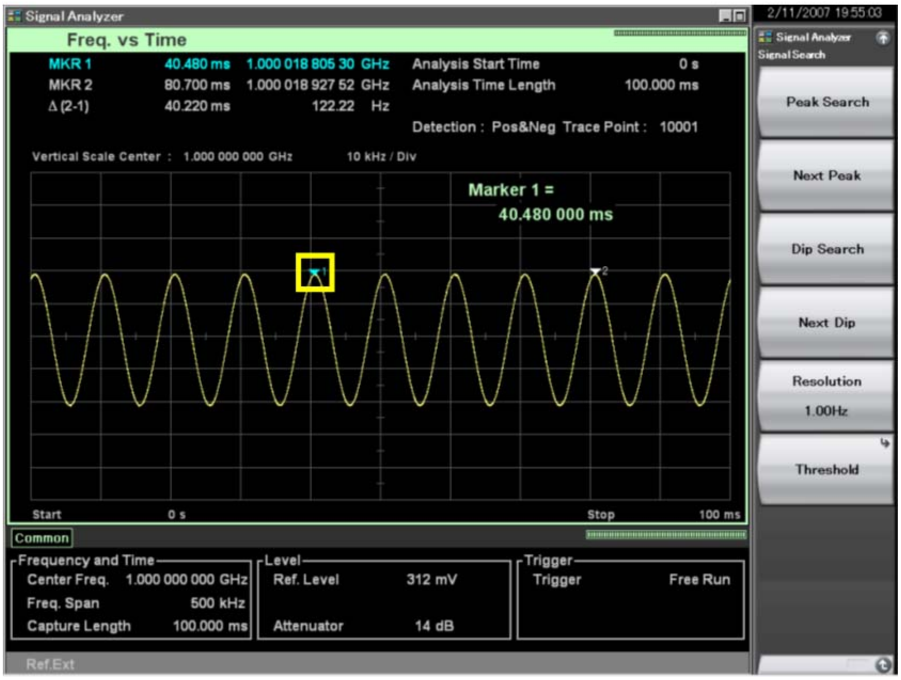


Figure 4.4.9-2 Marker

Example: To set Marker 1 to 1.5 μs

<Procedure>

1. Press Marker.
2. Press F2 (Marker 1).
3. Press 1 . 5, and then press F3 (μs).

(2) Selecting the active marker

Note:

This setting is enabled when both Markers 1 and 2 are On.

The active marker is selected. The marker position of the active marker can be set with the rotary knob or step key.

Example: To set the active marker

<Procedure>

1. Press Marker.
2. Press F1 (Marker 1 On/Off) and select On.
3. Press F3 (Marker 2 On/Off) and select On.
4. Press F5 (Active Marker 1/2/1&2) and select the active marker.

(3) Setting zooming in

Note:

This setting is enabled when both Markers 1 and 2 are On.

Example: To zoom in the range from Marker 1 to Marker 2

<Procedure>

1. Press Marker.
2. Press F6 (Zoom). The range enclosed with Markers 1 and 2 is zoomed in.

As shown in Figure 4.4.9-3, when Zoom is performed after setting the range with Markers 1 and 2, the Analysis Start Time and Analysis Time Length are changed to the range of Markers 1 and 2.

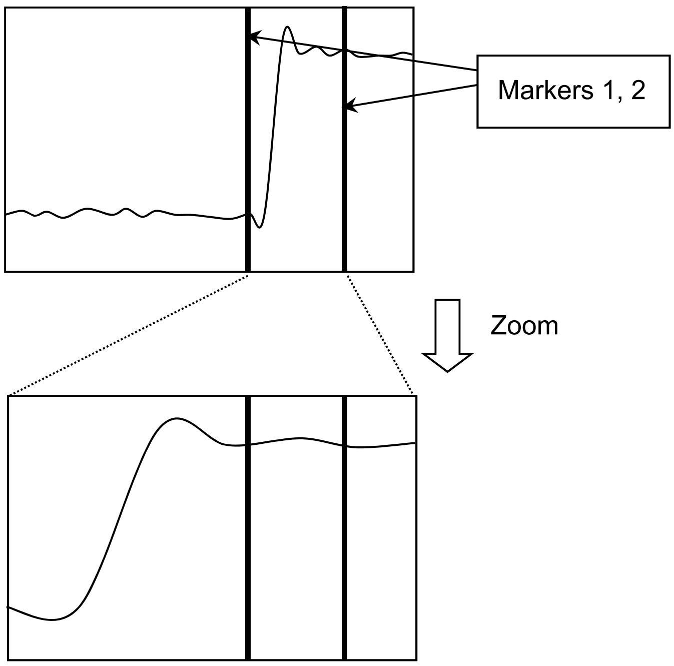


Figure 4.4.9-3 Zoom

(4) Setting zooming out

Note:

This setting is enabled when both Markers 1 and 2 are On.

Example: To reduce the analysis range to the range of Markers 1 and 2

<Procedure>

1. Press [Marker].
2. Press [F7] (Zoom Out). The displayed waveform data is zoomed out to the range enclosed with Markers 1 and 2.

As shown in Figure 4.4.9-4, when Zoom Out is performed after setting the range with Markers 1 and 2, the range of Markers 1 and 2 is changed to the Analysis Start Time and Analysis Time Length.

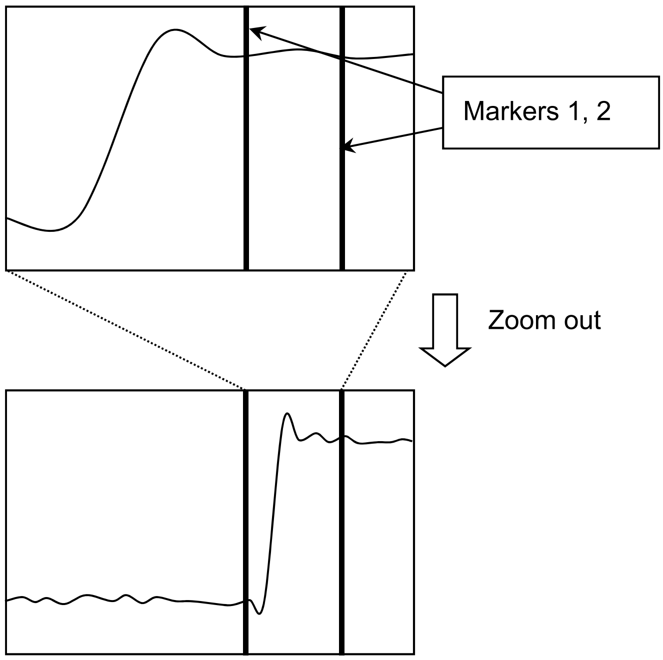


Figure 4.4.9-4 Zoom out

(5) Peak To Peak measurement

The maximum/minimum frequency is measured based on the displayed trace data in the marker range. The measurement start and stop points are the trace points of the marker position. When any of the markers is Off, the entire analysis range becomes the target.

The display items for measurement results are described below.

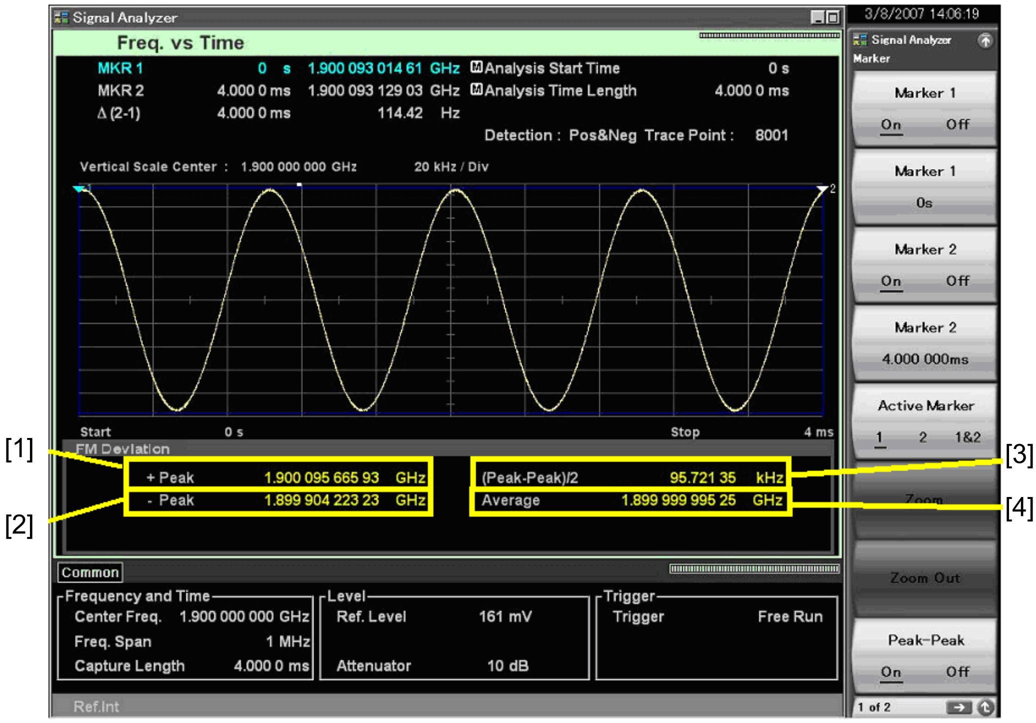


Figure 4.4.9-5 Display items for measurement results

Table 4.4.9-3 Display items for measurement results

No.	Display	Item
[1]	+Peak	Displays the maximum frequency.
[2]	–Peak	Displays the minimum frequency.
[3]	(Peak-Peak)/2	Displays (Peak-Peak)/2 calculated from the following formula: $$P_{P-P} = \frac{P_{Plus} - P_{Minus}}{2}$$ where $P_{P\text{-}P}$: (Peak-Peak)/2 [Hz] P_{Plus}: +Peak [Hz] P_{Minus}: –Peak [Hz]
[4]	Average	Displays the average frequency.

4.4.10 Setting marker search

The marker search functions include Peak search, Next Peak search, Dip search, and Next Dip search.

Signal Search function menu

Pressing F3 (Signal Search) on page 2 of the Trace function menu, or pressing Peak Search displays the Signal Search function menu.

Table 4.4.10-1 Signal Search function menu

Function Key	Menu Display	Function
F1	Peak Search	Moves the active marker to the maximum frequency point in the measurement time range. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F2	Next Peak	Moves the active marker to the second highest frequency position next to the active marker in the measurement time range. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F3	Dip Search	Moves the active marker to the minimum frequency point in the measurement time range. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F4	Next Dip	Moves the active marker to the second lowest frequency position next to the active marker in the measurement time range. If two or more such points exist, the point with the lowest time (toward the left of the scale) is selected.
F5	Resolution	Specifies the resolution for Next Peak search and Next Dip search.
F6	Threshold	Sets a threshold to restrict frequency points to be searched.

Threshold function menu

Pressing F6 (Threshold) on the Signal Search function menu displays the Threshold function menu.

Table 4.4.10-2 Threshold function menu

Function Key	Menu Display	Function
F1	Threshold (On/Off)	Sets the detection threshold function for peak point detection to On/Off .
F2	Threshold (Above/Below)	Selects whether peak point detection is to be performed Above (upper detection) or Below (lower detection) the threshold.
F3	Threshold Frequency	Sets a threshold to restrict frequency points to be searched.

(1) Executing Peak search

The active marker is moved to the position where the marker value becomes maximal in the analysis time range. If two or more marker values exist, the point with the lower marker frequency is selected. When the detection mode is Pos&Neg, a search is executed depending on the marker detection mode setting: Positive detection trace data is searched when Pos is set, and Negative detection trace data is searched when Neg is set.

Example: To execute a Peak search

<Procedure>

1. Press Peak Search.
2. Press F1 (Peak Search) to execute a Peak search.

(2) Executing Next Peak search

The second highest local maximum point (Peak) next to the marker value of the current active marker is detected and the active marker is moved to that position. If two or more marker values exist, the point with the lower marker frequency is selected. When the detection mode is Pos&Neg, a search is executed, depending on the marker detection mode setting: Positive detection trace data is searched when Pos is set, and Negative detection trace data is searched when Neg is set.

Example: To execute a Next Peak search

<Procedure>

1. Press Peak Search.
2. Press F2 (Next Peak) to execute a Next Peak search.

(3) Executing Dip search

The active marker is moved to the position where the marker value becomes minimal in the analysis time range. If two or more marker values exist, the point with the lower marker frequency is selected. When the detection mode is Pos&Neg, a search is executed depending on the marker detection mode setting: Positive detection trace data is searched when Pos is set, and Negative detection trace data is searched when Neg is set.

Example: To execute a Dip search

<Procedure>

1. Press Peak Search.
2. Press F3 (Dip Search) to execute a Peak Dip search.

(4) Executing Next Dip search

The second lowest local maximum point (Dip) next to the marker value of the current active marker is detected and the active marker is moved to that position. If two or more marker values exist, the point with the lower marker frequency is selected. When the detection mode is Pos&Neg, a search is executed depending on the marker detection mode setting: Positive detection trace data is searched when Pos is set, or Negative detection trace data is searched when Neg is set.

Example: To execute a Next Dip search
<Procedure>

1. Press Peak Search.
2. Press F4 (Next Dip). A Next Dip search is executed.

(5) Setting the search resolution

The Next Peak search and Next Dip search resolutions are set. Trace data with slopes greater that the resolution at both ends is to be searched.

Example: To set the search resolution value to 10 Hz
<Procedure>

1. Press Peak Search.
2. Press F5 (Resolution).
3. Press 1 0, and then press F4 (Hz) to set the search resolution.

(6) Setting the search threshold

The threshold to restrict marker values to be searched is set. A search is performed for marker values above/below the threshold.

Example: To set the marker values below 999 MHz as search targets when the center frequency is 1 GHz and span frequency is 31.25 MHz
<Procedure>

1. Press Peak Search.
2. Press F6 (Threshold).
3. Press F2 (Threshold Above/Below) to switch to Below.
4. Press F3 (Threshold Frequency).
5. Press 9 9 9, and then press F2 (MHz) to set the search threshold.

4.4.11 Measure measurement

Measure function menu

Press F1 (Measure) on page 2 of Trace menu or press Measure to display Measure function menu.

Table 4.4.11-1 Measure function menu

Function Key	Menu display	Function
F1	FM Deviation (On/Off)	Executes FM Deviation measurement.
F2	FM CW	Executes FM CW measurement. This function is available only for MS2830A and MS2840A.

(1) FM Deviation measurement

Measures the maximum and minimum frequency, based on the trace data within the marker range. The measurement range is between Marker 1 and 2 points on the trace. When either of Marker 1 and 2 is set to Off, the measurement is performed throughout the range on the trace. If set to On, then Scale Unit is set to ΔHz and Detection is set to Pos & Neg, and Peak-Peak function is set to On.

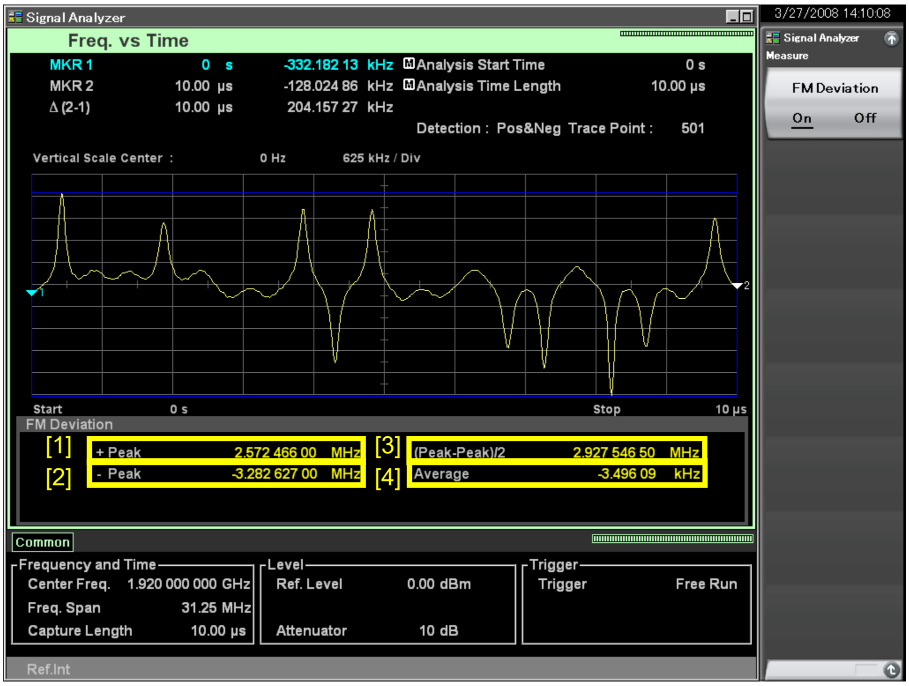


Figure 4.4.11-1 FM Deviation Measurement Trace

Table 4.4.11-2 Display Items

No.	Display	Descriptions
[1]	+Peak	Displays the maximum frequency.
[2]	–Peak	Displays the minimum frequency.
[3]	(Peak-Peak)/2	Displays (Peak-Peak)/2. It can be calculated by the following formula: $P_{P-P} = \dfrac{P_{Plus} - P_{Minus}}{2}$ Where: $P_{P\text{-}P}$: (Peak-Peak)/2[Hz] P_{Plus}: +Peak[Hz] P_{Minus}: –Peak[Hz]
[4]	Average	Displays the average frequency.

(2) FM CW measurement

This function is available only for MS2830A and MS2840A.
Measures the linearity of the time versus frequency slope of a signal in which the frequency increases or decreases with time (chirp signal) among the FM CW signals. In the FM CW measurement, the measurement range can be set by automatic detection or marker.

Automatically detectable signals

The following is the restrictions of the automatic detection and the detectable signal conditions in the FM CW measurement function.

- Up to 10 slopes can be detected by one measurement.
  The slope that has been detected first is a measurement target.
- The minimum time length of a slope that is automatically detectable is one tenth or more of the analysis time length.

4.4.3 “Setting analysis time”

- The start and end of a slope need to be within the analysis time length as the following figure.

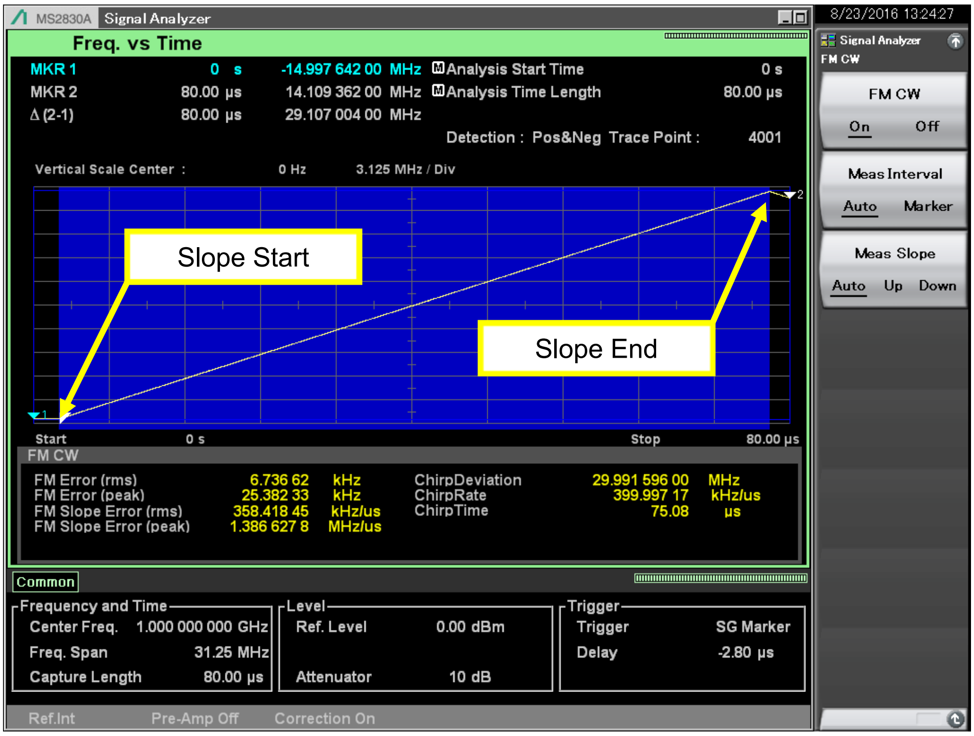
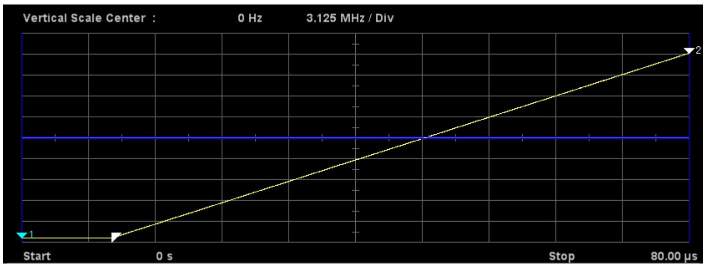
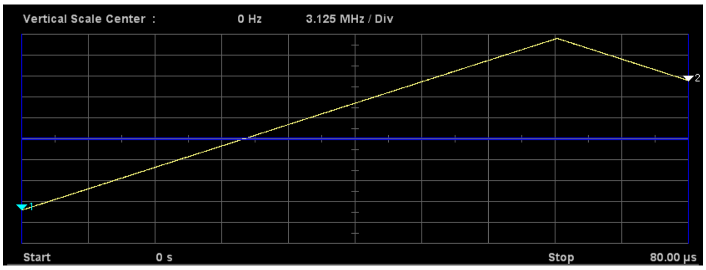


Figure 4.4.11-2 Slope start and end

If either of start or end of a slope is outside the analysis time length as the following figure, the slope is not detected automatically.



Slope end is missing



Slope start is missing

Figure 4.4.11-3 Cases where a slope is not detected automatically

FM CW function menu

This function is available only for MS2830A and MS2840A. Press F2 (FM CW) on Measure function menu to display FM CW function menu.

Table 4.4.11-3 FM CW function menu.

Function Key	Menu display	Function
F1	FM CW (On/Off)	Sets the FM CW measurement function to On/Off. When it is set to On, other measure functions of the same trace are set to Off.
F2	Meas Interval (Auto/Marker)	Sets how to detect the slope of the FM CW signals. Auto: Detects the slope automatically. When there are multiple slopes, up to 10 slopes are automatically detected, but only the first-detected slope will be a measurement target. Marker: The range selected by Marker1 and 2 is a measurement target.
F3	Meas Slope (Auto/Up/Down)	Sets the slope type to detect automatically. Auto: Detects both upslopes and downslopes. Up: Detects upslopes. Down: Detects downslopes.

When detecting slopes automatically with Meas Interval set to Auto, the target slope is shown on a blue background as the following figure. Except the target, downslopes are shown on a green background and upslopes on a purple one.

Figure 4.4.11-4 Slopes on colored backgrounds at automatic detection

Table 4.4.11-4 Display items of measurement results

Item	Description
FM Error (rms)	Displays the RMS value of the frequency error between the ideal slope* and measured value.
FM Error (peak)	Displays the peak value of the frequency error between the ideal slope* and measured value.
FM Slope Error (rms)	Displays the RMS value of the slope error between the ideal slope* and measured value.
FM Slope Error (peak)	Displays the peak value of the slope error between the ideal slope* and measured value.
Chirp Deviation	Displays the frequency deviation of the ideal slope*.
Chirp Rate	Displays the rate of the ideal slope*.
Chirp Time	Displays the time length of the measurement signal slope*.

*: The ideal slope is calculated using least square method in the range specified by automatic detection or marker.

The following figure shows measurement results of Table 4.4.11-4 Display items of measurement results.

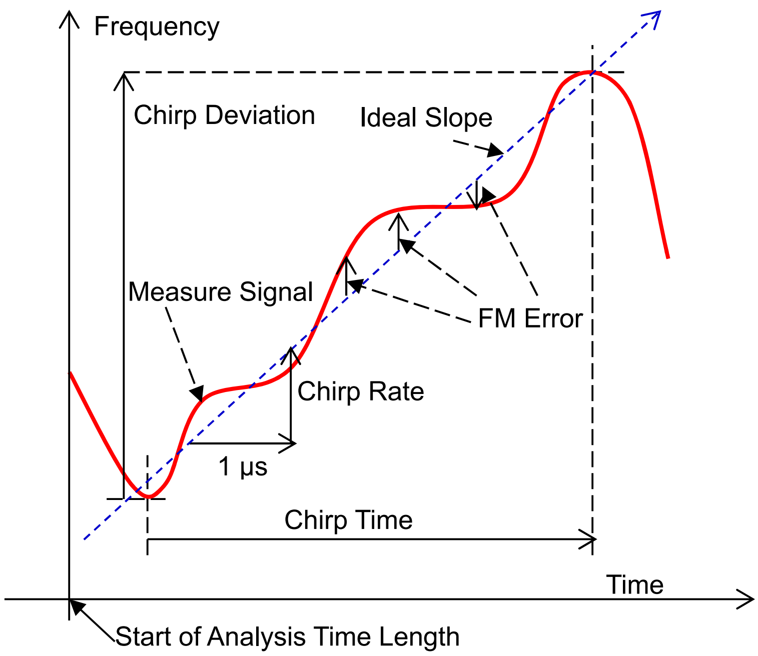


Figure 4.4.11-5 Explanatory figure of display items

4.5 Phase vs Time

4.5.1 What is Phase vs Time trace?

Phase vs Time trace is the display system to display the time fluctuation of phase from the acquired IQ digital data.

Display items of Phase vs Time trace are as follows:

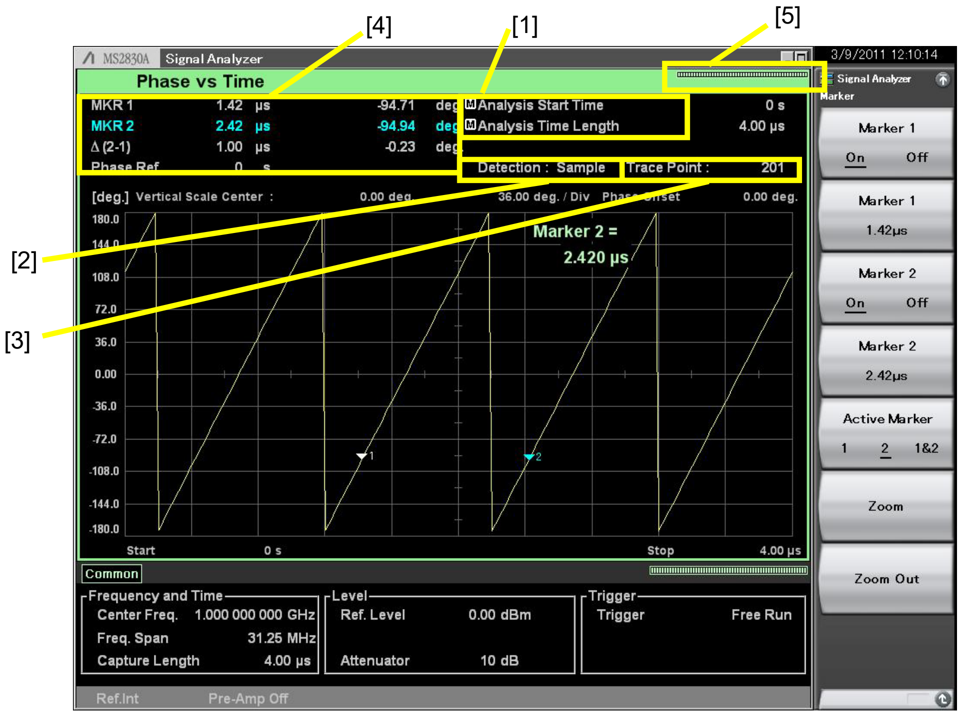


Figure 4.5.1-1 Display items for Phase vs Time trace

Table 4.5.1-1 Display items for Phase vs Time trace

No.	Display	Description
[1]	Analysis Start Time /Analysis Time Length	Displays the analysis start time and analysis time length.
[2]	Detection	Displays the detection mode.
[3]	Trace Point	Displays the trace point count (horizontal axis).
[4]	MKR1/MKR2/ Δ(2 – 1)	Displays the marker result value and marker frequency position.
[5]	Indicator	Displays the indicator showing the analysis progress rate.

4.5.2 Setting Phase vs Time parameters

After selecting Phase vs Time for Trace Mode, pressing F5 (Trace) from the main function key or pressing Trace displays the Trace function menu.

The Trace function menu consists of two pages, which can be toggled by pressing .

4.1 “Selecting Trace”

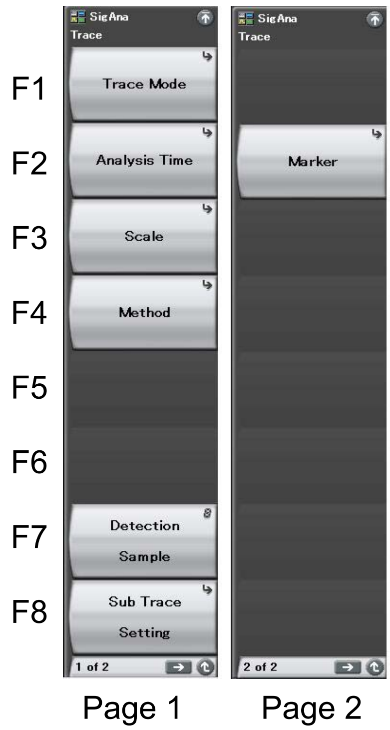


Figure 4.5.2-1 Trace function menu

Table 4.5.2-1 Trace function menu

Function Key	Menu Display	Function
Page1	Trace	Press Trace (Trace) to display this page.
F1	Trace Mode	Sets the trace type. 4.1 "Selecting Trace"
F2	Analysis Time	Used for setting related to the analysis time. 4.5.3 "Setting analysis time"
F3	Scale	Used for setting related to the scale. 4.5.4 "Setting scale"
F4	Method	Used for setting related to the phase. 4.5.7 "Setting methods"
F7	Detection	Used for setting related to detection. 4.5.5 "Setting detection mode"
F8	Sub Trace Setting	Used for setting related to sub-trace. 4.9 "Sub-Trace"
Page2	Trace	Press Trace (Trace), and then press ➔ to display page 2.
F2	Marker	Used for setting related to the marker. 4.5.6 "Setting markers"

4.5.3 Setting analysis time

Pressing F2 (Analysis Time) from the Trace function menu or pressing Time/Sweep displays the Analysis Time function menu.

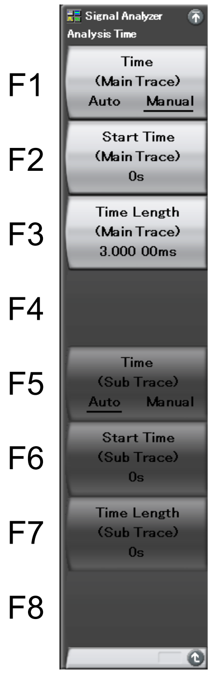


Figure 4.5.3-1 Analysis Time function menu

Setting Analysis Time on the Power vs Time trace normalizes a set time that exceeds five valid digits in addition to rounding up by time resolution.

Table 4.5.3-1 Analysis Time function menu

Menu Display	Function
Time (Main Trace) (Auto/Manual)	Switches between auto setting and manual setting for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length).
Start Time (Main Trace)	Sets the analysis start time.
Time Length (Main Trace)	Sets the analysis time length.
Time (Sub Trace) (Auto/Manual)	Switches between auto setting and manual setting for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

Setting the analysis time

Analysis time is the time to be analyzed. The analysis time can be specified with the analysis start position (Analysis Start Time) and analysis time length (Analysis Time Length).

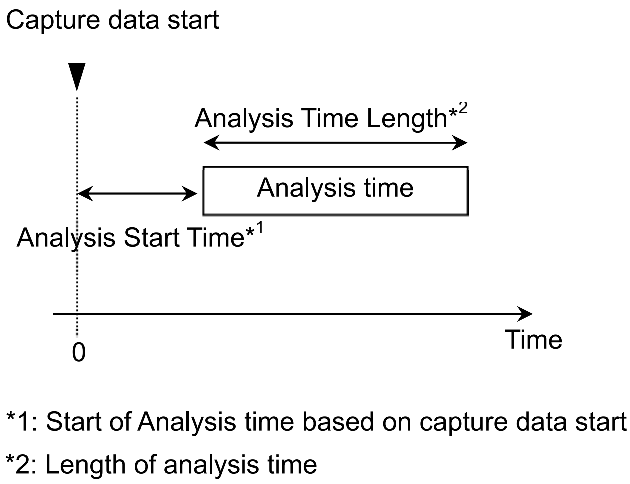


Figure 4.5.3-2 Analysis Time

(1) Auto mode

When Capture Time is set to Auto, the analysis time length is set to 100 ms for measurement.

When Capture Time is set to Manual, the analysis time length is set to the capture time for measurement.

Table 4.5.3-2 Setting analysis time in the Auto mode

Capture Time	Analysis Start Time [s]	Analysis Time Length [s]
Auto	0	0.1
Manual	0	x_1

x_1 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

The analysis start time and analysis time length are set manually. This is an effective method to perform measurement of discontinuous signals such as burst.

Analysis start time setting range

Table 4.5.3-3 Analysis start time setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length [s]

x_2 : Capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

Analysis time length setting range

Table 4.5.3-4 Analysis time length setting range

Time	Minimum Value [s]	Maximum Value [s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1 : Analysis start time [s]

x_2 : Capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

x_4 : Capture time length minimum value [s]

2.4 “Setting IQ Data Capture Time Range”

Note:

The maximum value may be less than this value due to the restrictions imposed by the trace point.

Analysis start time resolution

Table 4.5.3-5 Frequency Span and Setting Resolution

Frequency span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz	20 ns
31.25 MHz	20 ns
50 MHz *	10 ns
62.5 MHz *	10 ns
100 MHz *	5 ns
125 MHz *	5 ns

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.5.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Setting procedure for analysis time

Example: To switch the analysis time to Manual setting, and set the analysis start time to 20 ns and analysis time to 2 μs

<Procedure>

1. Press Time/Sweep.
2. Press F2 (Start Time).
3. Press 2 0, and then press F4 (ns) to set the analysis start time.
4. Press F3 (Time Length).
5. Press 2, and then press F3 (μs) to set the analysis time length.

4.5.4 Setting scale

Scale function menu

Pressing Trace and then F3 (Scale) displays the Scale function menu.

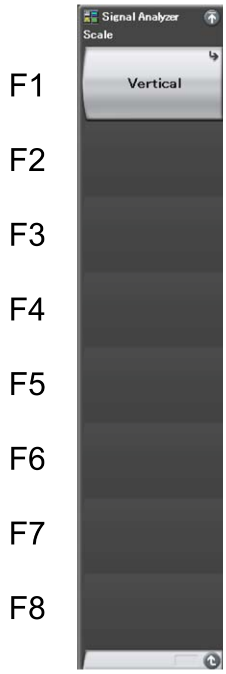


Figure 4.5.4-1 Scale function menu

Table 4.5.4-1 Scale function menu

Menu Display	Function
Vertical	Used for setting related to the vertical axis (phase axis) scale.

Vertical function menu

Pressing F1 (Vertical) on the Scale function menu displays the Vertical function menu.

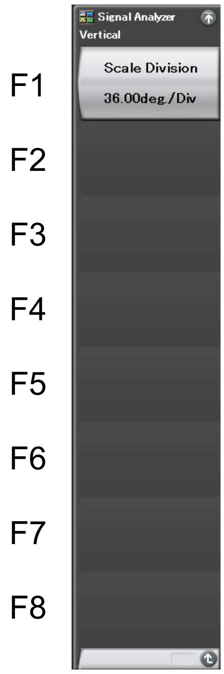


Figure 4.5.4-2 Vertical function menu

Table 4.5.4-2 Vertical function menu

Menu Display	Function
Scale Division	Sets the range of the vertical axis.

(1) Setting the numeric range of the vertical axis

For Phase vs Time trace, the vertical axis setting range (Phase Scale Division) is as follows:

Phase setting range (degree): 0.01 to 200G

Example: To set the numeric value of the vertical axis to 1

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F1 (Vertical).
4. After pressing F1 (Scale Division), press 1, and then press F7 (Set) to set the numeric value.

4.5.5 Setting detection mode

Pressing [Trace], and then [F7](Detection) selects the detection mode.

Detection mode types

The detection mode within analysis range (Detection) is set. The detection mode can be selected from the four types:
Average, Sample, Positive, and Negative.

Table 4.5.5-1 Detection Mode

Detection Mode	Description
Average	Traces the average value within the analysis range.
Sample	Traces the measured points within the analysis range.
Positive	Traces the maximum value within the analysis range. Positive is used to measure the upper envelope of the modulation waveform.
Negative	Traces the minimum value within the analysis range. Negative is used to measure the lower envelope of modulated waveform.

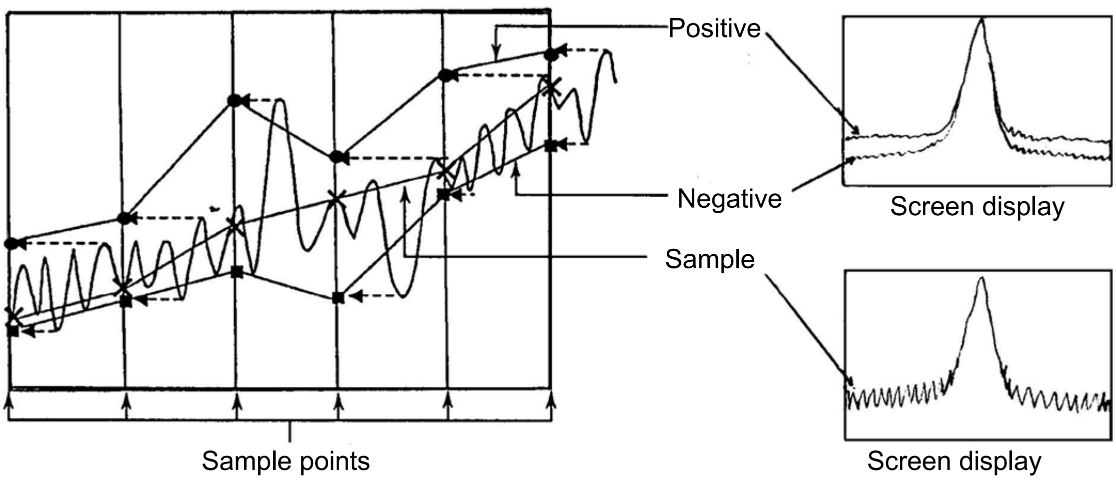


Figure 4.5.5-1 Display example for detection mode

(1) Setting detection mode

Example: To set the detection mode to Negative

<Procedure>

1. Press [Trace].
2. Press [F7] (Detection), and then select Negative.

4.5.6 Setting markers

This section describes various Marker functions and the functions to improve measurement efficiency, such as marker search and parameter setting with marker values.

For the Marker's setting range and resolution, refer to the setting ranges and resolutions in 4.5.3 "Setting analysis time".

Pressing F2 (Marker) on page 2 of the Trace function menu, or pressing Marker displays the Marker function menu.

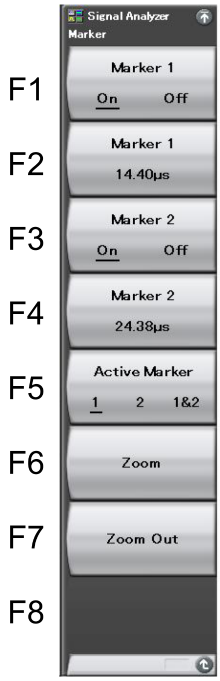


Figure 4.5.6-1 Marker function menu

Table 4.5.6-1 Marker function menu

Menu Display	Function
Marker 1 (On/Off)	Sets whether to display time marker 1.
Marker 1	Sets time marker 1.
Marker 2 (On/Off)	Sets whether to display time marker 2.
Marker 2	Sets time marker 2.
Active Marker (1 / 2 / 1&2)	Selects the active marker.
Zoom	Zooms in on the range of Marker1 and Marker2.
Zoom Out	Reduces the current screen display data into the range of Marker1 and Marker2.

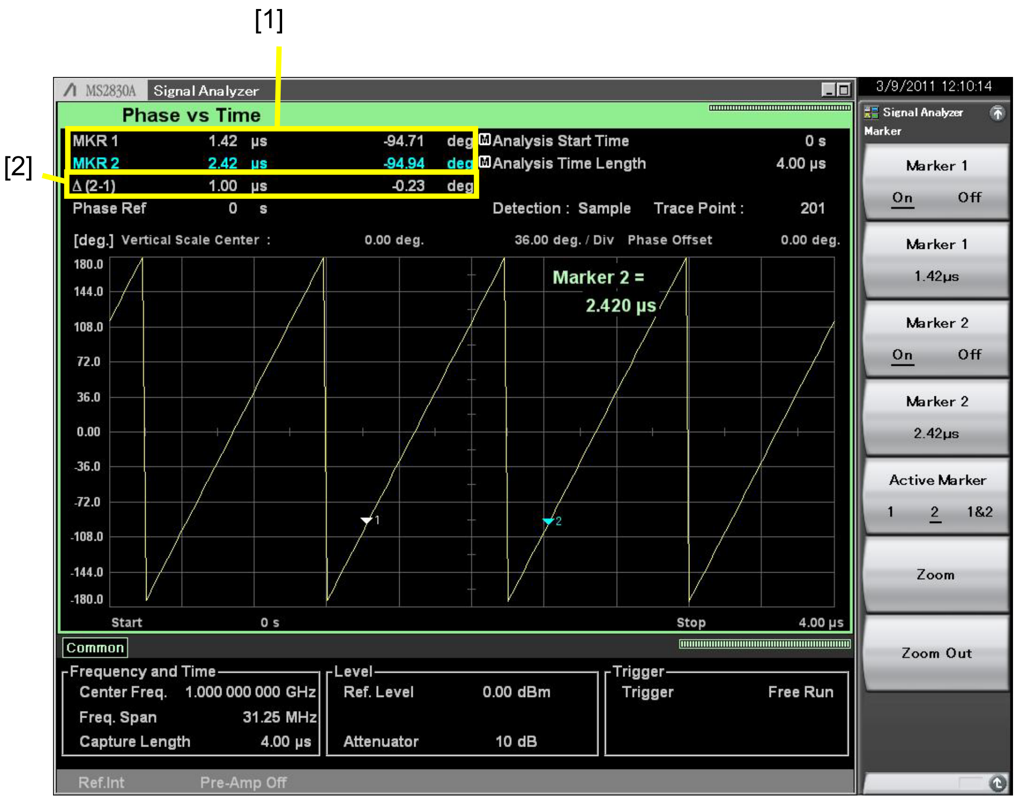


Figure 4.5.6-2 Display items for marker results

Table 4.5.6-2 Display items for marker results

No.	Display	Description
[1]	MRK1 / MRK2	Displays the phase at each marker time position.
[2]	Δ(2 – 1)	Displays the phase difference (Marker 2 – Marker 1) at marker time position.

(1) Changing the marker position

Note:

The marker position of Power vs Time, Frequency vs Time, Phase vs Time synchronizes one another.

The phase in the specified time can be measured by using the marker displayed in Figure 4.5.6-3.

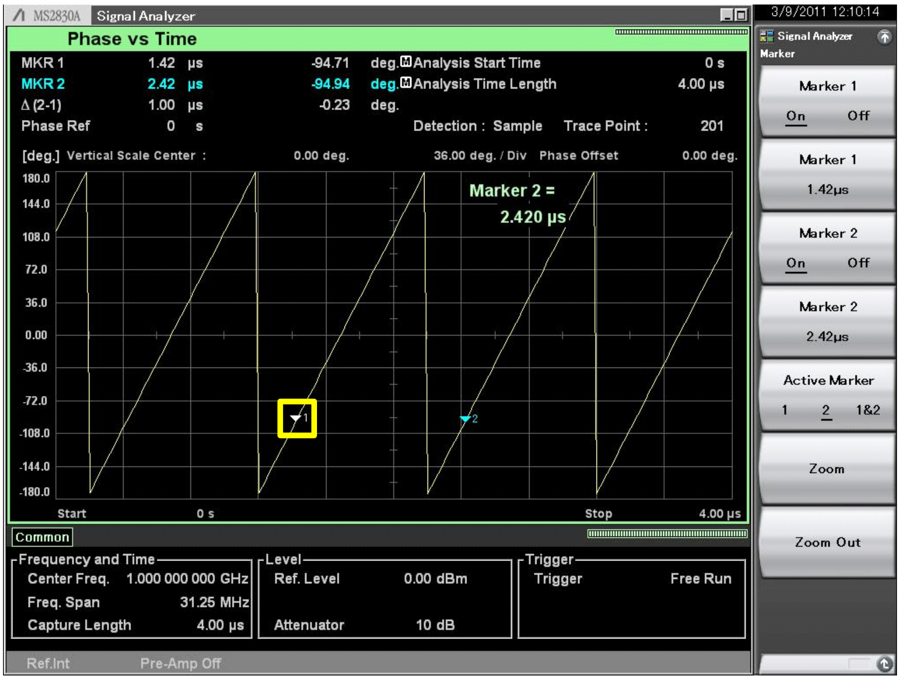


Figure 4.5.6-3 Marker

Example: To set Marker 1 to 1.5 μs

<Procedure>

1. Press Marker.
2. Press F2 (Marker 1).
3. Press 1 . 5, and then press F3(μs).

(2) Selecting the active marker

Note:

This setting is enabled when both Marker 1 and 2 are On.

The active marker is selected. The marker position of the active marker can be set with the rotary knob or step key.

Example: To set the active marker

<Procedure>

1. Press Marker.
2. Press F1 (Marker 1 On/Off), and then select On.
3. Press F3 (Marker 2 On/Off), and then select On.
4. Press F5 (Active Marker 1/2/1&2), and then select the active marker.

(3) Setting zooming in

Note:

This setting is enabled when both Marker 1 and 2 are On.

Example: To zoom in the range from Marker 1 to Marker 2

<Procedure>

1. Press Marker.
2. Press F6 (Zoom). The range enclosed with Marker 1 and 2 is zoomed in.

As shown in Figure 4.5.6-4, when Zoom is performed after setting the range with Marker 1 and 2, the Analysis Start Time and Analysis Time Length are changed to the range of Marker 1 and 2.

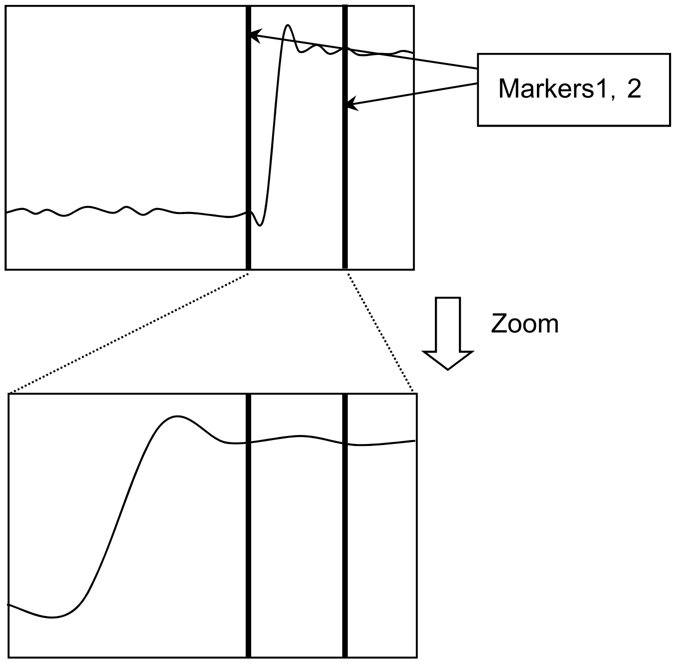


Figure 4.5.6-4 Zoom

(4) Setting zooming out

Note:

This setting is enabled when both Marker 1 and 2 are On.

Example: To reduce the analysis range to the range of Marker 1 and 2

<Procedure>

1. Press Marker.
2. Press F7 (Zoom Out). The displayed waveform data is zoomed out to the range enclosed with Marker 1 and 2.

As shown in Figure 4.5.6-5, when Zoom Out is performed after setting the range with Marker 1 and 2, the range of Marker 1 and 2 is changed to the Analysis Start Time and Analysis Time Length.

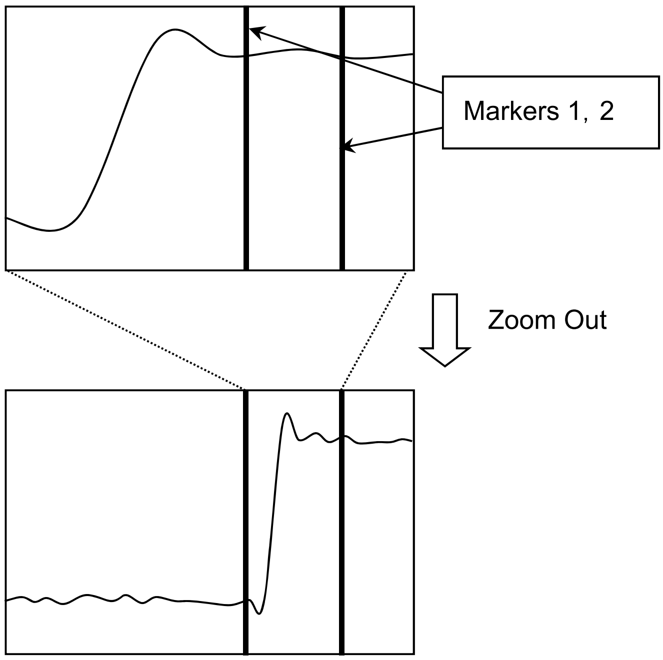


Figure 4.5.6-5 Zoom Out

4.5.7 Setting methods

Method function menu

Pressing F4 (Method) on page 1 of Trace function menu displays Method function menu.

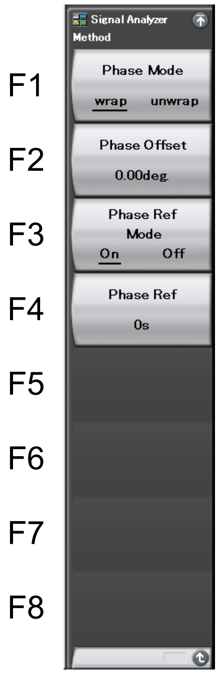


Figure 4.5.7-1 Method function menu

Table 4.5.7-1 Method function menu

Menu Display	Function
Phase Mode	Sets wrap or unwrap.
Phase Offset	Sets the offset value of the Phase vs Time graph.
Phase Ref Mode	Sets whether to set phase reference time.
Phase Ref	Sets phase reference time.

(1) Setting the vertical axis offset

Vertical axis offset is set. The setting range is as follows:

Setting range of phase offset: –100 to +100 M

Example: To set the vertical axis offset to 10

<Procedure>

1. Press Trace.
2. Press F4 (Method).
3. Press F2 (Phase Offset).
4. Press 1 0, and then press F7 (Set) to set the numeric value.

(2) Setting the phase reference

Uses the time phase of specified time as reference. The setting range is as follows:

Phase reference time setting range: 0 to 2000 s

Example: To set the phase reference time to 10 s

<Procedure>

1. Press Trace.
2. Press F4 (Method).
3. Press F3 (Phase Ref Mode) to select On.
4. Press F4 (Phase Ref).
5. Press 1 0, and then press F7 (Set) to set the numeric value.

(3) Setting the graph display method

Graph display method is set.

Wrap: Displays the signal phase between –180 to +180 deg.

Unwrap: Displays the accumulated result of signal phase difference.

Example: To set the graph display method to unwrap

<Procedure>

1. Press Trace.
2. Press F4 (Method).
3. Press F1 (Phase Mode), and select unwrap

4.6 CCDF

4.6.1 What is CCDF trace?

CCDF trace is a screen that performs a CCDF (Complementary Cumulative Distribution Function) analysis of the obtained IQ digital data to display.

The display items for a CCDF trace are as described below.

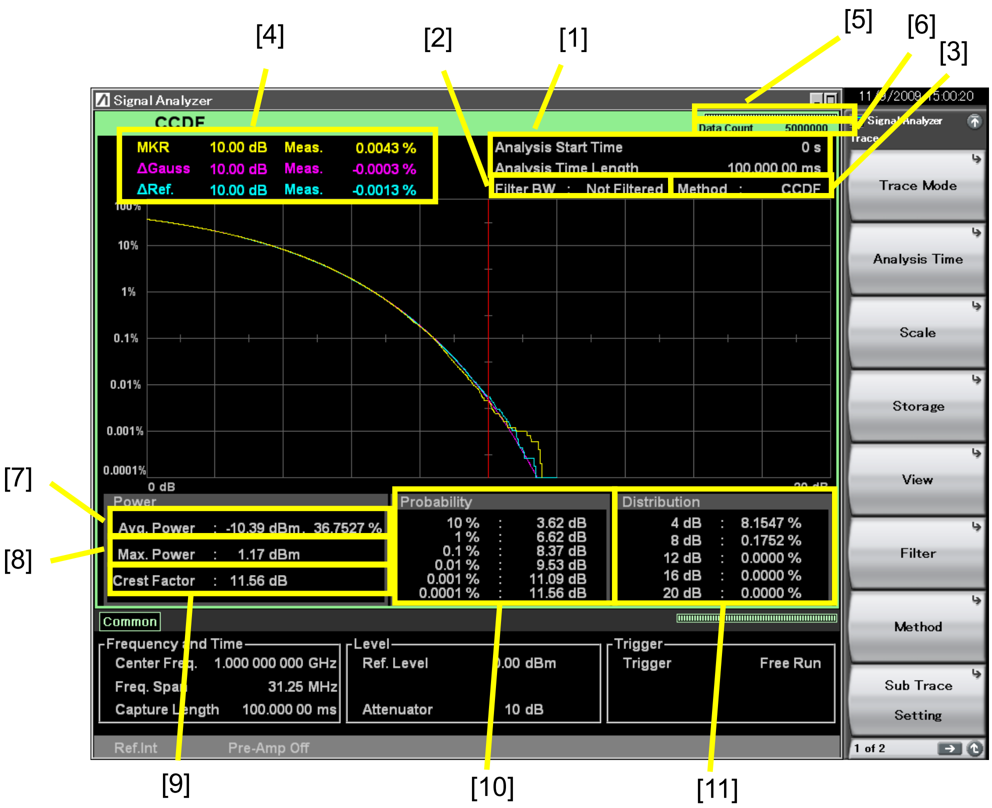


Figure 4.6.1-1 Display items for CCDF trace

Table 4.6.1-1 Display items for CCDF trace

No.	Display	Descriptions
[1]	Analysis Start Time/ Analysis Time Length	Displays the analysis start time and analysis time length.
[2]	Filter BW	Displays the filter bandwidth. "Not Filtered" is displayed when the filter is Off.
[3]	Method	Displays the measurement method.
[4]	MKR	Displays the marker result value and marker position.
[5]	Indicator	Displays the indicator showing the analysis progress rate.
[6]	Data Count	Displays the measurement point count.
[7]	Avg. Power	Displays the average power of the measurement point and its cumulative probability.
[8]	Max. Power	Displays the maximum power of the measurement point as an absolute value.
[9]	Crest Factor	Displays the crest factor of the measurement point.
[10]	Power Deviation	Displays the power deviations at which the probability distribution is 10%, 1%, 0.1%, 0.01%, 0.001%, and 0.0001%. If two or more corresponding power deviations exist, the greater value is assumed to be the result.
[11]	Probability Distribution	Displays the probability distribution above the deviation at the grid position.

4.6.2 Setting CCDF parameters

After selecting CCDF for Trace Mode, pressing F5 (Trace) on the main function menu or pressing Trace displays the Trace function menu.

4.1 "Selecting Trace"

Trace function menu consists of two pages, which can be toggled by pressing ➔.

Table 4.6.2-1 Trace function menu

Function Key	Menu Display	Function
Page1	Trace	Press Trace to display this page.
F1	Trace Mode	Sets the trace type. 4.1 "Selecting Trace"
F2	Analysis Time	Used for setting related to the analysis time. 4.6.4 "Setting analysis time"
F3	Scale	Sets the scale. 4.6.6 "Setting display format"
F4	Storage	Used for setting related to cumulative data reset. 4.6.7 "Setting cumulative data reset"
F5	View	Sets the trace type displayed when the View function menu is open. 4.6.8 "Setting up trace display"
F6	Filter	Sets the filter. 4.6.9 "Setting filter"
F7	Method	Selects the measurement method. 4.6.3 "Selecting measurement method"
F8	Sub Trace Setting	Used for setting related sub trace. 4.9 "Sub-Trace"
Page2	Trace	Press Trace, and then press ➔ to display this page.
F2	Marker	Used for setting related to the marker. 4.6.10 "Setting markers"

4.6.3 Selecting measurement method

Pressing Trace and then F7 (Method) displays the Method function menu.

Table 4.6.3-1 Method function menu

Function Key	Menu Display	Function
F1	Measure Method (CCDF/APD)	Selects the measurement method.
F2	Threshold (On/Off)	Enables/Disables the minimum level set for CCDF measurement. When it is set to On, signals under the level set in Threshold are not measured.
F3	Threshold	Sets the minimum level used for measurement.
F5	CCDF Meas Mode (Time/Count)	Sets the specified method of the measurement interval.
F6	Data Count	Sets the data count for the measurement target when CCDF Meas Mode is Count.

(1) Setting the measurement method

The measurement method (Measure Method) is selected. There are the following two measurement method types.

CCDF: Measures and displays CCDF (Complementary Cumulative Distribution Function). In this measurement, the cumulative distribution of instantaneous power deviation for the average power is measured and displayed.

APD: Measures and displays APD (Amplitude Probability Density). In this measurement, the probability distribution of instantaneous power deviation for the average power is measured and displayed.

Example: To set Measure Method selection

<Procedure>

1. Press Trace.
2. Press F7 (Method).
3. Press F1 (Measure Method CCDF/APD), and then select CCDF/APD to set the measurement method.

(2) Setting the minimum level

The minimum level (Threshold) of data used for measurement is set. When Threshold is set to On, any sampling points under the level specified here are not included in the data.

Example: To set the minimum level to –170 dBm

<Procedure>

1. Press Trace.
2. Press F7 (Method).
3. Press F3 (Threshold).
4. Press −/+ 1 7 0, and then press F7 (Set) to set the minimum level.

(3) Setting CCDF Meas Mode

Select the specified method of the measurement span. There are the following two specified method types.

Time: The target is the measurement interval set at Analysis Time.
Count: Measures until the sample count set at Data Count is met.

Note:

This function cannot be set when Capture Time is Manual. For the Capture Time settings, refer to Section 4.6.4 “Setting analysis time”.

Example: To set CCDF Meas Mode

<Procedure>

1. Press Trace.
2. Press F7 (Method).
3. Press F5 (CCDF Meas Mode) to select Time or Count.

4.6.4 Setting analysis time

Pressing F2 (Analysis Time) on the Trace function menu, or pressing Time/Sweep displays the Analysis Time function menu.

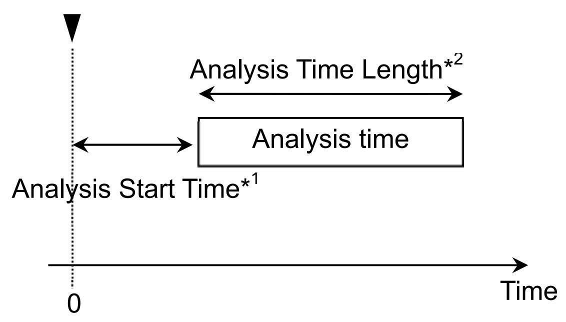
Trace function menu consists of two pages, which can be toggled by pressing ➔.

Table 4.6.4-1 Analysis Time function menu

Function Key	Menu Display	Function
Page 1	Analysis Time	Press Time/Sweep to display the menu.
F1	Time (Main Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length).
F2	Start Time (Main Trace)	Sets the analysis start time.
F3	Time Length (Main Trace)	Sets the analysis time length.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.
Page 2	Analysis Time	Press Time/Sweep and ➔ to display the menu.
F1	Gate Mode (On/Off)	Sets the specified method of the measurement interval. When this is On, a part of the analysis interval specified by Start Time (Main Trace) and Time Length (Main Trace) is defined as measurement target.
F2	Period	Sets the period interval, which is the unit of the range setting.
F3	Range Setup	Sets the range. ☞ 4.6.5 “Setting range”

Setting the analysis time

Analysis time is the target time for analysis. The analysis time can be specified with the analysis start position (Analysis Start Time) and analysis time length (Analysis Time Length).



*1: Start of Analysis time based on capture data start
*2: Length of analysis time

Figure 4.6.4-1 Analysis time

(1) Auto mode

When Capture Time is set to Auto, the analysis time length is automatically set to 100 ms. When Capture Time is set to Manual, the analysis start time and analysis time length are set automatically so that the entire capture time specified in Capture Time Length becomes the analysis range.

Table 4.6.4-2 Setting analysis time in Auto mode

Capture Time	Analysis Start Time [s]	Analysis Time Length [s]
Auto	0	0.1
Manual	0	x_1

x_1 : capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

The analysis start time and analysis time length are set manually. This is an effective method for measuring discontinuous signals such as burst.

Analysis start time setting range

Table 4.6.4-3 Analysis start time setting range in Manual mode

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length [s]

x_2 : Capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

Analysis time length setting range

Table 4.6.4-4 Analysis time length setting range

Capture Time	Minimum Value [s]	Maximum Value [s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1 : Analysis start time [s]

x_2 : Capture time length maximum value [s]

2.4 “Setting IQ Data Capture Time Range”

x_3 : Capture time length [s]

2.4 “Setting IQ Data Capture Time Range”

x_4 : Capture time length minimum value [s]

2.4 “Setting IQ Data Capture Time Range”

Analysis start time and analysis time length resolution

Table 4.6.4-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz *	20 ns
31.25 MHz *	20 ns
50 MHz*	10 ns
62.5 MHz*	10 ns
100 MHz*	5 ns
125 MHz*	5 ns

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.6.4-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

<u>Setting procedure for analysis time</u>

Example: To set the analysis start time to 20 ms and analysis time length to 60 ms

<Procedure>

1. Press [Time/Sweep].
2. Press [F2] (Start Time).
3. Press [2] [0], and then press [F2] (ms) to set the analysis start time.
4. Press [F3] (Time Length).
5. Press [6] [0], and then press [F2] (ms) to set the analysis start time length.

<u>Setting gate mode</u>

This mode is for measuring a specific part of the analysis period specified by Analysis Start Time and Analysis Time Length at CCDF measurement of burst waveforms. Measurement is repeated over by separating the analysis time into Period units. Range 1, 2, and 3 are specified in each Period and the data to be measured is specified according to each setting to calculate CCDF.

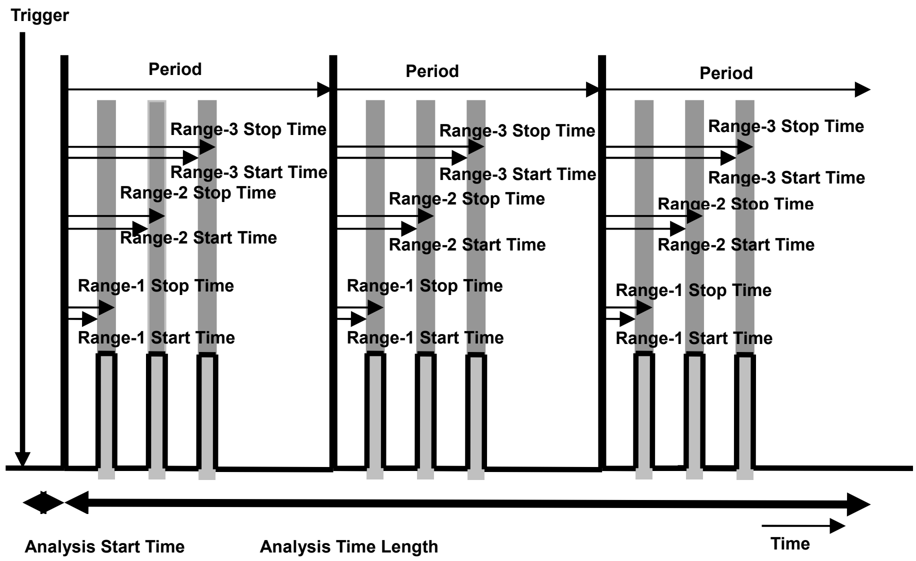


Figure 4.6.4-2 Setting gate mode

<u>Setting procedure for gate mode</u>

Example: To set the period to 6 ms

<Procedure>

1. Open the second page of the Analysis Time function menu, and press [F1] (Gate Mode) to set the gate mode to On.
2. Press [F2] (Period).
3. The period is set when pressing [6] and [F2] (ms).

4.6.5 Setting range

When pressing F2 (Analysis Time), → (Range Setup) and F3 after pressing Trace , the Range Setup function menu is displayed.

Table 4.6.5-1 Explanation of Range function menu

Function Key	Menu Display	Function
F1	Edit Range Number	Edits the range number to be measured.
F2	Range (On/Off)	Sets whether to execute the range measurement.
F3	Start time	Sets the measurement start time for each range.
F4	Stop time	Sets the measurement stop time for each range.

<u>Setting procedure for range measurement</u>

Example: To set the measurement start time of the range 2 to 2 ms

<Procedure>

1. Open the second page of the Analysis Time function menu, and press F3 (Range Setup).
2. Press F1 (Edit Range Number), and next press 2. Then press F7 (Set) to set Range2.
3. Pressing F3 (Start Time), 2, and F2 (ms) sets the measurement start time to 2 ms.

4

Trace

4.6.6 Setting display format

Pressing Trace and then F3 (Scale) displays the Scale function menu.

Table 4.6.6-1 Scale function menu

Function Key	Menu Display	Function
F2	Horizontal	Changes the scale of the power axis.

(1) Setting the Horizontal Scale

The power axis scale is set.

Example: To set the power axis scale to 5 dB

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F2 (Horizontal), and then select F1 (5 dB) to set the power axis scale.

The scale can be selected from the following four types:

- 5 dB Set the maximum value to 5 dB.
- 10 dB Set the maximum value to 10 dB.
- 20 dB Set the maximum value to 20 dB.
- 50 dB Set the maximum value to 50 dB.

4.6.7 Setting cumulative data reset

Pressing Trace and then F4 (Storage) displays the Storage function menu.

Table 4.6.7-1 Storage function menu

Function Key	Menu Display	Function
F1	Reset Every Capture (On/Off)	Sets whether to reset the results for each measurement.
F2	Restart	Clears all the accumulated data.

In a CCDF trace, the obtained IQ data is accumulated as cumulative data even after one measurement is finished, unless otherwise specified.

(1) Setting Restart

All the accumulated data is erased. Data Count is re-started from 0.

Example: To set Restart

<Procedure>

1. Press Trace.
2. Press F4 (Storage).
3. Press F2 (Restart).

(2) Setting Reset Every Capture

Whether to reset the results for each measurement is set. When Reset Every Capture is set to On, the cumulative data is deleted when Single or Continuous is pressed.

Example: To set Reset Every Capture

<Procedure>

1. Press Trace.
2. Press F4 (Storage).
3. Press F1 (Reset Every Capture On/Off) and select On.

4

Trace

4.6.8 Setting up trace display

This allows you to configure settings related to trace display for CCDF.

Pressing F5 (View) on the Trace function menu displays the View function menu.

Table 4.6.8-1 View function menu

Function Key	Menu Display	Function
F1	Store to Ref Trace	Temporarily saves the currently displayed trace. When Reference Trace is set to On, the saved trace is displayed in blue. This data is not saved when the power is turned off or the application is unloaded.
F2	Gaussian Trace	Switches between showing and hiding the Gaussian waveform.
F3	Reference Trace	Switches between showing and hiding the trace saved using the Store to Ref Trace function.

4.6.9 Setting filter

The setting related to the filter is performed.

Pressing F6 (Filter) from the Trace function menu, or pressing BW displays the Filter function menu.

Table 4.6.9-1 Filter function menu

Function Key	Menu Display	Function
F1	Type	Selects the filter type.
F3	Band Width	Sets the filter band.
F4	Freq. Offset	Sets the filter frequency offset.

(1) Rectangular filter

Example: To set the filter shape to Rect, filter bandwidth to 6 MHz, and filter frequency offset to 1 kHz

<Procedure>

1. Press BW.
2. Press F1 (Type) and select Rect.
3. Press F3 (Band Width).
4. Press 6, and then press F2 (MHz) to set the filter bandwidth.
5. Press F4 (Freq. Offset).
6. Press 1, and then press F3 (kHz) to set the filter frequency offset.

Refer to 4.3.5 "Setting filter" for details on the setting range and resolution.

4

Trace

4.6.10 Setting markers

This section describes various Marker functions.

Pressing F2 (Marker) on page 2 of the Trace function menu, or pressing Marker displays the Marker function menu.

Table 4.6.10-1 Marker function menu

Function Key	Menu Display	Function
F1	Marker (On/Off)	Sets the marker to On/Off .
F2	Marker Axis (Prob/Dist)	Sets the marker line as the vertical axis (probability) or horizontal axis (power).
F3	Distribution Position	Sets the marker position on the power distribution axis.
F4	Probability Position	Sets the marker position on the probability distribution axis.

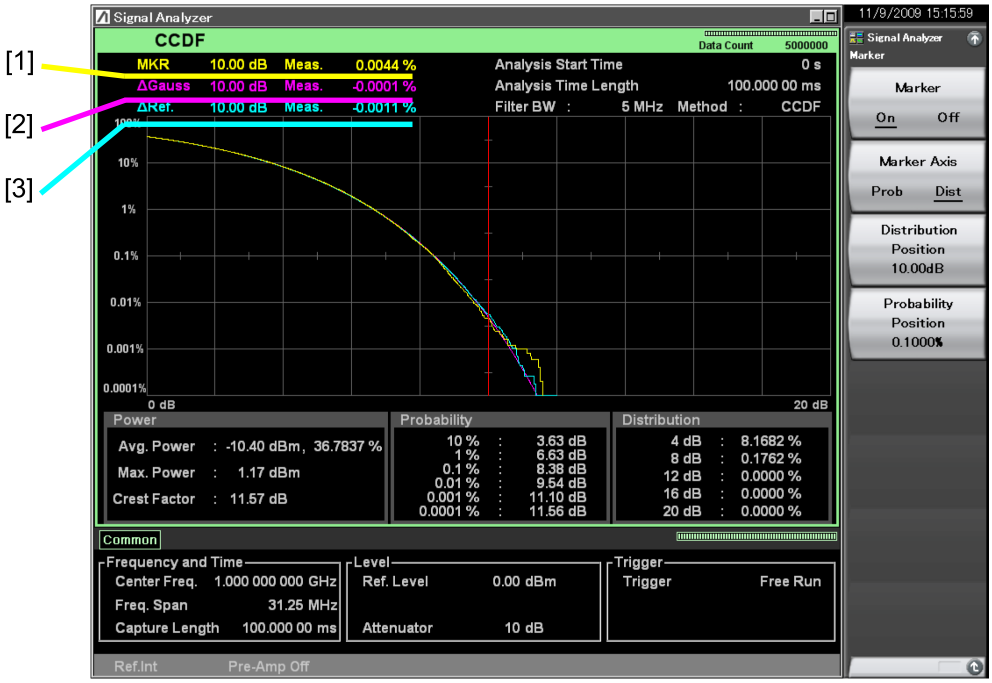


Figure 4.6.10-1 Display items for marker results

Table 4.6.10-2 Display items for marker results

No.	Display	Descriptions
[1]	MKR/Meas.	Displays the power deviation for the probability specified by the marker, or probability for the power deviation specified by the marker.
[2]	ΔGauss	Displays the marker result for the Gaussian waveform. This is displayed when Gaussian Trace is On.
[3]	ΔRef.	Displays the marker result for the temporarily saved trace. This is displayed when Reference Trace is On.

Changing the marker position

The power deviation with the specified probability or the probability of the specified power deviation can be measured depending on the displayed marker.

(1) Setting the marker axis

The marker axis can be selected from the following two types.

Distribution: Sets the marker line to power
Probability: Sets the marker line to probability

Example: To set the marker axis
<Procedure>

1. Press Marker.
2. Press F2 (Marker Axis), and then select Probability/Distribution to set the marker axis.

(2) Setting the marker position

The marker position is set. The marker value is measured by specifying one of the following.

Distribution Position: Measures probability by specifying power deviation.
Probability Position: Measures power deviation by specifying probability.

Example: To set the Distribution Position value to 20 dB
<Procedure>

1. Press Marker.
2. Press F3 (Distribution Position).
3. Press 2 0, and then press F1 (dB) to set the marker position on the power distribution axis.

Setting range and minimum resolution for Distribution Position

Setting range:	–Horizontal Scale to Horizontal Scale (APD) 0 to Horizontal Scale (CCDF)
Minimum resolution:	0.01 dB
Rotary knob resolution:	0.01 dB
Step key resolution:	Display grid

Example: Setting the Probability Position value to 10%

<Procedure>

1. Press Marker.
2. Press F4 (Probability Position).
3. Press 1 0, and then press F1 (%) to set the marker position on the probability distribution axis.

Setting range and resolution for Probability Position

Setting range:	0.0001 to 100
Minimum resolution:	0.0001%
Rotary knob resolution:	1 step at the highest 1st digit
Step key resolution:	Display grid

4.7 Spectrogram

4.7.1 What is Spectrogram Trace?

Spectrogram trace analyzes the captured IQ data by using FFT (Fast Fourier Transform) and diagrams the changes in a spectrum over time.

The display items of Spectrogram trace are described below:

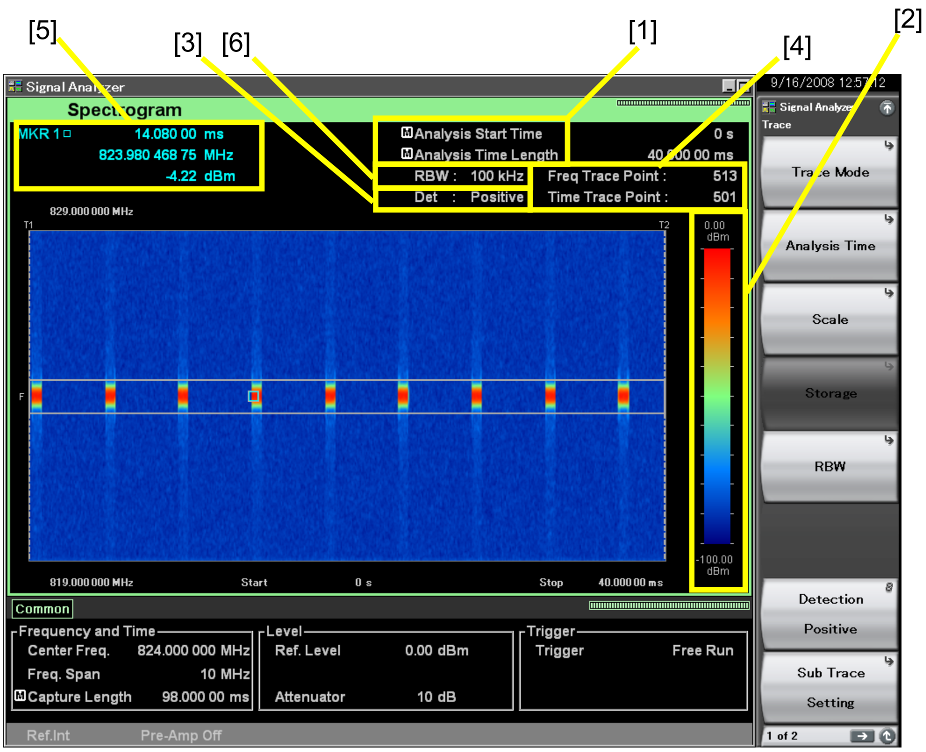


Figure 4.7.1-1 Spectrogram Trace Display Items

Table 4.7.1-1 Spectrogram Trace Display Items

No.	Display	Descriptions
[1]	Analysis Start Time /Analysis Time Length	Displays the analysis start time and the analysis time length.
[2]	Level Full Scale	Displays the scale of the level axis.
[3]	Det	Displays the detection mode.
[4]	Freq/Time Trace Point	Displays the number of the trace points on the frequency axis (vertical) and the time axis (horizontal).
[5]	MKR1/MKR2/MKR1□/MKR2□	Displays the marker time position, the marker time position, and the marker result value. When Marker Result is set to Peak, the peak point is displayed as □ on the trace.
[6]	RBW	Displays the resolution bandwidth (RBW).

4.7.2 Setting Spectrogram Parameter

Press F5 (Trace) or press Trace on the main function menu of the Spectrogram trace to display Trace function menu.

Trace function menu has 2 pages. Press ➔ to switch the pages.

4.1 "Selecting Trace"

Table 4.7.2-1 Trace function menu

Function Key	Menu	Function
Page1	Trace	Press Trace to display this page.
F1	Trace Mode	Sets the trace mode. 4.1 "Selecting Trace"
F2	Analysis Time	Sets the analysis time. 4.7.3 "Setting Analysis Time"
F3	Scale	Sets the scale. 4.7.4 "Setting Scale"
F5	Storage	Configures the setting to update and display the trace data. 4.7.6 "Setting Storage Mode"
F6	RBW	Sets the resolution bandwidth. 4.7.5 "Setting Resolution Bandwidth (RBW)"
F7	Detection	Sets the detection mode. 4.7.7 "Setting Detection Mode"
F8	Sub Trace Setting	Sets the sub trace. 4.9 "Sub-Trace"
Page2	Trace	Press Trace, and then press ➔ to display page 2.
F2	Marker	Configures the settings for Marker. 4.7.8 "Setting Marker"

4.7.3 Setting Analysis Time

Press F2 (Analysis Time) on the Trace function menu or press Time/Sweep to display the Analysis Time function menu.

Setting Analysis Time on the Spectrogram trace normalizes a set time that exceeds five valid digits in addition to rounding up by time resolution.

Table 4.7.3-1 Analysis Time function menu

Function Key	Menu	Function
F1	Time (Main Trace) (Auto/Manual)	Sets Auto/Manual for the analysis start time (Analysis Start Time) and the analysis time length (Analysis Time Length).
F2	Start Time (Main Trace)	Sets the time at which the analysis starts.
F3	Time Length (Main Trace)	Sets the length of the time during which the analysis is performed.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

Setting the analysis time

Analysis time is the time during which the analysis is performed. It is set by the analysis start time (Analysis Start Time) and the analysis time length (Analysis Time Length).

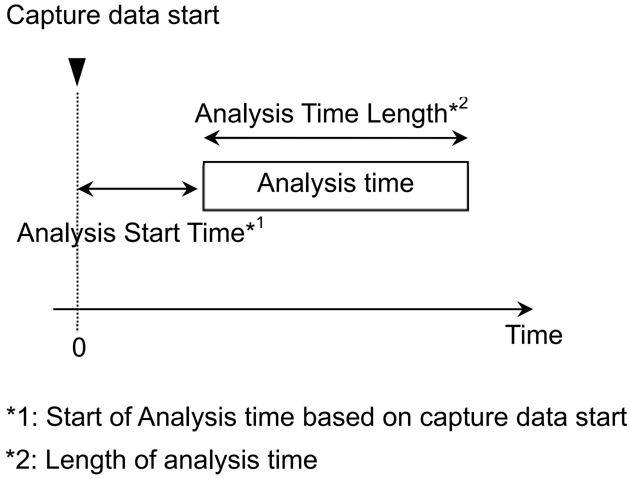


Figure 4.7.3-1 Analysis Time

(1) Auto mode

When Capture Time is set to Auto, 100 ms is set to the analysis time length, and when set to Manual, the capture time length (Capture Time) is set to the analysis time length.

Table 4.7.3-2 Setting the analysis time in Auto mode

Capture Time	Analysis Start Time[s]	Analysis Time Length[s]
Auto	0	0.1
Manual	0	x_1

x_1 : Capture time length[s]

2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

Manual mode allows you to set the analysis start time and the analysis time length manually. It is useful to measure a discontinuous signal such as burst.

<u>Setting range for Analysis Start Time</u>

Table 4.7.3-3 Setting range in Manual mode

Capture Time	Minimum[s]	Maximum[s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1: Analysis time length[s]

x_2: Maximum value of capture time length[s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_3: Capture time length[s]

☞ 2.4 “Setting IQ Data Capture Time Range”

<u>Setting range for analysis time length</u>

Table 4.7.3-4 Setting range in Manual mode

Capture Time	Minimum[s]	Maximum[s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1: Analysis Start Time[s]

x_2: Maximum value of capture time length[s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_3: Capture time length[s]

☞ 2.4 “Setting IQ Data Capture Time Range”

x_4: Capture time length minimum value [s]

☞ 2.4 “Setting IQ Data Capture Time Range”

Note:

The maximum values may be smaller, since those are limited by the resolution of the analysis time length.

Setting resolution of Analysis Start Time

Table 4.7.3-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz *	20 ns
31.25 MHz *	20 ns
50 MHz*	10 ns
62.5 MHz*	10 ns
100 MHz*	5 ns
125 MHz*	5 ns

*: 25 MHz and 31.25 MHz can be set when the MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.7.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Procedure for setting the analysis time

Example: To switch the analysis time to Manual and set the analysis start time to 20 ms and set the analysis time length to 50 ms

<Procedure>

1. Press Time/Sweep.
2. Press F2 (Start Time).
3. Press 2 0 and then press F2 (ms) to set the analysis start time.
4. Press F3 (Time Length).
5. Press 5 0 and then press F2 (ms) to set the analysis time length.

4.7.4 Setting Scale

Scale function menu

On the main function menu, press F5 (Trace) or press Trace, and then press F3 (Scale) to display the Scale function menu.

Table 4.7.4-1 Scale function menu

Function Key	Menu Item	Function
F3	Level Full Scale	Sets the scale range of the level axis.

Example: To set the scale range to 10 dB

<Procedure>

1. Press Trace.
2. Press F3 (Scale).
3. Press F3 (Level Full Scale).
4. Press 1 0 and then Enter to set to 10 dB scale.

Setting range of scale range

Setting range of scale range: 10 to 150 dB / step 10 dB

4

Trace

4.7.5 Setting Resolution Bandwidth (RBW)

On the Trace function menu, press F5 (RBW) or press BW to display the RBW function menu.

Table 4.7.5-1 RBW function menu

Function Key	Menu Item	Function
F1	RBW (Auto/Manual)	Sets Auto/Manual for the resolution bandwidth (RBW).
F2	RBW	Sets the resolution bandwidth (RBW).

The same as the resolution bandwidth of Spectrum trace is set to the resolution bandwidth of Spectrogram trace.
For details, refer to 4.2.5 “Setting resolution bandwidth (RBW)”.

4.7.6 Setting Storage Mode

Press Trace and then press F4 (Storage) to display the Storage function menu.

Table 4.7.6-1 Storage function menu

Function Key	Menu Item	Function
F1	Mode	Sets the mode to update and display the trace data.
F2	Count	Sets the storage count.
F3	Stop	Stops the storage.

Storage Mode

There are four storage modes in Spectrogram trace, as shown below:

Table 4.7.6-2 Storage Mode Type

Mode	Descriptions
Off	At each capture, the trace data are updated and displayed. These data are used for normal measurement.
Lin Average	Averages the data at each point and displays the result, each time it is captured. Used for reducing S/N.
Max Hold	At each capture, the previous and new trace data at each point are compared and the larger of the two is displayed.
Min Hold	At each capture, the previous and new trace data at each point are compared and the smaller of the two is displayed.

Setting the storage mode and the storage count

Example: To set the storage mode to Lin Average and set the storage count to 100

<Procedure>

1. Press [Trace].
2. Press [F4] (Storage).
3. Press [F1] (Mode) and select Lin Average.
4. Press [F2] (Count).
5. Press [1] [0] [0] and then press [F7] (Set) to set the storage count.

Setting range and Minimum setting resolution of storage count

Setting range:	2 to 9999
Minimum setting resolution:	1
Rotary knob resolution:	1 step
Step key resolution:	1 step at the highest 1st digit

4.7.7 Setting Detection Mode

Press [Trace] and then press [F7] (Detection) to select the detection mode.

Type of detection mode

The detection mode can be selected from three options: Average, Positive, and Negative.

Table 4.7.7-1 Detection mode within analysis range

Mode	Descriptions
Average	Traces the average point in the frequency axis and the time axis within the analysis range.
Positive	Traces the maximum point on the frequency axis and the time axis within the analysis range.
Negative	Traces the minimum point on the frequency axis and the time axis within the analysis range.

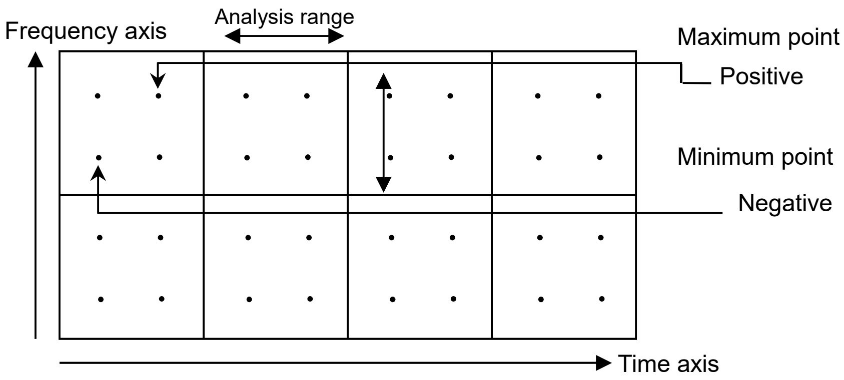


Figure 4.7.7-1 Example of Detection mode

Setting the detection mode

Example: To set the detection mode to Negative
<Procedure>

1. Press [Trace].
2. Press [F7] (Detection) and set Negative.

4.7.8 Setting Marker

This section describes the functions to improve the measurement efficiency of the functions, such as parameter settings by a marker value.

Press F1 (Marker) on page 2 of the Trace function menu or press Marker to display the Marker function menu.

The Marker function menu consists of 2 pages that are toggled by pressing ➔.

Table 4.7.8-1 Marker function menu

Function Key	Menu display	Function
Page1	Marker	Press Marker to display this page.
F1	Active Marker (1/2)	Selects the active marker. Marker (On/Off), Frequency Zone Center, Frequency Zone Width, Time1, and Time2 have their own values in both Marker 1 and 2.
F2	Marker(On/Off)	Displays/Hides the marker set in the active marker.
F3	Frequency Zone Center	Sets the center frequency of the active marker.
F4	Frequency Zone Width	Sets the frequency width of the active marker. It cannot be set when Marker Type is set to Spot.
F5	Time 1	Sets the position of Time Marker 1 of the active marker.
F6	Time 2	Sets the position of Time Marker 2 of the active marker.
F7	Marker Type (Zone/Spot)	Sets the marker type to Zone/Spot. When set to Spot, the spot marker is set at the peak point. When Marker Result is set to Integration or Density, the marker type is fixed to Zone.
F8	Couple Time 1 and 2 (On/Off)	Configures the shared settings between Time and 2. When set to On, Time 1 and 2 can be moved together.
Page2	Marker	Press Marker, and then press ➔ to display page 2.
F1	Marker to Center Freq.	Sets the marker frequency of the active marker to the center frequency in the measurement range.
F2	Marker to Ref. Level	Sets the marker value of the active marker (When Marker Result is Density, the integral power in the band is set.).
F3	Analyze with Spectrum Trace	Analyzes the range selected in Time 1 and 2 of the active marker on Spectrum trace.
F4	Marker Result	Displays the Marker Result function menu. Sets the display mode of the marker values.

Marker Result function menu

Press F4 (Marker Result) on page 2 of the Marker function menu to display the Marker Result function menu.

Table 4.7.8-2 Marker Result function menu

Function Key	Menu	Function
F1	Integration	Displays the total power in the zone band.
F2	Density	Displays the power per 1 Hz in the zone band.
F3	Peak (Fast)	Displays the peak power in the zone quickly.
F4	Peak (Accuracy)	Displays the peak power in the zone accurately.

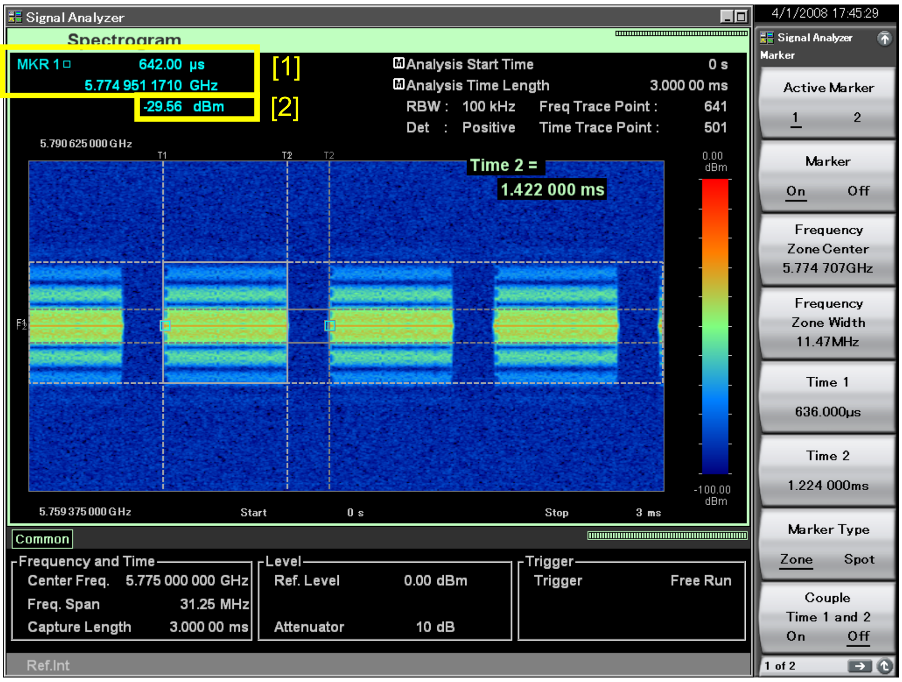


Figure 4.7.8-1 Display items of marker result

Table 4.7.8-3 Display item of marker result

No.	Display	Descriptions
[1]	MRK 1/MKR 2/MKR1□/MKR 2□	Displays the frequency and time of the active marker. When Marker Result is set to Peak, the peak point is displayed as □ on the trace. If the marker is set to active, the peak is displayed as a gray square around a light-blue square in full line. If not, the peak is displayed as a dark gray square in full line.
[2]	Marker Value	Displays the marker value displayed in the mode set in Marker Result.

Setting of Marker Result

The settings of Marker Result are shown below:

Integration:	Displays the total power within the zone maker band.
Density:	Displays the power per 1 Hz within the zone marker width.
Peak (Fast):	Displays the peak power within the zone marker width quickly.
Peak (Accuracy):	Displays the peak power within the zone marker accurately.

Example: To set Marker Result

<Procedure>

1. Press Marker.
2. Press F4 (Marker Result) on page 2 of the Marker function menu and select any of Integration, Density, Peak (Fast), and Peak (Accuracy).

Changing the marker position and width

On Figure 4.7.8-2 below, the frequency markers are displayed as F on the vertical (frequency) axis, and the time markers are displayed as T on the horizontal (time) axis. When Marker Type is set to Zone, the time markers (T1 and T2) are displayed. You can set the position and width of the frequency and time markers on the Marker function menu.

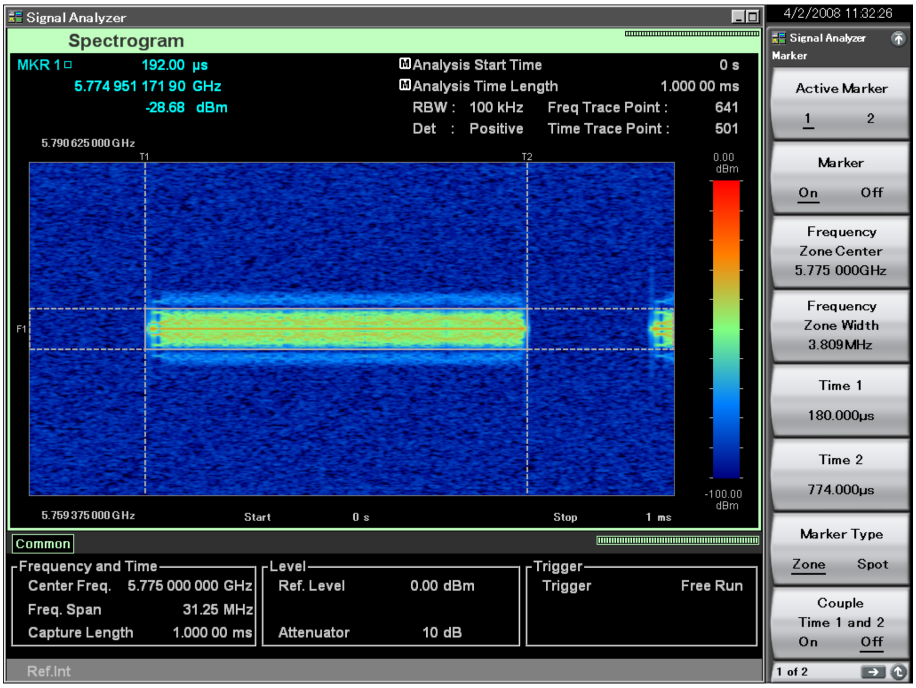


Figure 4.7.8-2 Setting Marker

(1) Changing the position of the frequency marker

Example: To set the position to 5 GHz and set the width to 1 MHz

<Procedure>

1. Press Marker.
2. On the Marker main function menu, press 5 and then press F1 (GHz) to set the center frequency of the frequency marker.
3. On the Marker main function menu, press F4 (Frequency Zone Width).
4. Press 1 and then press F2 (MHz) to set the zone width.

The positions and widths of the other markers can be set in the same way.

(2) Changing the position of the time marker

Example: To set the position of the time marker 1 to 0.6 ms

<Procedure>

1. Press Marker.
2. Press F5 (Time 1) on the Marker main function menu.
3. Press 0 . 6 and then press F2 (ms) to set the position of the time marker.

(3) Selecting the active marker

The position of the active marker can be set by the rotary knob and step key.

Example: To set the active marker

<Procedure>

1. Press Marker.
2. Press F1 (Active Marker) to switch to the marker number which you would like to select.

(4) Selecting Marker Type

The marker type can be set to Zone/Spot. Only when Marker Result is Peak (Fast) or Peak (Accuracy), it can be set to Spot.

Example: To set Marker Type to Zone

<Procedure>

1. Press Marker.
2. Press F7 (Marker Type) to set to Zone.

(5) Selecting Couple Time 1 and 2

Turns On/Off the shared settings of the time markers. When set to On, the time marker 1 and 2 can be moved together.

Example: To set Couple Time 1 and 2 to On

<Procedure>

1. Press Marker.
2. Press F8 (Couple Time 1 and 2) to set to On.

(6) Executing Marker to Center Freq.

Sets the marker frequency to the center frequency (Center Frequency).

Example: To detect the peak power within the measurement bandwidth and set it to the center frequency

<Procedure>

1. Press [Marker].
2. Press [F1] (Marker to Center Freq.) on page 2 of the Marker function menu.

(7) Executing Marker to Ref. Level

Sets the active marker value (the integral power within the band when Marker Result is set to Density) to the reference level.

Example: To detect the position of the peak power within the measurement band to set it the reference level

<Procedure>

1. Press [Marker].
2. Press [F2] (Marker to Ref. Level) on page 2 of the Marker function menu.

(8) Executing Analyze with Spectrum Trace

Analyzes the range selected by time markers 1 and 2 of the active marker using Spectrum trace. After execution, Trace Mode changes to Spectrum.

Example :To analyze the range selected by time markers 1 and 2 of the Spectrum Trace using Spectrum Trace

<Procedure>

1. Press [F5] (Trace) on the main function menu.
2. Press [F1] (Trace Mode).
3. Press [F5] (Spectrogram).
4. Press [Marker].
5. Press [F3] (Analyze with Spectrum Trace) on page 2 of the Marker function page.

After executed, the parameters on Spectrum trace are set to the setting values, as Table 4.7.8-4 shows:

Table 4.7.8-4 Parameter values set after executing Analyze with Spectrum Trace

Parameter on Spectrum trace	Setting Value
RBW Auto/Manual	RBW Auto/Manual on Spectrogram trace
RBW	RBW on Spectrogram trace
Zone Width Type of Marker 1	Marker Type on Spectrogram trace
Marker Result	Marker Result on Spectrogram trace
Time Detection	Detection on Spectrogram trace
Analysis Start Time	Smaller value set in Time 1 and 2 on Spectrogram trace
Analysis Time Length	Absolute value of the difference between Time 1 and 2 on Spectrogram trace
Storage Mode	Storage Mode on Spectrogram trace
Storage Count	Storage Count on Spectrogram trace
Zone Center of Marker 1	Zone Center on Spectrogram trace
Zone Width of Marker 1	Zone Width on Spectrogram trace
Marker Mode of Marker 1	Normal
Analysis Time Auto/Manual	Manual

4.8 No Trace

4.8.1 What is No Trace?

No Trace mode does not execute signal analysis. Therefore, “IQ data output” and “IQ data readout using remote commands” can be executed quickly without the need to wait for completion of analysis. As analysis is not executed, Save Waveform function for saving waveform data cannot be used. For details of Save Waveform functions, refer to “3.6.1 Saving parameters and waveform data” in the *MS2830A Signal Analyzer Operation Manual (Mainframe Operation), MS2840A Signal Analyzer Operation Manual (Mainframe Operation), or MS2850A Signal Analyzer Operation Manual (Mainframe Operation).*

The display items for No Trace are described below.

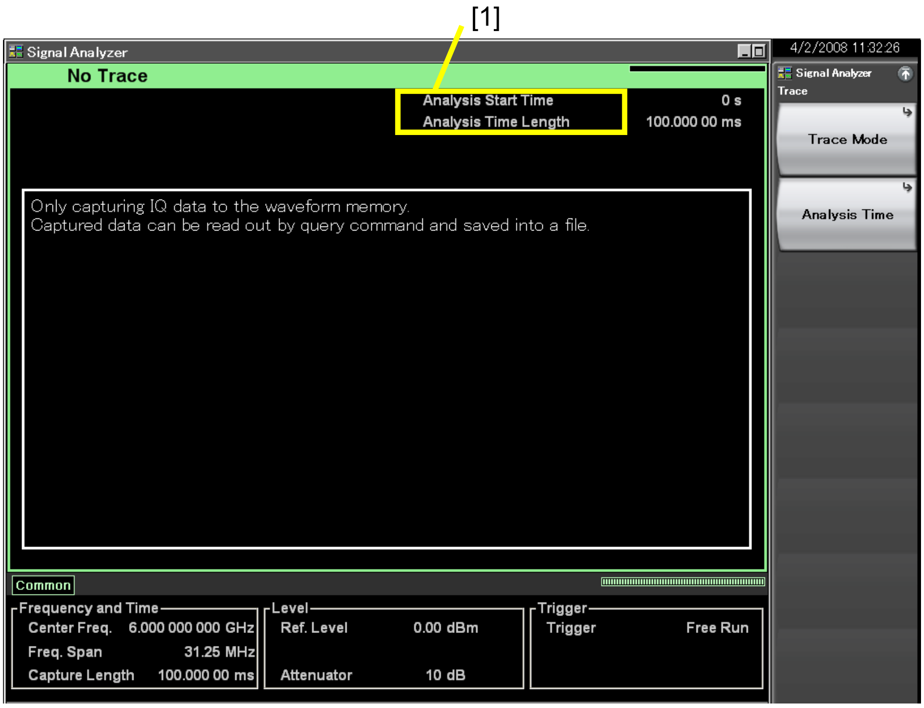


Figure 4.8.1-1 No Trace mode Display Items

Table 4.8.1-1 No Trace mode Display Items

No.	Display	Descriptions
[1]	Analysis Start Time /Analysis Time Length	Displays the analysis start time and the analysis time length.

4.8.2 Setting No Trace parameters

Press F5 (Trace) or press Trace on the main function menu of the No Trace to display Trace function menu.

☞ 4.1 “Selecting Trace”

Table 4.8.2-1 Trace function menu

Function Key	Menu	Function
F1	Trace Mode	Sets the trace mode. ☞ 4.1 “Selecting Trace”
F2	Analysis Time	Sets the analysis time. ☞ 4.8.3 “Setting Analysis Time”

4.8.3 Setting Analysis Time

Press F2 (Analysis Time) on the Trace function menu or press Time/Sweep to display the Analysis Time function menu.

Table 4.8.3-1 Analysis Time function menu

Function Key	Menu	Function
F1	Time (Main Trace) (Auto/Manual)	Sets Auto/Manual for the analysis start time (Analysis Start Time) and the analysis time length (Analysis Time Length).
F2	Start Time (Main Trace)	Sets the time at which the analysis starts.
F3	Time Length (Main Trace)	Sets the length of the time during which the analysis is performed.

Setting the analysis time

Analysis time is the time during which the analysis is performed. If No Trace is selected as the Trace mode, then analysis is not executed. Analysis time setting may, however, be required in outputting IQ data. It is set by the analysis start time (Analysis Start Time) and the analysis time length (Analysis Time Length).

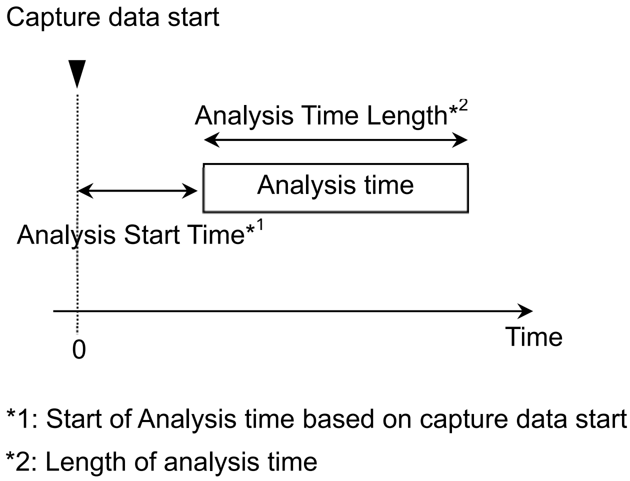


Figure 4.8.3-1 Analysis Time

(1) Auto mode

When Capture Time is set to Auto, 100 ms is set to the analysis time length, and when set to Manual, the capture time length (Capture Time) is set to the analysis time length.

Table 4.8.3-2 Setting the analysis time in Auto mode

Capture Time	Analysis Start Time[s]	Analysis Time Length[s]
Auto	0	0.1
Manual	0	x_1

x_1 : Capture time length[s]

2.4 “Setting IQ Data Capture Time Range”

(2) Manual mode

Manual mode allows you to set the analysis start time and the analysis time length manually.

Setting range for Analysis Start Time

Table 4.8.3-3 Setting range in Manual mode

Capture Time	Minimum[s]	Maximum[s]
Auto	0	$x_2 - x_1$
Manual	0	$x_3 - x_1$

x_1 : Analysis time length[s]

x_2 : Maximum value of capture time length[s]

☞ 2.4 "Setting IQ Data Capture Time Range"

x_3 : Capture time length[s]

☞ 2.4 "Setting IQ Data Capture Time Range"

Setting range for analysis time length

Table 4.8.3-4 Setting range in Manual mode

Capture Time	Minimum[s]	Maximum[s]
Auto	x_4	$x_2 - x_1$
Manual	x_4	$x_3 - x_1$

x_1 : Analysis Start Time[s]

x_2 : Maximum value of capture time length[s]

☞ 2.4 "Setting IQ Data Capture Time Range"

x_3 : Capture time length[s]

☞ 2.4 "Setting IQ Data Capture Time Range"

x_4 : Capture time length minimum value [s]

☞ 2.4 "Setting IQ Data Capture Time Range"

Note:

The maximum value may be less than this value due to the restrictions imposed by the trace point.

Setting resolution of Analysis Start Time

Table 4.8.3-5 Frequency Span and Setting Resolution

Frequency Span	Setting Resolution
1 kHz	0.5 ms
2.5 kHz	0.2 ms
5 kHz	0.1 ms
10 kHz	50 μs
25 kHz	20 μs
50 kHz	10 μs
100 kHz	5 μs
250 kHz	2 μs
500 kHz	1 μs
1 MHz	0.5 μs
2.5 MHz	0.2 μs
5 MHz	0.1 μs
10 MHz	50 ns
25 MHz*	20 ns
31.25 MHz*	20 ns
50 MHz*	10 ns
62.5 MHz*	10 ns
100 MHz*	5 ns
125 MHz*	5 ns

*: 25 MHz and 31.25 MHz can be set when the MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.
The resolution is displayed up to three decimal digits. (Example: 0.769 ns)

Table 4.8.3-5 Frequency Span and Setting Resolution (Cont'd)

Frequency Span	Setting Resolution
50 MHz	160 ns
62.5 MHz	160 ns
100 MHz	80 ns
125 MHz	80 ns
255 MHz	40 ns
510 MHz*	20 ns
1 GHz*	10 ns

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

<u>Procedure for setting the analysis time</u>

Example: To switch the analysis time to Manual and set the analysis start time to 20 ns and set the time length to 2 μs

<Procedure>

1. Press Time/Sweep.
2. Press F2 (Start Time).
3. Press 2 0 and then press F4 (ns) to set the analysis start time.
4. Press F3 (Time Length).
5. Press 2 and then press F3 (μs) to set the analysis time length.

4.9 Sub-Trace

4.9.1 What is Sub Trace?

A sub-trace can be displayed as an aid to the normal trace (main trace). Select either Power vs Time or Spectrogram as the sub-trace to display the trace data for any time range. Displaying the sub-trace allows the analysis range of the main trace to be confirmed and set while checking on two screens.

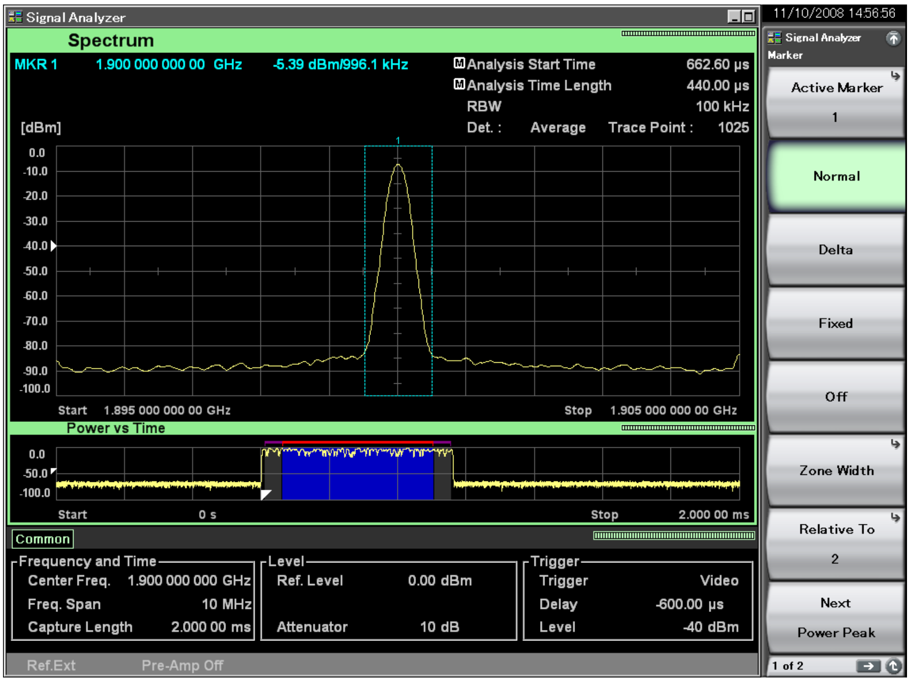


Figure 4.9.1-1 Sub Trace

4.9.2 Setting parameters for Sub Trace

Pressing F5 (Trace) on the main function menu or pressing Trace displays the Trace function menu. Pressing F8 (Sub Trace Setting) on the Trace function menu displays the Sub Trace Setting function menu. This section describes how to set parameters for a sub-trace.

Table 4.9.2-1 Sub Trace Setting function menu

Function Key	Menu Display	Function
F1	Trace Mode	Sets the sub-trace type. 4.9.3 “Selecting Sub Trace”
F2	Analysis Time	Used for setting related to the analysis time. 4.9.4 “Setting analysis time”
F3	Scale	Used for setting related to the scale. 4.9.5 “Setting scale”
F5	RBW	Used for setting related to RBW. This menu display is not displayed if a sub-trace is not set to Spectrogram. 4.9.6 “Setting resolution bandwidth (RBW)”
F7	Detection	Used for setting related to detection. 4.9.7 “Setting detection mode”

Note:

F2 to F7 are not displayed if F1 Trace Mode is set to Off.

4.9.3 Selecting Sub Trace

Pressing F1 (Trace Mode) on the Sub Trace Setting function menu displays the Trace Mode (Sub Trace) function menu. This section describes how to set sub-trace types.

Table 4.9.3-1 Trace Mode (Sub Trace) function menu

Function Key	Menu Display	Function
F1	Off	Does not display a sub-trace.
F2	Power vs Time	Sets the sub-trace to Power vs Time.
F3	Spectrogram	Sets the sub-trace to Spectrogram. However, this setting is disabled when Scale Mode is set to Lin.

4.9.4 Setting analysis time

Pressing F2 (Analysis Time) on the Sub Trace Setting function menu displays the Analysis Time (Sub Trace) function menu. This section describes how to set the analysis time for a sub-trace. When the sub-trace is set to Power vs Time or Spectrogram, you can set the analysis time of the sub-trace.

Table 4.9.4-1 Analysis Time (Sub Trace) function menu

Function Key	Menu Display	Function
F1	Time (Main Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and the analysis time length (Analysis Time Length).
F2	Start Time (Main Trace)	Sets the analysis start time.
F3	Time Length (Main Trace)	Sets the analysis time length.
F5	Time (Sub Trace) (Auto/Manual)	Switches between auto mode and manual mode for the analysis start time (Analysis Start Time) and analysis time length (Analysis Time Length) of a sub-trace.
F6	Start Time (Sub Trace)	Sets the analysis start time of a sub-trace.
F7	Time Length (Sub Trace)	Sets the analysis time length of a sub-trace.

When both Analysis Time and Capture Time are set to Auto, the analysis start time and the analysis time length are the same as those of the main trace.
When Capture Time is set to Manual and when Analysis Time is set to Auto, the analysis start time is set to the minimum value and the time length is set to the maximum value.

The setting ranges and resolutions of the analysis start time and the analysis time length are the same as those of the main trace.

Setting analysis time

The Analysis Start Time and Analysis Time Length of the main trace are highlighted within the sub-trace for easier viewing.

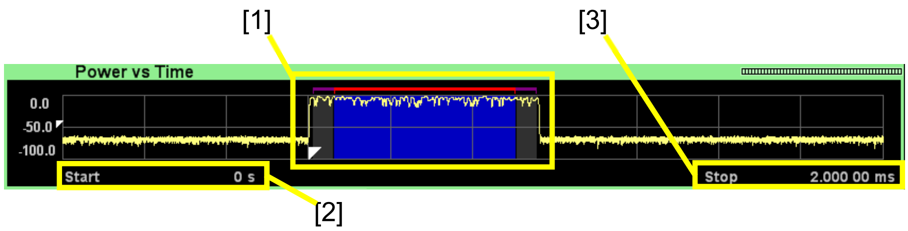


Figure 4.9.4-1 Analysis time display in Sub-trace

Table 4.9.4-2 Display items for sub-trace

No.	Descriptions
[1]	Displays the analysis time. The analysis time length is indicated by a red line for emphasis. In addition, if the main trace is a spectrum, the range of IQ data captured to be used for FFT is indicated by a purple line outside of this red line. See Appendix D "FFT and RBW" for relationships between the analysis time and the captured data. ☞ Appendix D "FFT&RBW" When measuring a burst signal, you might want to display a spectrum with the rising and falling of the signal hidden. To display such a spectrum, set the analysis time so that the purple line of the IQ data range does not reach the rising and falling of the signal.
[2]	Displays analysis start time.
[3]	Displays analysis end time.

Note:

This highlight displays the same when sub-trace is set to Spectrogram.

4.9.5 Setting scale

Pressing F3 (Scale) on the Sub Trace Setting function menu displays the Scale (Sub Trace) function menu. This section describes how to set the scale range for a sub-trace.

Table 4.9.5-1 Scale function menu

Function Key	Menu Display	Function
F3	Level Full Scale	Sets the scale range of the level axis. The Level Full Scale setting value applies to the entire level axis. For instance, when Level Full Scale is set to 100 dB, trace data can be displayed within the range of 100 dB.

Example: To set the scale range to 10 dB

<Procedure>

1. Press Trace.
2. Press F8 (Sub Trace Setting) to open the Sub Trace Setting function menu.
3. Press F3 (Scale).
4. Press F3 (Level Full Scale).
5. Press 1 0, and then press Enter to set to 10 dB scale.

Table 4.9.5-2 Setting Range

Scale	Setting range
Log Scale	10 to 150 dB / step 10 dB
Lin Scale	10, 20, 50, 100%

4.9.6 Setting resolution bandwidth (RBW)

Pressing F5 (RBW) on the Sub Trace Setting function menu displays the RBW (Sub Trace) function menu. This setting is enabled only when the sub-trace is set to Spectrogram.

Table 4.9.6-1 RBW (Sub Trace) function menu

Function Key	Menu Display	Function
F1	RBW (Auto/Manual)	Switches between auto mode and manual mode for the resolution bandwidth.
F2	RBW	Sets the resolution bandwidth.

The setting range and the resolution for the resolution bandwidth in a sub-trace are set to the same values as when Marker Result is set to Integration on Spectrum trace.

For details, refer to 4.2.5 "Setting resolution bandwidth (RBW)".

4.9.7 Setting detection mode

Pressing F7 (Detection) on the Sub Trace Setting function menu displays the Detection function menu. Select with the cursor key, and set with F7 (Set) or Enter. This section describes the detection mode of a sub-trace.

Table 4.9.7-1 Detection modes in Detection menu

Detection mode	Descriptions
Average	Traces the average value within the analysis range.
Positive	Traces the maximum value within the analysis range. The peak value of a signal near the noise level is measured in Positive mode.
Negative	Traces the minimum value within the analysis range. Negative is used to measure the lower envelope of the modulation waveform.
Pos & Neg	Displays the line connecting the maximum and minimum values of the sampling points within the analysis range. Used for normal measurement. This mode is not displayed if Trace Mode is set to Spectrogram.

For details of the detection mode when a sub-trace is set to Power vs Time or when it is set to Spectrogram, refer to 4.3.8 “Setting detection mode” or 4.7.7 “Setting Detection Mode”, respectively.

Chapter 5 Digitize Function

This chapter describes how to save IQ data to external memory and data file formats and how to replay the saved IQ data.

5.1 Saving IQ Data

Pressing F7 (Capture) from the main function menu and then pressing F3 (Save Captured Data) displays the Save Captured Data function menu.

Note:

IQ data should be saved or digitized after a single sweeping has been executed and ended, even when trigger function is used.

Table 5.1-1 Save Captured Data

Function Key	Menu Display	Function
F1	Device	Selects the location of the file to be saved.
F2	File Name	Sets the name of the file to be saved.
F3	Output Rate	Sets the rate of the output data. The rate of the output data is fixed to the sampling rate in waveform capture when Capture Time is set to Auto. Changes the rate of the output data when Capture Time is set to Manual.
F4	Time Range	Sets the specification method of the time range for the IQ data to be saved.
F5	Start Time	Sets the start time of the IQ data to be saved when Time Range is set to Manual. Full: Saves all IQ data that are obtained. Parts of IQ data that are obtained for calculation and are not displayed on the trace data are also saved. Select this to analyze the same range in the Replay function. Analysis Time: Saves the IQ data for the range specified by Analysis Start Time and Analysis Time Length. Select this to save IQ data for the range displayed as trace data. Manual: Saves the IQ data for the range specified by Start Time and Time Length of Save Captured Data.
F6	Time Length	Sets the time length of the IQ data to be saved when Time Range is set to Manual.
F7	Exec Digitize	Executes saving.
F8	Close	Closes the Save Captured Data function menu.

The IQ data stored in the internal memory at the time of execution of this function is saved to the external memory.

Example: To save IQ data

<Procedure>

1. Press F7 (Capture) from the main function menu.
2. Press F3 (Save Captured Data).
3. Press F1 (Device) from the Save Captured Data function menu, and then select the destination drive.
4. Press F2 (File Name) to specify the file name.
5. Press F7 (Exec Digitize) to save.

Saving Files

When save processing is executed, the following files are created.

- “[File Name].dgz” Data file (binary format)
- “[File Name].xml” Data information file (XML format)

The IQ data row is saved to the data file. The information on the saved data is saved to the data information file.

Automatically named as “Digitize date sequential number” when omitted. A 2-digit sequential number from 00 to 999 is added to the file name.

Files are saved in the following directory of the saving target drive specified by F1 (Device).

\Anritsu Corporation\Signal Analyzer\User Data\Digitized Data\Signal Analyzer

Up to 1000 files can be saved in the folder.

The rate of the output data when Capture Time is set to Manual can be changed.

The setting range of the output data rate and the resolution change according to the frequency span are as shown in Table 5.1-2.

Table 5.1-2 Frequency span and setting resolution/setting range

Frequency span	Setting resolution	Minimum	Maximum
1 kHz	1 Hz	1 kHz	2 kHz
2.5 kHz	1 Hz	2 kHz	5 kHz
5 kHz	1 Hz	5 kHz	10 kHz
10 kHz	1 Hz	10 kHz	20 kHz
25 kHz	1 Hz	20 kHz	50 kHz
50 kHz	1 Hz	50 kHz	100 kHz
100 kHz	1 Hz	100 kHz	200 kHz
250 kHz	1 Hz	200 kHz	500 kHz
500 kHz	10 Hz	500 kHz	1 MHz
1 MHz	10 Hz	1 MHz	2 MHz
2.5 MHz	10 Hz	2 MHz	5 MHz
5 MHz	100 Hz	5 MHz	10 MHz
10 MHz	100 Hz	10 MHz	20 MHz
25 MHz *	100 Hz	20 MHz	50 MHz
31.25 MHz *	100 Hz	20 MHz	50 MHz
50 MHz *	1 kHz	50 MHz	100 MHz
62.5 MHz *	1 kHz	50 MHz	100 MHz
100 MHz *	1 kHz	100 MHz	200 MHz
125 MHz *	1 kHz	100 MHz	200 MHz

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077, MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078, MS2840A-078/178 is installed.

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.

Table 5.1-2 Frequency span and setting resolution/setting range (Cont'd)

Frequency Span	Setting Resolution	Minimum Value	Maximum Value
50 MHz	1 kHz	50 MHz	81.25 MHz
62.5 MHz	1 kHz	50 MHz	81.25 MHz
100 MHz	1 kHz	81.25 MHz	162.5 MHz
125 MHz	1 kHz	81.25 MHz	162.5 MHz
255 MHz	1 kHz	162.5 MHz	325 MHz
510 MHz*	1 kHz	325 MHz	650 MHz
1 GHz*	1 kHz	650 GHz	1.3 GHz

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Example: To save W-CDMA signal (Chip Rate: 3.84 MHz) for 10 ms with an oversampling rate of 15.36 MHz, which is four times of the chip rate.

<Procedure>

1. Press Span.
2. Press 1 0, and then press F2 (MHz) to set the frequency span to 10 MHz.
3. Press to return to the main function menu.
4. Press F7 (Capture).
5. Press 1 0, and then press F2 (ms) to set the capture length to 10 ms.
6. Press F3 (Save Captured Data).
7. Press F4 (Time Range) and then press F2 (Analysis Time).8. Press to return to the main function menu.
9. Press F3 (Output Rate).
10. Press 1 5 . 3 6 and then press F2 (MHz) to set the output rate to 15.36 MHz.
11. Press Single.
12. Press F7 (Exec Digitize) to save the IQ data.

5.1.1 Format of data information file

The information on the saved IQ data is recorded in the data information file. Table 5.1.1-1 shows the details of the recorded parameters.

Table 5.1.1-1 Format of data information file

Item	Description
CaptureDate	Year/Month/Day of the captured data in the "DD/MM/YYYY" format.
CaptureTime	Data capture time in the "HH/MM/SS" format.
FileName	Data file name
Format	Data format, fixed to "Float"
CaptureSample	Number of samples of the recorded data [Sample]
Condition	Error status of the recorded data. "Normal": Normal "OverLoad": Level Over
TriggerPosition	Trigger occurrence position [Sample] Start point of the recorded data is 0.
CenterFrequency	Center frequency [Hz]
SpanFrequency	Frequency span [Hz]
SamplingClock	Sampling rate [Hz]
PreselectorBandMode	Frequency band switch mode. "Normal": Normal mode "Spurious": Spurious mode ☞ 2.2.5 "Setting frequency band"
ReferenceLevel	Reference level [dBm] Note that this value does not include the reference level offset.
AttenuatorLevel	Attenuator value [dB]
InternalGain	Internal gain value [dB] This is an internal parameter.
PreAmp	6 GHz Preamplifier gain value [dB]
IQReverse	IQ reverse setting, fixed to "Normal"
TriggerSwitch	Trigger On/Off. "FreeRun": Trigger is not used "Triggered": Trigger is used

Table 5.1.1-1 Format of data information file (Cont'd)

Item	Description
TriggerSource	Trigger source "Video": Video trigger "WideIF": Wide IF video trigger "External": External trigger 1 "External 2": External trigger 2 "SGMarker": SG marker trigger
TriggerLevel	Trigger level [dBm] Note that this value does not include the reference level offset. It is in dBm units, even if the scale mode is Lin.
TriggerDelay	Trigger delay time [s] It is the relative time from the trigger input position to the start point of the recorded data.
IQReference0dBm	Reference IQ amplitude value indicating 0 dBm, fixed to "1".
ExternalReferenceDisp	Reference signal information "Ref.Int": Internal reference signal "Ref.Ext": External reference signal "Ref.Int Unlock": Internal reference signal is unlocked "Ref.Ext Unlock": External reference signal is unlocked
Correction Factor	Corrected value [dB] calculated by Correction. The Correction Factor value is added to the IQ data of the data file. 0.000 is automatically set when Correction is Off.
Terminal	Signal Input "RF" :RF terminal "DigRF 3G":DigRF 3G terminal
ReferencePosition	0-second reference position Indicates the 0-second reference position using the digitized data point position. During Replay function execution, the ReferencePosition position is displayed as 0 s.
Trigger Slope	Selects the edge where the trigger is generated (rise or fall). "Rise": rising edge "Fall": falling edge

5.1.2 Format of data file

The data file is created in binary format. From the beginning of the file, I-phase data and Q-phase data are recorded by 4 bytes. The I-phase data and Q-phase data are recorded as a float type (IEEE real*4).

Beginning of the file →

I-phase data 1	(4 bytes)
Q-phase data 1	(4 bytes)
I-phase data 2	(4 bytes)
Q-phase data 2	(4 bytes)
I-phase data 3	(4 bytes)
Q-phase data 3	(4 bytes)

⋮

Figure 5.1.2-1 Format of data file

IQ data can be converted to power based on the following formula:

$$P = 10Log_{10}\left(I^2 + Q^2\right)$$

where

P: Power [dBm]

I: I-phase data

Q: Q-phase data

5.2 Replay Function

The Replay function allows you to replay the saved IQ data. Pressing F7 (Capture) on the main function menu and then F4 (Replay) displays the Replay function menu.

Table 5.2-1 Description of Replay function menu

Function Key	Menu Display	Function
F1	Device	Selects the drive of the target file.
F2	Application	Selects the application used for saving the target file.
F7	Select File	Selects the target file. After the file has been selected, the Replay function is executed.
F8	Close	Closes the Replay function menu.

5.2.1 Starting Replay function

Start the Replay function using the following procedure.

Example: To start the Replay function

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F4 (Replay) on the Capture function menu.
3. Press F1 (Device) on the Replay function menu to select the drive in which the target file is stored.
4. Press F2 (Application) to select the application used for saving the target file.
5. Press F7 (Select File) to display the file selection dialog. After the target file has been selected, the Replay function starts and then **Replaying** appears on the screen.

The Replay function can be executed for an IQ data file saved in the following applications:

- Signal Analyzer function *1
- Extended Digitizing Software *1, *2

*1: The Replay function cannot be executed for an IQ data file saved after the output rate has been changed. In that case, an error message “Unsupported SpanFrequency” appears.

*2: Regarding an IQ data file whose span is 18.6 MHz or 20 MHz, the span is displayed as 25 MHz.

Reanalysis of Digitized File

When the target IQ data is saved with Save Captured Data of this application, it can be analyzed in the same range as the analysis range when the data was saved, by setting the Capture Time to Manual.

Note:

IQ data files that have been saved with the previous version cannot be analyzed in the same range as the analysis range when they were saved.

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Set F1 (Capture Time) to Manual on the Capture function menu.
3. Press F3 (Save Captured Data).
4. Press F1 (Device) on the Save Captured Data function menu to select the drive in which to save the IQ data.
5. Press F2 (File Name) to set the target file.
6. Select Full in F4 (Time Range).
7. Press Single.
8. Press F7 (Exec Digitize) to save the IQ data.

The Replay function cannot be executed if the data length of the IQ data file is less than the specified length.

5.2.2 Display During Replay Function Execution

Replay Error Info. appears if the IQ data file meets the following conditions:

- Frequency reference is Unlocked when IQ data is saved
- Level Over occurs when IQ data is saved

5.2.3 Restrictions During Replay Function Execution

Since the signals to be analyzed are fixed during replay, the following functions are restricted.

Table 5.2.3-1 Functions Restricted During Replay

Function
Center Frequency
Start Frequency
Stop Frequency
Span Frequency
Frequency Band Mode
Attenuator
Attenuator Auto/Manual
Pre Amp
Trigger Switch
Trigger Source
Trigger Slope
Trigger Delay
Video Trigger Level
Wide IF Trigger Level
Continuous Measurement
Single Measurement
Capture Time Auto/Manual
Capture Time Length
Marker to Center Frequency
Storage Mode
Storage Count
Storage Stop
Reset Result Every Capture
Noise Cancel
Adjust Reference Clock
Adjust Reference Clock Preset
Erase Warm Up Message
Switching Speed
Trigger Hold
Micro Wave Preselector Bypass

Also, during replay, the reference level setting range is as follows, regardless of the attenuator and preamplifier.

Table 5.2.3-2 Reference level range with Replay function on.

Scale mode	Unit	Reference Level Range
Log scale	dBm	–120 to +50 dBm
	dBμV	–13.01 to +156.99 dBμV
	dBmV	–73.01 to +96.99 dBmV
	V	0.224 μV to 70.7 V
	W	1 fW to 100 W
	dBμV (emf)	–6.99 to +163.01 dBμV (emf)
	dBμV/m	–13.01 to +156.99 dBμV/m
Linear Scale (in dBm)	V	22.4 μV to 70.7 V (–80 to +50 dBm)

dBm: Unit system where 1 mW/50 Ω is regarded as 0 dBm

dBμV: Unit system where 1 μV is regarded as 0 dBμV. Indicated by termination voltage with 50 Ω terminator.

dBmV: Unit system where 1 mV is regarded as 0 dBmV. Indicated by termination voltage with 50 Ω terminator.

dBμV (emf): Unit system in dBμV, indicated by open voltage. The value is “dBμV + 6 dB”.

dBμV/m: Unit system indicating electric field intensity. The value is the same as the dBμV unit system.

Since data range is reserved during replay for the range required for calculation to execute replay, the actual range for which analysis can be executed is narrower than the range of the IQ data file.

The analysis range is set by using either of the following remote commands:

`:MMEMory:LOAD:IQData:INFormation?`

or

`:MMEMory:LOAD:IQData:INFormation:LENGth?.`

5.2.4 Condition of IQ Data File for Replay

The condition of IQ data files for which replay analysis is possible is as follows.

Format of waveform data file: I, Q (Binary format)

Table 5.2.4-1 lists the combinations of frequency span and sampling rate for which analysis is possible.

Table 5.2.4-1 Frequency Span and Sampling Rate

Frequency Span	Sampling Rate
1 kHz	2 kHz
2.5 kHz	5 kHz
5 kHz	10 kHz
10 kHz	20 kHz
25 kHz	50 kHz
50 kHz	100 kHz
100 kHz	200 kHz
250 kHz	500 kHz
500 kHz	1 MHz
1 MHz	2 MHz
2.5 MHz	5 MHz
5 MHz	10 MHz
10 MHz	20 MHz
18.6 MHz	20 MHz
20 MHz	25 MHz
25 MHz *	50 MHz
31.25 MHz *	50 MHz
50 MHz *	100 MHz
62.5 MHz *	100 MHz
100 MHz *	200 MHz
125 MHz *	200 MHz

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.

5

Digitize Function

The following table shows the setting range for the MS2850A when frequency span is 50 MHz or higher.

Table 5.2.4-1 Frequency Span and Sampling Rate (Cont'd)

Frequency Span	Sampling Rate
50 MHz	81.25 MHz
62.5 MHz	81.25 MHz
100 MHz	162.5 MHz
125 MHz	162.5 MHz
255 MHz	325 MHz
510 MHz*	650 MHz
1 GHz*	1.3 GHz

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table 5.2.4-2 lists the minimum data length settings (Capture Sample) for which analysis is possible.

Table 5.2.4-2 Minimum Data Length

CaptureSample	Frequency Span
74000	1 kHz
160000	2.5 kHz
310000	5 kHz
610000	10 kHz
730000	Other than the above

Notes:

- The replay function cannot be executed if the data length (Capture Sample) of the IQ data file is less than the length required for analysis.

- It is recommended to configure the settings below, in order to replay IQ data saved by the Signal Analyzer functions.

  - To set Capture Time to Manual.
  - To set Time Range to Full.
  - To set Output Rate to the maximum value.

5.2.5 Stopping Replay function

Stop the Replay function using the following procedure.

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F5 (Stop Replaying).

5.3 Playback Function

The Playback function converts the captured data into waveform patterns and outputs them by loading into the vector signal generator option. Press F7 (Capture) in the Main function menu, and then press F6 (Capture & Playback) in the Capture function menu to display the Playback function menu.

Note:

When Time Length of Trace Analysis Time is set to 0 s, the Playback function cannot be used because F6 (Capture & Playback) is disabled.

Table 5.3-1 Description of Playback function menu

Function Key	Menu Display	Function
Page 1	Playback	Displayed when pressing F6 (Capture & Playback).
F1	Package	Sets a package name for the waveform patterns into which the captured data is converted.
F2	Pattern Name	Sets a name for the waveform patterns into which the captured data is converted.
F3	Burst	Turns On/Off the RF Gate automatic setting function, regarding the Off interval of burst waveform as no signal output instead of modulation wave.
F4	Burst Off Threshold	Sets the burst off threshold for the RF Gate automatic setting.
F5	Minimum Burst Off Length	Sets the minimum length of Off interval of the burst wave. (Specifies the time length during which the signal level is not judged as Off interval when it goes below the threshold owing to modulation.)
F7	Exec Capture & Playback	Executes Capture & Playback.
F8	Close	Goes back to Capture Function Menu.
Page 2	Playback	Displayed when pressing F6 (Capture & Playback) and then →.
F1	Ramp	Turns On/Off the function to add a ramp (moderate change) to the waveform start and end for the purpose of preventing spectrum from spreading.
F2	Ramp Length	Sets the ramp length.
F8	Close	Goes back to Capture Function Menu.

Package

Default Playback

Available characters Alphanumeric characters and the following symbols

! % & ( ) + = ' { } _ - ^ @ [ ]

Character number 31 characters at maximum

Pattern Name

Default Same as Saving Files in 5.1 "Saving IQ Data".

Available characters Alphanumeric characters and the following symbols

! % & ( ) + = ' { } _ - ^ @ [ ]

Character number 20 characters at maximum

Burst

Options On/Off

Default On

Burst Off Threshold

Range –80.00 to 0.00 dB

Resolution 0.01 dB

Default –40 dB

Minimum Burst Off Length

Range 0 to (Time Length or 50000 samples, whichever smaller)

Resolution Time Resolution

Default Time Resolution×10

Unit s, ms, μs, ns

- When the span is changed, it is reset to default.
- When the time length is changed, it is reset to default.
- When the time length is 0, it is fixed to 0.

Ramp

Options On/Off

Default Off

Ramp Length

Range 0 to (Time Length or 50000 samples, whichever smaller)

Resolution Time Resolution

Default Time Resolution×10

Unit s, ms, μs, ns

- When the span is changed, it is reset to default.
- When the time length is changed, it is reset to default.
- When the time length is 0, it is fixed to 0.

Note:

Time Length: The set value for F3 Time Length in Table 4.2.3-1 Analysis Time function menu is used here.

Time Resolution: The value is decided as in Table 4.2.3-5 Frequency span and resolution.

5.3.1 Starting Playback function

Start the Playback function using the following procedure :

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F6 (Capture & Playback) on the Capture function menu.

Note:

An error message appears and Playback is not performed in the cases below.

- The application of vector signal generator option is not loaded.
- Free space in HDD or SSD (C or D drive) is insufficient.

Drive	Free Space Required
C	dgz file size to output × 2
D	dgz file size to output × 2

3. Sets a package name for waveform patterns by pressing F1 (Package) in the Playback function menu.
4. Press F2 (Pattern Name) and specify a waveform pattern name.
5. Press F7 (Exec Capture & Playback).

   At the upper right of the menu bar of the Signal Analyzer application, the Capture & Playback dialog box is displayed to show the status by icon and progress bar.

Note:

After converting data into waveforms by Playback function, the frequency and level for the vector signal generator option will be rounded up/down as below when they are out of setting range.

- Frequency and level are above the limit :
  Rounded down to the upper limit.
- Frequency and level are below the limit :
  Rounded up to the lower limit.

For the setting range of the vector signal generator option, refer to 1.3 “Specifications” in the *MS2830A/MS2840A Signal Analyzer Operation Manual (Vector Signal Generator Function Operation)*.

6. Signal is output from the vector signal generator option.

5.3.2 Display During Playback Function Execution

While executing Playback function, the Capture & Playback function menu and the Capture & Playback dialog box are displayed.

Table 5.3.2-1 Description of Capture & Playback function menu

Function Key	Menu Display	Function
F8	Cancel	Aborts the execution of Playback function.

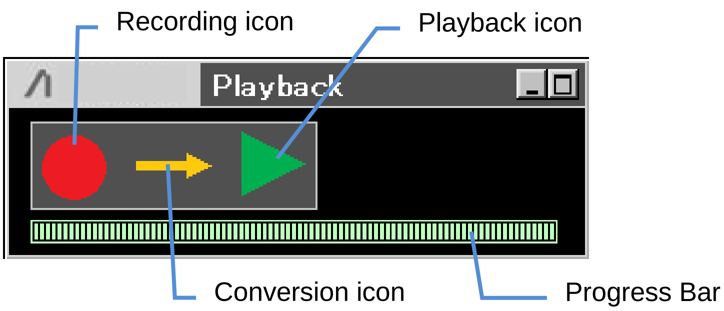
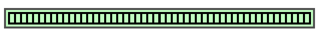


Figure 5.3.2-1 Capture & Playback Dialog box

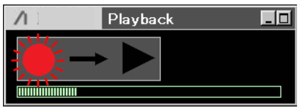
Table 5.3.2-2 Capture & Playback Icon

Display	Name	Function
	Recording icon	Blinking: Saving captured data is in progress. Lighting: Saving captured data is completed.
	Conversion icon	Blinking: Converting captured data into waveform patterns is in progress. Lighting: Converting captured data into waveform patterns is completed.
	Playback icon	Blinking: Loading waveform patterns into the vector signal generator option is in progress. Lighting: Outputting signals from the vector signal generator option is in progress.
	Progress Bar	Recording icon is blinking: Displays the progress in saving captured data. Conversion icon is blinking: Displays the progress in converting captured data into waveform patterns. Playback icon is blinking: Displays the progress in loading waveform patterns into the vector signal generator option. Aborted: Displays the progress in aborting.

Execute Capture & Playback

⇩

Saving Captured Data

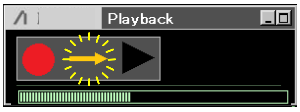


Recording icon blinking

Displays progress

⇩

Converting into Waveform Patterns

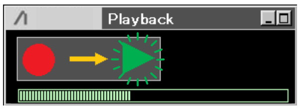


Playback icon blinking

Displays progress

⇩

Loading Waveform Patterns into Memory of Vector Signal Generator Option

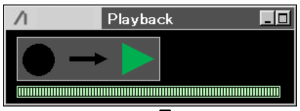


Playback icon blinking

Displays progress

⇩

Output Waveform Patterns (Select loaded waveform patterns)



Playback icon lighting

Displays progress 100%

⇩

Capture & Playback Completed

Figure 5.3.2-2 Capture & Playback icon transition

5.3.3 Aborting Playback function

While executing Playback function, pressing F8 (Cancel) in the Capture & Playback function menu can abort the operation.

The processing of generated data files differs depending on the aborted timing of Playback function.

Saving captured data in progress

Aborts saving captured data.

Converting into waveform patterns

Aborts converting into waveform patterns, and deletes the files and waveform patterns that have been partially converted. (The captured data already saved will not be deleted.)

Loading waveform patterns

Aborts loading waveform patterns and resets the vector signal generator option to the status before loading. (Captured data and fully-converted waveform patterns will not be deleted.)

Chapter 6 System Setting

This chapter describes how to save IQ data to external memory and data file formats and how to replay the saved IQ data.

6.1 Setting System

Pressing F8 (Accessory) from the main function menu displays the Accessory function menu.

Table 6.1-1 Accessory function menu

Function Key	Menu Display	Function
F1	Title	Specifies the title. ☞ 6.3 “Setting Title”
F2	Title (On/Off)	Sets whether to display the title. ☞ 6.3 “Setting Title”
F4	Erase Warm Up Message	Forcefully erases the warmup message display. ☞ 6.2 “Erasing Warm up Message”
F6	Reference Clock	Adjusts the internal reference clock signal. ☞ 6.4 “Adjusting Internal Reference Clock Signal”
F7	Preselector	Opens the Preselector function menu. ☞ 6.7 “Setting Preselector”

6.2 Erasing Warm up Message

If the warm up message (Warm Up) indicating that the level and frequency are not stable is displayed upon power on, the message can be forcefully erased.

Setting example: Erasing the warm up message
<Procedure>

1. Press F8 (Accessory) from the main function menu.
2. Press F4 (Erase Warm Up Message) to erase the warm up message.

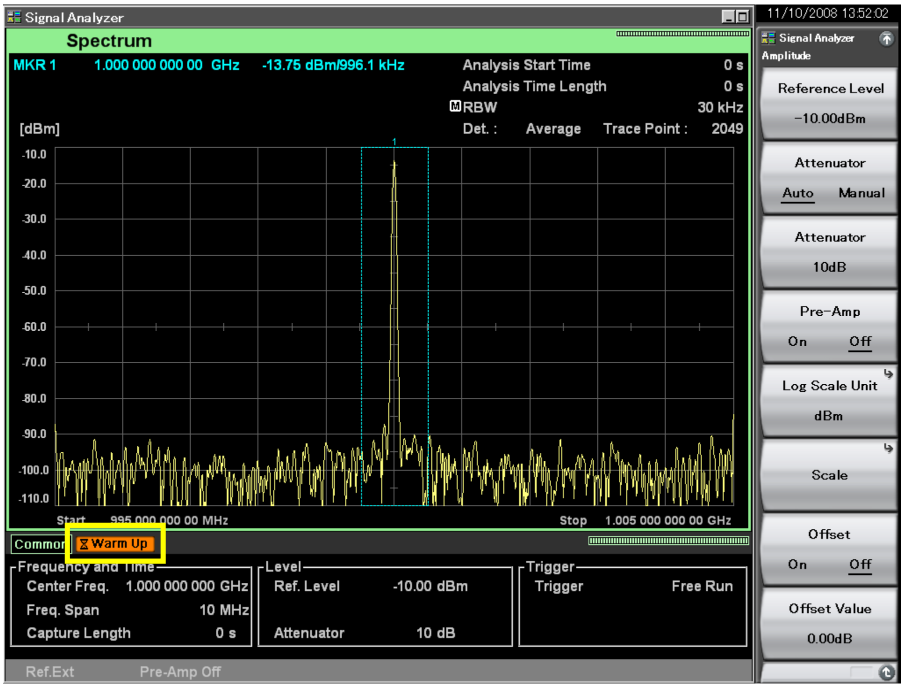


Figure 6.2-1 Warm up message

6.3 Setting Title

Settings related to the title displayed on the screen can be configured. For the Signal Analyzer function, a title of up to 32 characters can be displayed on the screen. (Character strings of up to 17 characters can be displayed on a function menu.)

Example: To set the title

<Procedure>

1. Press F8 (Accessory) from the main function menu.
2. Press F1 (Title) to display the character string input screen. Select a character using the rotary knob, and enter it by pressing Enter. Enter the title by repeating this operation.
3. When the title is entered, press F7 (Set).

Note:

Pressing F2 (Title On/Off) can show or hide the title.

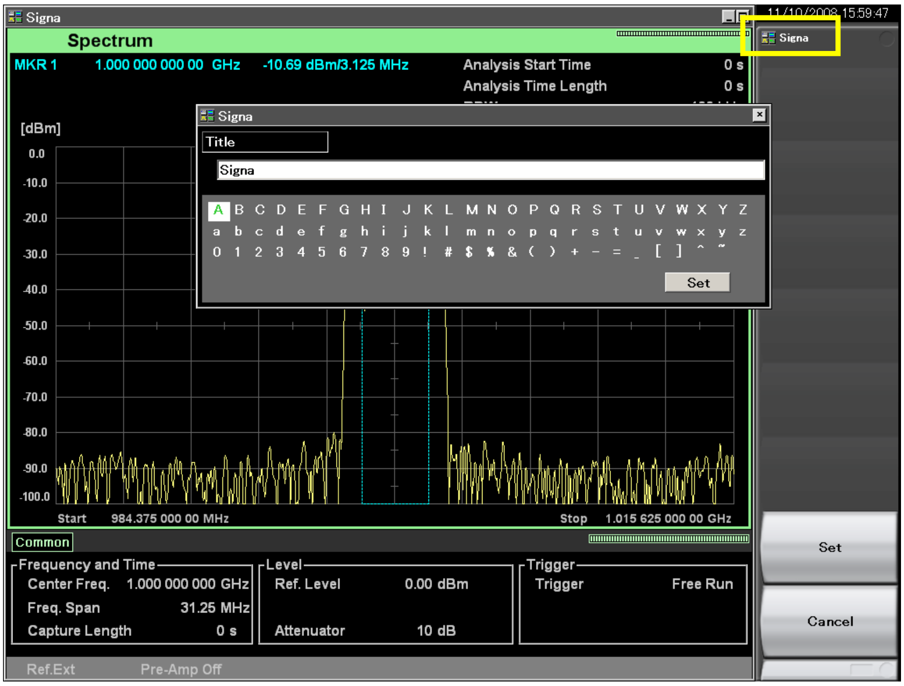


Figure 6.3-1 Setting title

6.4 Adjusting Internal Reference Clock Signal

Pressing F6 (Reference Clock) from the Accessory function menu displays the Reference Clock function menu.

Table 6.4-1 Reference Clock function menu

Function Key	Menu Display	Function
F1	Reference Clock	Adjusts the frequency of the internal reference clock signal.
F2	Reference Clock Preset	Resets the Reference Clock to the factory-default value.

Example: To adjust the reference clock.

<Procedure>

1. Press F8 (Accessory) from page 1 of the main function menu.
2. Press F6 (Reference Clock) and then press F1 (Reference Clock) to adjust the frequency of the internal reference clock signal.

6.5 Input Source for Reference Clock Signal

The reference clock signal used is displayed on the screen.

Ref.Int: The internal reference clock signal is used.

Ref.Int Unlock: The internal reference clock signal is unlocked. The internal hardware may be faulty.

Ref.Ext: The external reference clock signal is used.

Ref.Ext Unlock: Not in sync with the external reference clock signal. Check the reference signal input to the Ref Input connector.

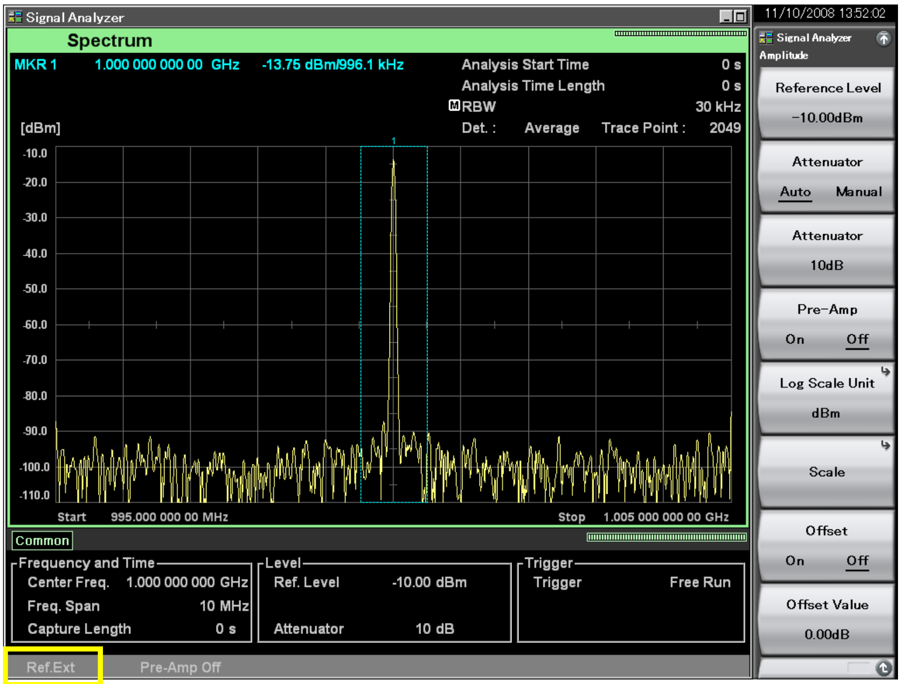


Figure 6.5-1 Input source for reference clock signal

6.6 Pre-Amp On/Off Display

If the MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 pre-amp is installed, whether the pre-amp is on or off is displayed at the lower left of the screen.

☞ 2.3.6 “Pre Amp”

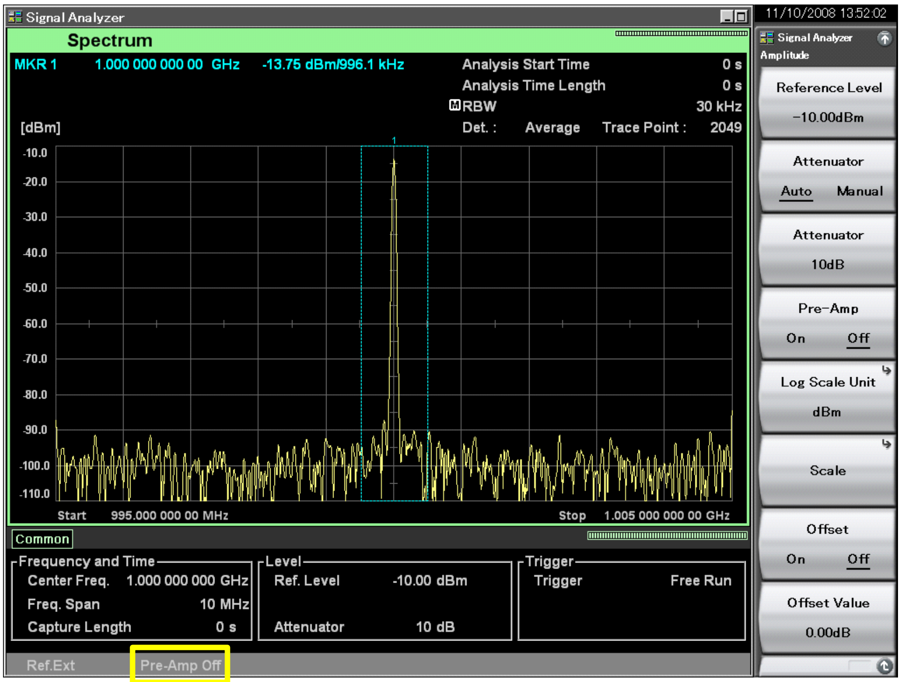


Figure 6.6-1 Pre-Amp display

6.7 Setting Preselector

Performs settings to tune preselector.
This function is available for MS2830A-044/045, MS2840A-044/046, and MS2850A-047/046.

Pressing F7 (Preselector) from the Accessory function menu displays the Preselector function menu.

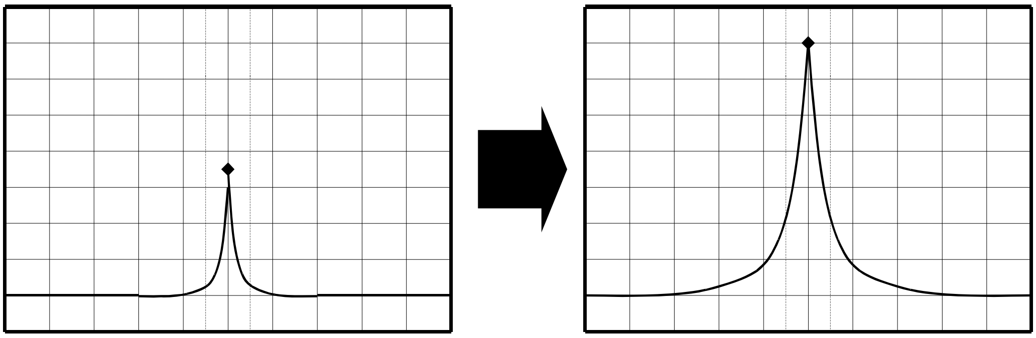
You can also execute the Preselector Auto Tune function by pressing F5 (Preselector Auto Tune) on the Frequency function menu.

Table 6.7-1 Preselector function menu

Function keys	Menu display	Function
F1	Preselector Auto Tune	Auto-tunes preselector. ☞ 6.7.1 “Preselector auto tuning”
F2	Manual	Manually tunes preselector. ☞ 6.7.2 “Preselector manual tuning”
F3	Preselector Tune Preset	Sets the preselector peaking bias value to factory defaults.

The MS2830A-044/045, MS2840A-044/046, MS2850A-047/046 are a superheterodyne spectrum analyzer, so spurious responses such as image responses and multiple responses occur for the reception frequencies over 6 GHz. To eliminate the spurious responses to display only the real signal on the screen, the MS2830A, MS2840A, MS2850A uses a preselector. The preselector is a tunable band-pass filter that follows the reception frequency of the analyzer.

The preselector is set up to obtain tuning at each frequency in normal use. However, if the tuning frequency is not correct, the reception level becomes low, as shown in the left figure, below. To obtain the maximum response as shown in the right figure, below, preselector tuning frequency adjustment (preselector tuning) must be performed.



The state in which preselector tuning is incorrect

The state in which preselector tuning is optimal

Figure 6.7-1 Preselector auto tune

For preselector tuning, use an unmodulated signal. If a modulation signal is used, proper tuning may not be executed.

Before the measurement of a modulation signal, input an unmodulated signal from the signal generator for preselector tuning in advance.

6.7.1 Preselector auto tuning

Tunes the preselector peaking bias value automatically, and performs the preselector auto tuning.

Preselector auto tuning is not available in the following condition.

- Option 007/067/167 is installed and Preselector Bypass is ON.
- Frequency Span is ≥ 50 MHz.
- Frequency Band Mode is Normal and Center Frequency is ≤ 6.0 GHz
- Frequency Band Mode is Spurious and Center Frequency is ≤ 4.0 GHz

Example: To perform preselector auto tuning when the measurement signal is an unmodulated signal

<Procedure 1>

1. Press Frequency.
2. Press F5 (Preselector Auto Tune).

<Procedure 2>

1. Press F8 (Accessory) on the page 1 of main function menu.
2. Press F7 (Preselector), and then press F1 (Preselector Auto Tune) .

6.7.2 Preselector manual tuning

Sets the preselector peaking bias value to tune the preselector manually.

Example: To perform preselector manual tuning

<Procedure>

1. Press F6 (Accessory) on Page 1 on the main function menu.
2. Press F7 (Preselector), and then press F2 (Manual).
3. Use rotary knob or cursor key to tune the peaking bias to make the signal indication level maximum.

Range: –128 to 127 MHz

Resolution: 1 MHz

Press F3 (Preselector Tune Preset) to return to factory defaults.

Chapter 7 External Mixer

This section describes the operation of the external mixer and measurement procedure using examples.

7.1 External Mixer Overview

External Mixer function is MS2830A-044/045, MS2840A-044/046, MS2850A dedicated function.
The frequency range of MS2830A-044/045, MS2840A-044/046, MS2850A extends up to 325 GHz by using optional external mixer. MA2806A, MA2808A, and MA2743C to 51C are products designed for exclusive use with MS2830A , MS2840A, or MS2850A.

Table 7.1-1 External Mixer (High Performance Waveguide Mixer)

Model	Name	Frequency range	Waveguide flange
MA2806A	High Performance Waveguide Mixer (50 to 75 GHz)	50 to 75 GHz	UG-385/U
MA2808A	High Performance Waveguide Mixer (60 to 90 GHz)	60 to 90 GHz	UG-387/U

To set parameters of High Performance Waveguide Mixer, use the Spectrum Analyzer function of the mainframe.
For details, refer to Chapter 8 “External Mixer” in the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)*.

Table 7.1-2 External Mixer (Harmonic Mixer)

Model	Name	Frequency range	Waveguide flange
MA2743C	Harmonic Mixer	40 to 60 GHz	MIL-DTL-3922/67D-007
MA2744C	Harmonic Mixer	50 to 75 GHz	MIL-DTL-3922/67D-008
MA2745C	Harmonic Mixer	60 to 90 GHz	MIL-DTL-3922/67D-009
MA2746C	Harmonic Mixer	75 to 110 GHz	MIL-DTL-3922/67D-010
MA2747C	Harmonic Mixer	90 to 140 GHz	MIL-DTL-3922/67D-M08
MA2748C	Harmonic Mixer	110 to 170 GHz	MIL-DTL-3922/67D-M06
MA2749C	Harmonic Mixer	140 to 220 GHz	MIL-DTL-3922/67D-M05
MA2750C	Harmonic Mixer	170 to 260 GHz	MIL-DTL-3922/67D-M04
MA2751C	Harmonic Mixer	220 to 325 GHz	MIL-DTL-3922/67D-M03

You can also apply other external mixers from other suppliers to cover frequency range up to 325 GHz.

Applicable mixer	Two-port mixer
Local frequency	5 GHz to 10 GHz
IF frequency	1875 MHz

7.2 External Mixer

Press F1 (Frequency) in Page 1 of the main function menu, or press Frequency to display the Frequency function menu.
Then press → (more) to show the second page of the Frequency function menu for External Mixer settings.

Table 7.2-1 Frequency function menu

Function keys	Menu display	Function
Page 1	Frequency	Press **Frequency** to display this menu.
F1	Center	Sets the center frequency. 2.2.1 "Setting center frequency"
F2	Start	Sets the start frequency. 2.2.3 "Setting start frequency"
F3	Stop	Sets the stop frequency. 2.2.4 "Setting stop frequency"
F4	Span*1	Sets the frequency span. 2.2.2 "Setting frequency span"
F5	Preselector Auto Tune	Auto-tunes preselector. This function is available with MS2830A-044/045 or MS2840A-044/046. 6.7 "Setting Preselector"
F6	Switching Speed	Sets the frequency switching speed. 2.2.6 "Switching speed"
F7	Step Size	Sets the step size for center, start and stop frequency. 2.2.7 "Setting step size"
F8	Frequency Band Mode (Spurious/Normal)	Selects frequency band mode (Spurious or Normal). This function is available with MS2830A-041/043/044/045 or MS2840A-041/044/046. 2.2.5 "Setting frequency band"

*1: Maximum setting of Span is 510 MHz when High Performance Waveguide Mixer is selected.

Table 7.2-1 Frequency function menu (Cont'd)

Function keys	Menu display	Function
Page 2	Frequency	Press **Frequency**, and then press ➔ to display this menu.
F1	External Mixer*2 (On/Off)	Turn on when using external mixer. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. To set parameters of High Performance Waveguide Mixer, use the Spectrum Analyzer function of the mainframe. Chapter 8 "External Mixer" in the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)*
F2	External Mixer Band Select	Opens the Ext Band Select menu. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is available when External Mixer is turned On. 7.4 "Setting Band of External Mixer"
F3	External Mixer Bias	Sets the External Mixer Bias. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is not available when High Performance Waveguide Mixer is selected, or External Mixer is turned Off. 7.5 "Setting External Mixer Bias"
F4	External Mixer Loss	Sets the External Mixer Loss. This function is available with MS2830A-044/045, MS2840A-044/046, or MS2850A. This function is not available when High Performance Waveguide Mixer is selected, or External Mixer is turned Off. 7.6 "Setting Conversion Loss of External Mixer"
F8	Micro Wave Preselector Bypass (On/Off)	Enables/Disables the Micro Wave Preselector Bypass function. This function is available with MS2830A-007/067/167, MS2840A-067/167, or MS2850A. This function is not available when External Mixer is turned On. 1.3.13 "MS2830A-067/167", 1.3.14 "MS2830A-007" in the *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*, 1.3.15 "MS2840A-067/167" in the *MS2840A Signal Analyzer Operation Manual (Mainframe Operation), or* 1.3.6 "MS2850A-067" in the *MS2850A Signal Analyzer Operation Manual (Mainframe Operation).*

*2: The following restrictions apply when External Mixer is On:

- Spurious Emission measurement cannot be set to On. Conversely, in Spurious Emission measurement mode, External Mixer cannot be set to On.
- Sweep Type Rule is fixed to Swept Only.
- ATT cannot be used.
- Preselector function menu becomes unavailable.
- Pre-AMP is fixed to OFF.
- Microwave Preselector Bypass cannot be set.

7.3 Connecting External Mixer

1. Fix the external mixer to the device under test.
2. Using the coaxial cable (commercially available), connect the external mixer to the 1st Local Output on the front panel.

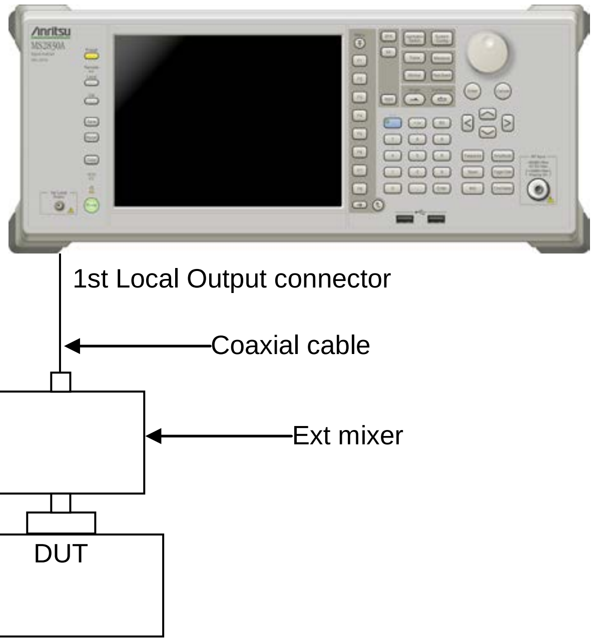


Figure 7.3-1 External Mixer Connection

Notes:

- To connect an external mixer, choose a low insertion loss coaxial cable especially in the range of local frequency from 5 to 10 GHz and also at 1875 MHz IF frequency.
- Tighten the SMA connector by the regulation torque.

7.4 Setting Band of External Mixer

To set the band, perform the following key operation:
Press F2 (External Mixer Band Select) on Page 2 of the Frequency function menu, and use the function keys to select the desired band.

Table 7.4-1 Ext Band Select function menu

Function keys	Menu display	Function
Page 1	Ext Band Select	Press F2 (External Mixer Band Select) on Page 2 of the Frequency function menu.
F1	Band V+ High Performance 50-75 GHz	High Performance Waveguide Mixer Band VHP Mixing order (n) 8+
F2	Band E– High Performance 60-90 GHz	High Performance Waveguide Mixer Band EHP Mixing order (n) 12–
F4	Band A+ 26.5-40 GHz	Harmonic Mixer Band A+ Mixing order (n) 4+
F5	Band Q+ 33-50 GHz	Harmonic Mixer Band Q+ Mixing order (n) 5+
F6	Band U+ 40-60 GHz	Harmonic Mixer Band U+ Mixing order (n) 6+
F7	Band V+ 50-75 GHz	Harmonic Mixer Band V+ Mixing order (n) 8+
F8	Band E+ 60-90 GHz	Harmonic Mixer Band E+ Mixing order (n) 9+
Page 2	Ext Band Select	Press F2 (External Mixer Band Select), and then press ➔ to display this menu.
F1	Band W+ 75-110 GHz	Harmonic Mixer Band W+ Mixing order (n) 11+
F2	Band F+ 90-140 GHz	Harmonic Mixer Band F+ Mixing order (n) 14+
F3	Band D+ 110-170 GHz	Harmonic Mixer Band D+ Mixing order (n) 17+
F4	Band G+ 140-220 GHz	Harmonic Mixer Band G+ Mixing order (n) 22+
F5	Band Y+ 170-260 GHz	Harmonic Mixer Band Y+ Mixing order (n) 26+
F6	Band J+ 220-325 GHz	Harmonic Mixer Band J+ Mixing order (n) 33+

When selecting the Band V+ High Performance 50-75 GHz, the MS2830A/MS2840A/MS2850A should be combined with the High Performance Waveguide Mixer (50 to 75 GHz).
When selecting the Band E– High Performance 60-90 GHz, the MS2830A/MS2840A/MS2850A should be combined with the High Performance Waveguide Mixer (60 to 90 GHz).

The below equation shows the measurable side band phase noise on the selected band.

Sideband phase noise = –95 + 20 log (n) dBc, typical value

Measurement of Band F+ to J+ is made possible in conjunction with other manufacture's external mixer.

When using High Performance Waveguide Mixer, select the band by using the Spectrum Analyzer function of the mainframe. For details, refer to Chapter 8 "External Mixer" in the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)*.

7.5 Setting External Mixer Bias

Sets the External Mixer Bias.

Press F3 (External Mixer Bias) on Page 2 of the Frequency function menu, and use the numeric keypad or rotary knob to input so that the received signal level becomes maximum. The displayed value indicates the biased current (mA).

Setting range: 0.0 to 20.0 mA
Resolution: 0.1 mA

Notes:

- The conversion loss varies depending on the mixer bias.
- Adjust according to your external mixer.
- The External Mixer Bias is fixed to 0.0 mA when High Performance Waveguide Mixer is used.

7.6 Setting Conversion Loss of External Mixer

To set the conversion loss of the external mixer, perform the following operations:
Press F4 (External Mixer Loss) on Page 2 of the Frequency function menu, and use rotary knob to input.

If correct level measurement is necessary, input the value which was calibrated with power meter.

Setting range: 0.00 to 99.99 dB
Resolution: 0.01 dB

By default, this unit is adjusted to display the level that is derived from adding the input level of the IF frequency signal for CW (1875 MHz) to the 1st Local Output connector and the external mixer's conversion loss value.

When using High Performance Waveguide Mixer, set the conversion loss of the external mixer using the Spectrum Analyzer function. For details, refer to Chapter 8 “External Mixer” in the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)*.

Appendix A Error Message

Table A-1 Error Messages

Message	Description
Out of range	The settable range is exceeded.
Not available if not Vector Signal Generator option.	This operation is invalid when the vector signal generator option is not installed.
Not available if Zone Width is same as Zoom Width.	This operation is invalid when Zone Width is equal to Zoom Width.
Not available in Marker Off.	This operation is invalid in the Marker Off state.
Not available in Marker 1 or 2 Off.	This operation is invalid when either Marker1 or Marker2 is Off.
Not available in overlapping Marker 1 and Marker 2.	This operation is invalid when Marker1 and Marker2 overlap.
Not available if not Nyquist or Root Nyquist filter.	This operation is invalid when Nyquist filter or Root Nyquist filter is not selected.
Not available in Lin Scale.	This operation is invalid when Scale Mode is set to “Linear” (Lin scale).
Not available in Log Scale.	This operation is invalid when Scale Mode is set to “Log” (Log scale).
Not available if not executing storage.	This operation is invalid when storage is not being executed.
Not available in Trace Off.	This operation is invalid in the Trace Off state.
Not available in Free Run.	This operation is invalid in the Free Run state.
Not available in SG Marker Trigger.	This operation is invalid when SG Marker Trigger is used.
Not available if not re-capture after changing common parameter.	This operation is invalid when recapture is not executed after common parameter change.
Not available over the maximum number of characters.	This operation is invalid because the maximum number of characters has been exceeded.
Not available if not Pre-Amplifier option.	This operation is invalid when Option 008/108/068/168/069/169 Pre-amplifier is not installed.
Not available unless Main Trace is Power vs Time.	This operation is invalid when the main trace is not Power vs Time.
Not available unless Main Trace is Frequency vs Time.	This operation is invalid when the main trace is not Frequency vs Time.
Not available unless Main Trace is CCDF.	This operation is invalid when the main trace is not CCDF.
Not available unless Main Trace is Spectrum or Frequency vs Time.	This operation is invalid when the main trace is not Spectrum or Frequency vs Time.
Not available unless Main Trace is Power vs Time or Frequency vs Time.	This operation is invalid when the main trace is not Power vs Time or Frequency vs Time.
Not available if Main Trace is CCDF or Phase vs Time or No Trace.	This operation is invalid when the main trace is not CCDF, Power vs Time or No Trace.
Not available if Main Trace is CCDF or Spectrogram or No Trace.	This operation is invalid when the main trace is CCDF, Spectrogram or No Trace.
Not available if Main Trace is CCDF or Spectrogram or Phase vs Time or No Trace.	This operation is invalid when the main trace is CCDF, Spectrogram, Phase vs Time or No Trace.

Table A-1 Error Messages (Cont'd)

Message	Description
Not available if Main Trace is Spectrum.	This operation is invalid when the main trace is Spectrum.
Not available if Main Trace is CCDF or No Trace.	This operation is invalid when the main trace is CCDF or No Trace.
Not available unless Main Trace is Spectrum or CCDF.	This operation is invalid when the main trace is not Spectrum or CCDF.
Not available unless Main Trace is Power vs Time or CCDF.	This operation is invalid when the main trace is not Power vs Time or CCDF.
Not available if Main Trace is Spectrum or CCDF.	This operation is invalid when the main trace is Spectrum or CCDF.
Not available unless Main Trace is Spectrum or Power vs Time.	This operation is invalid when the main trace is not Spectrum or Power vs Time.
Not available under the minimum displaying frequency range.	This operation is invalid because the display frequency range will exceed the lower limit value.
Not available in Storage Mode Off.	This operation is invalid when Storage Mode is Off.
Not available over the maximum displaying time range.	This operation is invalid because the display frequency range will exceed the upper limit value.
Not available in Center Frequency under 1kHz.	This operation is invalid because the center frequency is less than 1 kHz.
Not available in Measure Method APD.	This operation is invalid when Measure Method is set to APD.
Not available if not Storage Mode Off.	This operation is invalid when Storage Mode is not set to Off.
Not available if not executing Single measurement.	This operation is invalid when Single measurement is not performed.
Not available during measurement.	This operation is invalid during measurement.
Not available in Frequency Span 1kHz.	This operation is invalid when Frequency Span is set to 1 kHz.
Limited due to Capture Time.	The operation is limited due to Capture Time.
Not available if Zoom Width equals to Frequency Span.	This operation is invalid when Zoom Width is equal to Frequency Span.
Not available for invalid Digitizer parameter.	This operation is invalid because a digitize function parameter has an error.
Not available if not input save file name.	This operation is invalid when save file name is not input.
Not available in already saved the maximum number of files in the selected device.	This operation is invalid when the number of files already registered in the specified device has reached the maximum.
Not available because model name is not match.	This operation is invalid because the specified model name does not match.
Not available because option configuration is not match.	This operation is invalid because the option configuration does not match.
Not available in Capture Time Manual.	This operation is invalid when Capture Time is set to Manual.
Reached to the Zoom limit.	The limit of Zoom is reached.
Reached to the Zoom Out limit.	The limit of Zoom Out is reached.

Table A-1 Error Messages (Cont'd)

Message	Description
Not available if not Pre-selector lower frequency expansion option.	This operation is invalid when the preselector lower frequency extension option is not installed.
Can not set under 4 dB with Step Key and Encoder. Please Input with Numeric Key.	Use the numeric keypad when entering an attenuator less than 4 dB.
Not available when Save Captured Data isn't executed.	This operation is invalid when Save Captured Data is not executed.
Unable to set when Analysis Start Time reached its limit.	This operation is invalid when Analysis Start Time is set to the maximum.
Unable to set when Analysis Time Length reached its limit.	This operation is invalid when Analysis Time Length is set to the maximum.
Invalid Button.	Invalid key operation.
Not available when Detection isn't set to Pos&Neg.	This operation is invalid when Detection is set to other than Pos&Neg.
Standard Parameter isn't found.	Standard parameter was not found.
Not available when Standard is set to OFF.	This operation is invalid when Standard is set to Off.
Not available when Capture Time is set to Auto.	This operation is invalid when Capture Time is set to Auto.
Search error.	Search error
Disk is full.	Free disk capacity is insufficient.
Media not found.	Media was not found.
File not found.	File was not found.
Read/Write error.	Read/Write failed.
Format error.	Media is not converted into a format.
File Open error.	File Open failed.
File Close error.	File Close failed.
Unable to set any Digitizer parameter while waveform is read out.	It is unable to set any Digitizer parameter while waveform is read out.
Hardware setting failure.	Hardware setting failed.
Signal not found.	No signal has been entered.
Not available in frequency band without the Preselector pass frequency band.	It is not available while any band other than Preselector pass frequency band is used.
Not available during Save Captured Data.	It is not available while executing Save Captured Data.
Not available in ACP and Burst Average Power Off.	It is not available when ACP and Burst Average Power are set to Off.
Not available in ACP Off.	It is not available when ACP is set to Off.
Not available in Burst Average Power Off.	It is not available when Burst Average Power is set to Off.
Not available in Standard Off.	It is not available when Standard is set to Off.
Not available when unsupported Standard Parameter is selected.	Standard Parameter does not support the noise canceling function.
Not available when Load Standard Parameter isn't executed.	It is necessary to execute Load Standard Parameter.
Not available while executing Noise Measurement.	It cannot be changed or modified during noise measurement.

Table A-1 Error Messages (Cont'd)

Message	Description
Not available when ACP Reference is set to Span Total.	It is not available when ACP Reference is set to Span Total.
Not available when Freq. Span is 50 MHz or more.	The setting is impossible when Freq. Span is 50 MHz or more.
Not available in Measure On.	The operation is invalid while Measure is set to On.
Not available in Zone Width Type Spot.	The operation is invalid while Zone Width Type is set to Spot.
Not available when active marker is set to Off or Fixed.	The operation is invalid while Active Marker is set to Off or Fixed.
The active marker cannot be set.	Active marker cannot be set.
The target marker cannot be set.	Target marker cannot be set.
Unable to return to Spectrogram.	It is unable to return to Spectrogram.
Not available in Marker Type Spot.	This operation is invalid when Marker Type is set to Spot.
Not available if Main Trace is CCDF or Spectrogram.	This operation is invalid when the main trace is CCDF or Spectrogram.
Not available if Main Trace is No Trace.	This operation is invalid when the main trace is No Trace.
Not available if Main Trace is Spectrum or Spectrogram or No Trace.	This operation is invalid when the main trace is Spectrum or Spectrogram or No Trace.
Not available when Analysis Start Time is set to 0 s, Analysis Time Length is set to 0 s, and Capture Time is set to Auto.	This operation is invalid when Analysis Start Time is 0 s, Analysis Time Length is 0 s , and Capture Time is Auto.
Not available if Main Trace is Spectrogram or No Trace.	This operation is invalid when the main trace is Spectrogram or No Trace.
Not Available in "Application Name" Application.	This operation is invalid when Application is "Application Name" status.
Unsupported SpanFrequency.	The frequency span is not supported.
Unsupported SamplingClock.	The sampling rate is not supported.
Not available while executing replay function.	This operation is invalid while the Replay function is being executed.
Only available while replaying.	This operation is invalid unless the Replay function is executed.
DGZ file error.	Loading an IQ data file has failed.
Selected item is empty.	There is no selectable file in this folder.
Unable to set Standard Parameter with different span while replaying.	Standard Parameter with a different span cannot be set while the Replay function is being executed.

Table A-1 Error Messages (Cont'd)

Message	Description
Unable to set this Standard Parameter while replaying.	This standard parameter cannot be set while the Replay function is being executed.
Unable to set this Standard Parameter since Capture Time Length is short.	This Standard Parameter cannot be set since Capture Time Length is not sufficient.
Shortage of data samples in IQ data file.	Analysis cannot be performed because the number of data samples of the IQ data file is less than the minimum number of data samples required for analysis.
Not available if Capture Time Length equals to zero.	This operation is invalid when Capture Time Length is 0.
Not available if Analysis Time Length equals to zero.	This operation is invalid when Analysis Time Length is 0.
Not available if Time Range is set to Full or Analysis Time.	This operation is invalid when Time Range is Full or Analysis Time.
Unable to set when Time Length reached its limit.	This operation is invalid when Time Length is set to the maximum.
Unable to set when Start Time reached its limit.	This operation is invalid when Start Time is set to the maximum.
Not available if Sub Trace is Off.	This operation is invalid when the sub trace is set to Off.
Not available unless Sub Trace is Off.	This operation is invalid unless the sub trace is set to Off.
Not available if Sub Trace is Spectrogram.	This operation is invalid when the sub trace is set to Spectrogram.
Not available unless Sub Trace is Spectrogram.	This operation is invalid unless the sub trace is set to Spectrogram.
Unable to set when Analysis Time Length (Sub Trace) reached its limit.	This operation is invalid when Analysis Time Length (Sub Trace) is set to the maximum.
Unable to set when Analysis Start Time (Sub Trace) reached its limit.	This operation is invalid when Analysis Start Time (Sub Trace) is set to the maximum.
Not available in APD method.	This operation is invalid when Measure Method is APD.
Not available when Trigger Source is set to Video.	The operation is invalid when Trigger Source is set to Video.
Not available when CCDF Meas Mode is set to Time.	This operation is invalid when CCDF Meas Mode is set to Time.
Not available when Gate Mode is set to Off.	This operation is invalid when the gate mode is set to Off.
Cannot set all Ranges to Off at the same time.	This operation cannot set all ranges to Off at the same time.
Not available if Phase Mode is wrap.	This operation is invalid when the phase mode is set to wrap.
Invalid character.	—

Table A-1 Error Messages (Cont'd)

Message	Description
Not available in External Mixer On.	The following restrictions will apply when External Mixer is set to On. • Spurious Emission measurement cannot be set to On. • Sweep Type Rule is fixed to Swept Only. • ATT cannot be set. (fixed to 60 dB.) • Preselector function menu becomes unavailable. • Pre-AMP is fixed to OFF. • Microwave Preselector Bypass cannot be set.
Not available in External Mixer off.	External Mixer Band Select, External Mixer Bias, Conversion Loss cannot be set with External Mixer set to Off.
Not available in High Performance Waveguide Mixer.	External Mixer Bias cannot be set when External Mixer Band Select is VHP or EHP.
Not available in High Performance Waveguide Mixer. Please set in Spectrum Analyzer Application.	External Mixer Loss cannot be set when External Mixer Band Select is VHP or EHP. Set it using the Spectrum Analyzer Application.
Not available in Microwave Preselector Bypass On.	Preselector Auto Tune cannot be executed when Preselector Bypass is set to On.
Not available in frequency band without Preselector pass band.	This operation is invalid in frequency band without Preselector pass band.
Please Load Signal Generator.	To execute Playback, load the vector signal generator application.
Not available in Center Frequency under 4.2 GHz.	This operation is invalid when the center frequency is under 4.2 GHz.

Appendix B Default Value List

<Common parameters for all traces>

Frequency	
Center Frequency	3.6 GHz
Frequency Span	31.25 MHz (MS2830A-005/105/007/009/109/ 077/078, MS2840A-005/105/009/109/ 077/177/078/178, MS2850A-032/033/133/034/134) 10 MHz (MS2830A-006/106, MS2840A-006/106)
Start Frequency	3.584375 GHz (MS2830A-005/105/007/009/109/ 077/078, MS2840A-005/105/009/109/ 077/177/078/178, MS2850A-032/033/133/034/134) 3.595 GHz (MS2830A-006/106, MS2840A-006/106)
Stop Frequency	3.615625 GHz (MS2830A-005/105/007/009/109/ 077/078, MS2840A-005/105/009/109/ 077/177/078/178, MS2850A-032/033/133/034/134) 3.605 GHz (MS2830A-006/106, MS2840A-006/106)
Step Size	1 GHz
Preselector Auto Tune	Off
Frequency Band Mode	Normal (MS2830A-041/043/044/045, MS2840A-041/044/046, MS2850A-047/046)
External Mixer	Off
Band Select	A+
Bias	0.0 mA
Loss	15.00 dB
Microwave Preselector Bypass	On

Amplitude	
Reference Level	0 dBm
Attenuator	Auto, 10 dB
Log Scale Unit	dBm
Scale	Log
Log Scale Division	10dB/Div
Log Scale Line	10
Reference Level Offset	Off
Offset value	0 dB
Pre-Amp	Off
Trigger	
Trigger Switch	Off
Trigger Source	Video
Trigger Slope	Rise
Trigger Level (Video)	–40 dBm (Log) 60% (Lin)
Trigger Level (Wide IF Video)	–20 dBm
Trigger Hold	Off
Trigger Hold	100 μs
Trigger Delay	0 s
Frame Sync Setup	Off
Frame Trigger Period	10 ms
Frame Sync Offset	0 s
Trace	
Trace Mode	Spectrum
Measure	
Standard	Off
Capture	
Capture Mode	Continuous
Capture Time	Auto
Capture Time Length	0 s
Save Captured Data	
Device	D
File Name	DigitizeYYYYMMDD_NNN
Time Range	FULL
Output Rate	50 MHz
Replay	
Device	D
Application	Signal Analyzer
Capture & Playback	
Package	Playback
Pattern Name	DigitizeYYYYMMDD_NNN
Burst	On
Burst Off Threshold	–40 dB

	Minimum Burst Off Length	Time Length×10
	Ramp	Off
	Ramp Length	Time Length×10
Accessory		
	Title	On, “Signal Analyzer”
	Reference Clock	Factory-adjusted value

Appendix

Appendix B

<Spectrum trace>

Analysis Time			
	Auto/Manual		Auto
	Start Time		0 s
	Time Length		0 s
Scale			
	Vertical		
		Log Scale Division	10 dB/Div
		Lin Scale Division	10%/Div
		Log Scale Line	10
	Horizontal		
		Center	3.6 GHz
		Width	31.25 MHz (MS2830A-005/105/007/009/109/ 077/078, MS2840A-005/105/009/109/ 077/177/078/178, MS2850A-032/033/133/034/134) 10 MHz (MS2830A-006/106, MS2840A-006/106)
Storage			
	Mode		Off
	Count		10
RBW			Auto, 100 kHz
Time Detection			Average
Measure			
	ACP		
		On/Off	Off
		ACP Reference	Both Sides of Carriers
		Offset Ch BW	3.84 MHz
		Carrier BW	3.84 MHz
		In Band Center	3.6 GHz
		Carrier Spacing	5 MHz
		Offset-1	On, 5 MHz
		Offset-2	On, 10 MHz
		Offset-3	Off, 15 MHz
		In Band Filter Type	Root Nyquist
		Offset Ch Filter Type	Root Nyquist
		In Band Roll-off Factor	0.22
		Offset Ch Roll-off Factor	0.22
		Noise Cancel	Off
		Result Type	Offset
		Carrier Number	1

Channel Power		
	On/Off	Off
	Channel Center	3.6 GHz
	Channel Width	3.84 MHz
	Filter Type	Root Nyquist
	Roll-off Factor	0.22
OBW		
	On/Off	Off
	Method	N%
	N% of Ratio	99%
	XdB Value	25 dB
Marker		
	Active Marker	Marker1
	Zone Center	3.6 GHz
	Zone Width	3.125 MHz (MS2830A-005/105/007/009/109/077/078, MS2840A-005/105/009/109/077/177/078/178, MS2850A-032/033/133/034/134) 996.1 kHz (MS2830A-006/106, MS2840A-006/106)
	Marker Mode	Normal
	Marker Result	Integration
	Marker List	Off
	Couple Zone	On
	Spot Line	On
	Relative to	Marker2 (Active Marker is 1) Marker3 (Active Marker is 2) Marker4 (Active Marker is 3) Marker5 (Active Marker is 4) Marker6 (Active Marker is 5) Marker7 (Active Marker is 6) Marker8 (Active Marker is 7) Marker9 (Active Marker is 8) Marker10 (Active Marker is 9) Marker1 (Active Marker is 10)

Signal Search	
Resolution	1 dB
Threshold	
On/Off	Off
Above/Below	Above
Level	–50 dBm
Search Peaks Number	10

<Power vs Time trace>

Analysis Time			
	Auto/Manual		Auto
	Start		0 s
	Length		100 ms
Scale			
	Vertical		
		Log Scale Division	10 dB/Div
		Lin Scale Division	10%/Div
		Log Scale Line	10
Storage			
	Mode		Off
	Count		10
Filter			
	Type		Off
	Roll-off Factor		0.22
	Band Width		5 MHz
	Freq. Offset		0 Hz
View			
	Smoothing Time Length		Off, 2 μs
Time Detection			Average
Measure			
	Burst Average Power		
		On/Off	Off
		Noise Cancel	Off
	AM Depth		
		On/Off	Off
Marker			
	Marker 1		On, 0 s
	Marker 2		On, 100 ms
	Active Marker		1
	Peak-Peak		Off
Signal Search			
	Resolution		1 dB (Log) 1% (Lin)
	Threshold		
		On/Off	Off
		Above/Below	Above
		Level	–50 dBm

<Frequency vs Time trace>

Analysis Time			
	Auto/Manual		Auto
	Start		0 s
	Length		100 ms
Scale			
	Vertical		
		Scale Unit	Hz
		Width	Span/5
Storage			
	Mode		Off
	Count		10
Filter			
	Auto/Manual		Auto
	Filter Bandwidth		10 MHz
			(MS2830A-005/105/007/009/109/
			077/078,
			MS2840A-005/105/009/109/
			077/177/078/178,
			MS2850A-032/033/133/034/134)
			3 MHz
			(MS2830A-006/106,
			MS2840A-006/106)
View			
	Smoothing Time Length		Off, 2 μs
Time Detection			Pos&Neg
Marker			
	Marker 1		On, 0 s
	Marker 2		On, 100 ms
	Active Marker		1
	Peak-Peak		Off
	Detection Mode 1		Pos
	Detection Mode 2		Pos
Signal Search			
	Resolution		1 Hz
	Threshold		
		On/Off	Off
		Above/Below	Above
		Frequency	3.6 GHz
Measure			
	FM Deviation		
		On/Off	Off
	FM CW		
		FM CW	Off

Measurement Interval	Auto
Meas Slope	Auto

< Phase vs Time trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms
Scale	
Vertical	
Scale Division	36.00 deg/Div
Time Detection	Sample
Marker	
Marker 1	On, 0 s
Marker 2	On, 100 ms
Active Marker	1
Method	
Phase Offset	0.00 deg
Unwrap Phase	0s
Phase Mode	wrap

<CCDF trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms
Gate Mode	Off
Period	100 ms
Range Setup	
Edit Range Number 1	
Range	On
Start Time	0 s
Stop Time	100 ms
Edit Range Number 2	
Range	Off
Start Time	0 s
Stop Time	100 ms
Edit Range Number 3	
Range	Off
Start Time	0 s
Stop Time	100 ms
Scale	
Horizontal	20 dB
Storage	
Reset Every Capture	On
Filter	
Type	Off
Band Width	5 MHz
Freq. Offset	0 Hz
Method	
Measure Method	CCDF
Threshold On/Off	Off
Threshold	–170 dBm
CCDF Meas Mode	Time
Data Count	10000000
Marker	
Marker	On
Marker Axis	Dist
Distribution Position	10 dB
Probability Position	0.1%
View	
Gaussian Trace	Off
Reference Trace	Off

<Spectrogram trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms
Scale	
Level Full Scale	100 dB
Storage	
Mode	Off
Count	10
RBW	Auto, 100 kHz
Time Detection	Positive
Marker	
Active Marker	1
Marker On/Off	On
Zone Center	3.6 GHz
Zone Width	3.125 MHz
	1.000 MHz
Time 1	Analysis Start Time
Time 2	Analysis Start Time+ Analysis Time Length
Marker Type	Zone
Couple Time1 and 2	Off
Marker Result	Peak (Accuracy)

<No Trace trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms

<Sub Trace common parameter>

Trace Mode	Off

<Power vs Time sub trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms
Scale	
Level Full Scale	100 dB
Time Detection	Average

<Spectrogram sub trace>

Analysis Time	
Auto/Manual	Auto
Start	0 s
Length	100 ms
Scale	
Level Full Scale	100 dB
RBW	Auto, 100 kHz
Time Detection	Positive

Appendix C Standard Parameter List

The parameters set by the standard functions are listed below.

The standard functions can only be selected if MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.

C.1 ACP

5G Pre-Standard

Table C.1-1 Standard parameters for ACP function

Standard	Parameter Name	Setting
5G Pre-Standard (99 MHz 1 Carrier)	Frequency Span	510 MHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	90 MHz
	Carrier Spacing	99 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
5G Pre-Standard (100 MHz 1 Carrier)	Frequency Span	510 MHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	90 MHz
	Carrier Spacing	100 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
5G Pre-Standard (99 MHz 2 Carrier)	Frequency Span	1 GHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Both Sides of
Carriers
	Carrier Number	2
	Carrier BW	90 MHz
	Carrier Spacing	99 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
5G Pre-Standard (100 MHz 2 Carrier)	Frequency Span	1 GHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Both Sides of
Carriers
	Carrier Number	2
	Carrier BW	90 MHz
	Carrier Spacing	100 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
5G Pre-Standard (99 MHz 4 Carrier)	Frequency Span	1 GHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	4
	Carrier BW	90 MHz
	Carrier Spacing	99 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
5G Pre-Standard (100 MHz 4 Carrier)	Frequency Span	1 GHz
	RBW	300 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	4
	Carrier BW	90 MHz
	Carrier Spacing	100 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	100 MHz
	Offset Freq – 2	200 MHz
	Offset Freq – 3	300 MHz
	Ch BW	90 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22
	Noise Cancel Capture Time	Auto
	Storage Mode	Off
	Trigger Switch	Off
	ATTN Value	60
	Smoothing Switch	Off
	Reference Level Offset	Off
	Scale Mode	Log
	Log Scale Unit	dBm
	ACP Cancel Factor	5000
	ACP Lower Limit	100000
	Noise Cancel Analysis Time Length	50 ms

W-CDMA

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
W-CDMA Uplink	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	3.84 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
W-CDMA Downlink (Single Carrier)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	3.84 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
W-CDMA Downlink (2 Carriers)	Frequency Span	31.25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Both Sides of Carriers
	Carrier Number	2
	Carrier BW	3.84 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Root Nyquist
	In Band Roll-off Factor	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Mobile WiMAX

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
Mobile WiMAX DL/UL 10 MHz BW	Frequency Span	31.25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	9.5 MHz
	Carrier Spacing	10 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	10 MHz
	Offset Freq – 2	20 MHz
	Offset Freq – 3	30 MHz
	Ch BW	9.5 MHz
	Offset Ch Filter Type	Rect

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
Mobile WiMAX DL/UL 5 MHz BW	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	4.75 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	4.75 MHz
	Offset Ch Filter Type	Rect

LTE

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 1.4 MHz BW (UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	1.095 MHz (DL) 1.08 MHz (UL)
	Carrier Spacing	1.4 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	3.2 MHz
	Offset Freq – 2	8.2 MHz
	Offset Freq – 3	13.2 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 1.4 MHz BW (UTRA 1.6 MHz)	Frequency Span	10 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	1.095 MHz (DL) 1.08 MHz (UL)
	Carrier Spacing	1.4 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.5 MHz
	Offset Freq – 2	3.1 MHz
	Offset Freq – 3	4.7 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 1.4 MHz BW (E-UTRA 1.4 MHz)	Frequency Span	10 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	1.095 MHz (DL) 1.08 MHz (UL)
	Carrier Spacing	1.4 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.4 MHz
	Offset Freq – 2	2.8 MHz
	Offset Freq – 3	4.2 MHz
	Ch BW	1.095 MHz (DL) 1.08 MHz (UL)
	Offset Ch Filter Type	Rect
	Offset Ch Roll-off Factor	0.22 (Disabled)

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 1.4 MHz BW (E-UTRA 1.4 MHz)	Frequency Span	10 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	1.095 MHz (DL) 1.08 MHz (UL)
	Carrier Spacing	1.4 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.4 MHz
	Offset Freq – 2	2.8 MHz
	Offset Freq – 3	4.2 MHz
	Ch BW	1.095 MHz (DL) 1.08 MHz (UL)
	Offset Ch Filter Type	Rect

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 3 MHz BW (UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	2.715 MHz (DL) 2.7 MHz (UL)
	Carrier Spacing	3 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	4 MHz
	Offset Freq – 2	9 MHz
	Offset Freq – 3	14 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 3 MHz BW (UTRA 1.6MHz)	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	2.715 MHz (DL) 2.7 MHz (UL)
	Carrier Spacing	3 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	2.3 MHz
	Offset Freq – 2	3.9 MHz
	Offset Freq – 3	5.5 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 3 MHz BW (E-UTRA 3 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	2.715 MHz (DL) 2.7 MHz (UL)
	Carrier Spacing	3 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	3 MHz
	Offset Freq – 2	6 MHz
	Offset Freq – 3	9 MHz
	Ch BW	2.715 MHz (DL) 2.7 MHz (UL)
	Offset Ch Filter Type	Rect
	Offset Ch Roll-off Factor	0.22 (Disabled)

Table C.1-1　Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 3 MHz BW (E-UTRA 3 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	2.715 MHz (DL) 2.7 MHz (UL)
	Carrier Spacing	3 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	3 MHz
	Offset Freq – 2	6 MHz
	Offset Freq – 3	9 MHz
	Ch BW	2.715 MHz (DL) 2.7 MHz (UL)
	Offset Ch Filter Type	Rect

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/ Downlink 5 MHz BW (UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.515 MHz (DL) 4.5 MHz (UL)
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 5 MHz BW (UTRA 1.6 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.515 MHz (DL) 4.5 MHz (UL)
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	3.3 MHz
	Offset Freq – 2	4.9 MHz
	Offset Freq – 3	6.5 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Downlink 5 MHz BW (UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.515 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	3.84 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Ch Roll-off Factor	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 5 MHz BW (E-UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.515 MHz (DL) 4.5 MHz (UL)
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll-off Factor	0.22 (Disabled)
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	4.515 MHz (DL) 4.5 MHz (UL)
	Offset Ch Filter Type	Rect
	Offset Ch Roll-off Factor	0.22 (Disabled)

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink 5 MHz BW (E-UTRA 5 MHz)	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.515 MHz (DL) 4.5 MHz (UL)
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	4.515 MHz (DL) 4.5 MHz (UL)
	Offset Ch Filter Type	Rect

DSRC

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
DSRC π/4DQPSK/ASK	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	7.032 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	4.4 MHz
	Carrier Spacing	5 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	In Band Roll Off Ratio	0.22
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	5 MHz
	Offset Freq – 2	10 MHz
	Offset Freq – 3	15 MHz
	Ch BW	4.4 MHz
	Offset Ch Filter Type	Rect
	Offset Roll Off Ratio	0.22

TD-SCDMA

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 1 Carrier	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	1
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 2 Carrier	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	2
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 3 Carrier	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	3
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 4 Carrier	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	4
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 5 Carrier	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	5
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
TD-SCDMA 6 Carrier	Frequency Span	25 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Adjacent Channel Power	On
	ACP Reference	Carrier Select
	Carrier Number	6
	Carrier BW	1.28 MHz
	Carrier Spacing	1.6 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	1.6 MHz
	Offset Freq – 2	3.2 MHz
	Offset Freq – 3	4.8 MHz
	Ch BW	1.28 MHz
	Offset Ch Filter Type	Root Nyquist
	Offset Roll Off Ratio	0.22

CDMA2000

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
CDMA2000 Forward Link	Frequency Span	5 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.25 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	1.23 MHz
	Carrier Spacing	1.25 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	765 kHz
	Offset Freq – 2	1.995 MHz
	Offset Freq – 3	4 MHz
	Ch BW	30 kHz
	Offset Ch Filter Type	Rect

EV-DO

Table C.1-1 Standard parameters for ACP function (Cont'd)

Standard	Parameter Name	Setting
EV-DO Forward Link	Frequency Span	5 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.666667 ms
	Adjacent Channel Power	On
	ACP Reference	Carrier-1
	Carrier Number	1
	Carrier BW	1.23 MHz
	Carrier Spacing	1.25 MHz
	In Band Center	Center Frequency
	In Band Filter Type	Rect
	Offset – 1 On/Off	On
	Offset – 2 On/Off	On
	Offset – 3 On/Off	Off
	Offset Freq – 1	765 kHz
	Offset Freq – 2	1.995 MHz
	Offset Freq – 3	4 MHz
	Ch BW	30 kHz
	Offset Ch Filter Type	Rect

C.2 Channel Power

W-CDMA

Table C.2-1 Standard parameters for channel power function

Standard	Parameter Name	Setting
W-CDMA Uplink/Downlink (Mean Power)	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	5 MHz
	Filter Type	Rect
W-CDMA Uplink/Downlink (RRC Filtered Power)	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	3.84 MHz
	Filter Type	Root Nyquist
	Filter Roll-off Factor	0.22

Mobile WiMAX

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
Mobile WiMAX DL/UL 10 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	10 MHz
	Filter Type	Rect
Mobile WiMAX DL/UL 5 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	5 MHz
	Filter Type	Rect

LTE

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Mean Power 1.4 MHz BW	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.4 MHz
	Filter Type	Rect
LTE Uplink/Downlink Mean Power 3 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	3 MHz
	Filter Type	Rect
LTE Uplink/Downlink Mean Power 5 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	5 MHz
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Mean Power 10 MHz BW	Frequency Span	25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	10 MHz
	Filter Type	Rect
LTE Uplink/Downlink Mean Power 15 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	15 MHz
	Filter Type	Rect
LTE Uplink/Downlink Mean Power 20 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	20 MHz
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/ Downlink Filtered Power 1.4 MHz BW	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.095 MHz (DL) 1.08 MHz (UL)
	Filter Type	Rect
LTE Uplink/Downlink Filtered Power 3 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	2.715 MHz (DL) 2.7 MHz (UL)
	Filter Type	Rect
LTE Uplink/Downlink Filtered Power 5 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	4.515 MHz (DL) 4.5 MHz (UL)
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Filtered Power 10 MHz BW	Frequency Span	25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	9.015 MHz (DL) 9 MHz (UL)
	Filter Type	Rect
LTE Uplink/Downlink Filtered Power 15 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	13.515 MHz (DL) 13.5 MHz (UL)
	Filter Type	Rect
LTE Uplink/Downlink Filtered Power 20 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	18.015 MHz (DL) 18 MHz (UL)
	Filter Type	Rect

LTE TDD

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink Mean Power 1.4 MHz BW	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.4 MHz
	Filter Type	Rect
LTE TDD Uplink/Downlink Mean Power 3 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	3 MHz
	Filter Type	Rect
LTE TDD Uplink/Downlink Mean Power 5 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	5 MHz
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink Mean Power 10 MHz BW	Frequency Span	25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	10 MHz
	Filter Type	Rect
LTE TDD Uplink/Downlink Mean Power 15 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	15 MHz
	Filter Type	Rect
LTE TDD Uplink/Downlink Mean Power 20 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	20 MHz
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink Filtered Power 1.4 MHz BW	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.095 MHz (DL) 1.08 MHz (UL)
	Filter Type	Rect
LTE TDD Uplink/Downlink Filtered Power 3 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	2.715 MHz (DL) 2.7 MHz (UL)
	Filter Type	Rect
LTE TDD Uplink/Downlink Filtered Power 5 MHz BW	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	4.515 MHz (DL) 4.5 MHz (UL)
	Filter Type	Rect

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
LTE TDD Uplink/Downlink Filtered Power 10 MHz BW	Frequency Span	25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	9.015 MHz (DL) 9 MHz (UL)
	Filter Type	Rect
LTE TDD Uplink/Downlink Filtered Power 15 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	13.515 MHz (DL) 13.5 MHz (UL)
	Filter Type	Rect
LTE TDD Uplink/Downlink Filtered Power 20 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	18.015 MHz (DL) 18 MHz (UL)
	Filter Type	Rect

DSRC/TD-SCDMA

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
DSRC π/4DQPSK	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	7.032 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	4.4 MHz
	Filter Type	Rect
DSRC ASK	Frequency Span	10 MHz
	RBW	Auto
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	7.032 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	4.4 MHz
	Filter Type	Rect
TD-SCDMA	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	662.5 μs
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.6 MHz
	Filter Type	Rect

XG-PHS

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
XG-PHS Mean Power 10 MHz BW	Frequency Span	25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	500 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	10 MHz
	Filter Type	Rect
XG-PHS Mean Power 20 MHz BW	Frequency Span	31.25 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	500 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	20 MHz
	Filter Type	Rect

CDMA2000/EV-DO

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
CDMA2000 Forward Link	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.25 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.23 MHz
	Filter Type	Rect
EV-DO Forward Link	Frequency Span	5 MHz
	RBW	Auto
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.666667 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	1.23 MHz
	Filter Type	Rect

ISDB-Tmm

Table C.2-1 Standard parameters for channel power function (Cont'd)

Standard	Parameter Name	Setting
ISDB-Tmm 14.2 MHz BW (Mean Power)	Frequency Span	25 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	14.2 MHz
	Filter Type	Rect
ISDB-Tmm (ISDB-T) 5.6 MHz BW (Mean Power)	Frequency Span	10 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0
	Analysis Time Length	1 ms
	Channel Power	On
	Channel Center	Center Frequency
	Channel Width	5.6 MHz
	Filter Type	Rect

C.3 OBW

W-CDMA/Mobile WiMAX

Table C.3-1 Standard parameters for OBW function

Standard	Parameter Name	Setting
W-CDMA Uplink/Downlink	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
Mobile WiMAX DL/UL 10 MHz BW	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	31.25 MHz
	RBW	100 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
Mobile WiMAX DL/UL 5 MHz BW	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	100 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms

LTE

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 1.4 MHz BandWidth LTE TDD Uplink/Downlink 1.4 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	5 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)
LTE Uplink/Downlink 3 MHz BandWidth LTE TDD Uplink/Downlink 3 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)
LTE Uplink/Downlink 5 MHz BandWidth LTE TDD Uplink/Downlink 5 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink 10 MHz BandWidth LTE TDD Uplink/Downlink 10 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	25 MHz
	RBW	100 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)
LTE Uplink/Downlink 15 MHz BandWidth LTE TDD Uplink/Downlink 15 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	31.25 MHz
	RBW	100 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)
LTE Uplink/Downlink 20 MHz BandWidth LTE TDD Uplink/Downlink 20 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	31.25 MHz
	RBW	100 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms (LTE) 1 ms (LTE TDD)

DSRC/TD-SCDMA

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
DSRC π/4DQPSK/ASK	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	30 kHz
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	7.032 ms
TD-SCDMA	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	5 MHz
	RBW	30 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s

XG-PHS

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
XG-PHS 10 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	25 MHz
	RBW	100 kHz
	Storage Mode	Max Hold
	Storage Count	10
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
XG-PHS 20 MHz Bandwidth	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	31.25 MHz
	RBW	100 kHz
	Storage Mode	Max Hold
	Storage Count	10
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms

CDMA2000/EV-DO

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
CDMA2000 Forward Link	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	5 MHz
	RBW	30 kHz
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.25 ms
EV-DO Forward Link	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	5 MHz
	RBW	30 kHz
	Time Detection	Positive
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.666667 ms

ISDB-Tmm

Table C.3-1 Standard parameters for OBW function (Cont'd)

Standard	Parameter Name	Setting
ISDB-Tmm 14.2 MHz BW	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	25 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms
ISDB-Tmm (ISDB-T) 5.6 MHz BW	Method	N% of Power
	N% Ratio	99.00%
	Frequency Span	10 MHz
	RBW	10 kHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1 ms

C.4 Burst Average Power

W-CDMA/Mobile WiMAX

Table C.4-1 Standard parameters for Burst Average Power function

Standard	Parameter Name	Setting
W-CDMA Uplink/Downlink (Mean Power)	Frequency Span	10 MHz
	Time Detection	Pos & Neg
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	5 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
W-CDMA Uplink/Downlink (RRC Filtered Power)	Frequency Span	10 MHz
	Time Detection	Pos & Neg
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Root Nyquist
	Filter BW	3.84 MHz
	Filter Freq Offset	0 Hz
	Filter Roll-off Factor	0.22
	Burst Average Power	On
Mobile WiMAX DL/UL 10 MHz BW	Frequency Span	31.25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Filter Type	Rect
	Filter BW	10 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
Mobile WiMAX DL/UL 5 MHz BW	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5 ms
	Filter Type	Rect
	Filter BW	5 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On

LTE

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Mean Power 1.4 MHz BW LTE TDD Uplink/Downlink Mean Power 1.4 MHz BW	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	1.4 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Mean Power 3 MHz BW LTE TDD Uplink/Downlink Mean Power 3 MHz BW	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	3 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Mean Power 5 MHz BW LTE TDD Uplink/Downlink Mean Power 5 MHz BW	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	5 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Mean Power 10 MHz BW LTE TDD Uplink/Downlink Mean Power 10 MHz BW	Frequency Span	25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	10 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Mean Power 15 MHz BW LTE TDD Uplink/Downlink Mean Power 15 MHz BW	Frequency Span	31.25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	15 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Mean Power 20 MHz BW LTE TDD Uplink/Downlink Mean Power 20 MHz BW	Frequency Span	31.25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	20 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Filtered Power 1.4 MHz BW LTE TDD Uplink/Downlink Filtered Power 1.4 MHz BW	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	1.095 MHz (DL) 1.08 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Filtered Power 3 MHz BW LTE TDD Uplink/Downlink Filtered Power 3 MHz BW	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	2.715 MHz (DL) 2.7 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Filtered Power 5 MHz BW LTE TDD Uplink/Downlink Filtered Power 5 MHz BW	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	4.515 MHz (DL) 4.5 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
LTE Uplink/Downlink Filtered Power 10 MHz BW LTE TDD Uplink/Downlink Filtered Power 10 MHz BW	Frequency Span	25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	9.015 MHz (DL) 9 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Filtered Power 15 MHz BW LTE TDD Uplink/Downlink Filtered Power 15 MHz BW	Frequency Span	31.25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	13.515 MHz (DL) 13.5 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On
LTE Uplink/Downlink Filtered Power 20 MHz BW LTE TDD Uplink/Downlink Filtered Power 20 MHz BW	Frequency Span	31.25 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	10 ms
	Filter Type	Rect
	Filter BW	18.015 MHz (DL) 18 MHz (UL)
	Filter Freq Offset	0 Hz
	Burst Average Power	On

DSRC/TD-SCDMA

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
DSRC	Frequency Span	10 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	782.00 μs
	Filter Type	Rect
	Filter BW	4.4 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On
TD-SCDMA	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	5.00 ms
	Filter Type	Rect
	Filter BW	1.6 MHz
	Filter Freq Offset	0 Hz
	Burst Average Power	On

CDMA2000/EV-DO

Table C.4-1 Standard parameters for Burst Average Power function (Cont'd)

Standard	Parameter Name	Setting
CDMA2000 Forward Link	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.25 ms
	Filter Type	Rect
	Filter BW	1.5 MHz
	Burst Average Power	On
EV-DO Forward Link Active Slot	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	0 s
	Analysis Time Length	1.666667 ms
	Filter Type	OFF
	Burst Average Power	On
	Trigger Switch	Off
EV-DO Forward Link Idle Slot	Frequency Span	5 MHz
	Time Detection	Average
	Capture Time	Auto
	Analysis Start Time	326.334 μs
	Analysis Time Length	180.660 μs
	Filter Type	OFF
	Burst Average Power	On
	Trigger Switch	On

Appendix D FFT and RBW

The Spectrum, Spectrogram trace of the Signal Analyzer performs spectrum analysis via FFT processing.

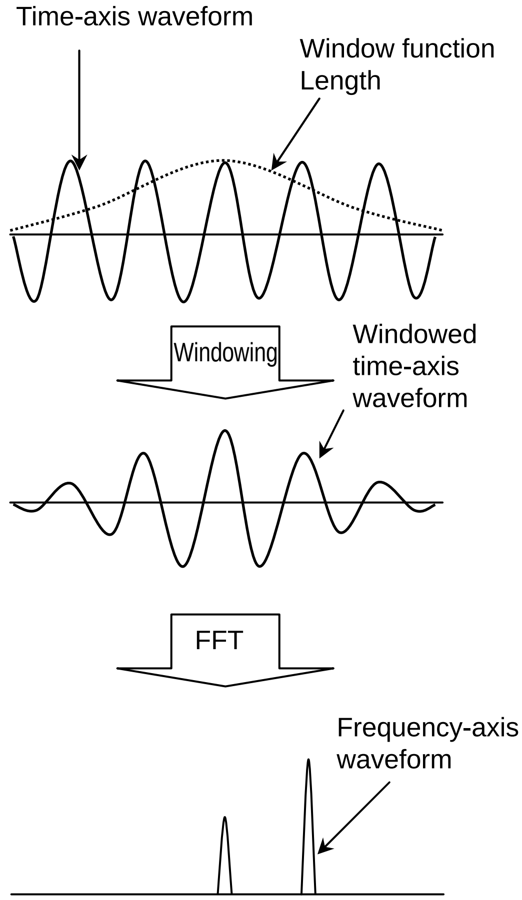


Figure D-1 Generating a spectrum waveform

Figure D-1 shows an overview of spectrum waveform generation. In FFT processing, part of a long signal is taken out for calculation. To suppress occurrences of discontinuity at the links when signals taken out are connected periodically, windowing is performed with a window function. The Signal Analyzer function uses the Gauss window as a window function.

Next, the length of the window function (Window Function Length) and capture data length are described. Figure D-2 illustrates the relation between capture data length and window function length. To display a spectrum waveform with a given analysis time length, capture data length with window function length added is required. Table D-2, Table D-3, Table D-4, Table D-5, Table D-6, Table D-7 shows the relation between window function length and RBW of the Spectrum, Spectrogram trace.

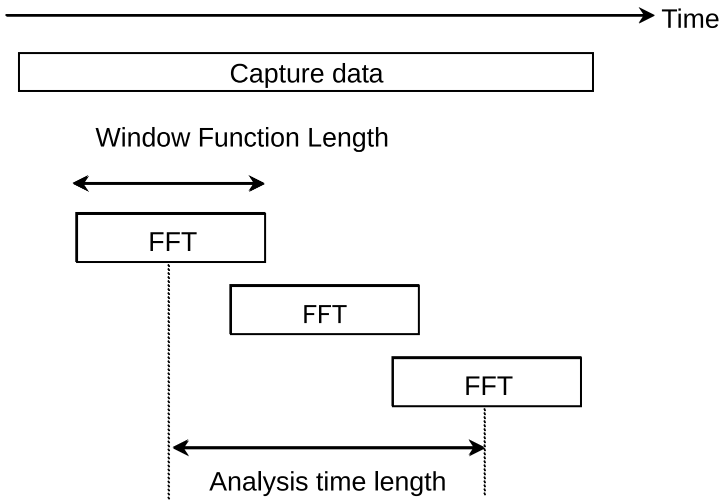


Figure D-2　Capture data length and window function length

A value varies depending on the Marker Result settings.

Table D-1　Marker Result Settings

Integration	Density	Peak(Fast)	Peak(Accuracy)
[1]	[1]	[2]	[3]

Table D-2 RBW and window function length in Spectrum trace and [1]

Span \ RBW	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*						524288	262144
10 MHz						262144	131072
5 MHz					524288	131072	65536
2.5 MHz					262144	65536	32768
1 MHz				524288	131072	32768	8192
500 kHz			524288	262144	65536	16384	4096
250 kHz			262144	131072	32768	8192	2048
100 kHz		524288	131072	32768	8192	4096	2048
50 kHz	524288	262144	65536	16384	4096	2048	2048
25 kHz	262144	131072	32768	8192	2048	2048	2048
10 kHz	131072	32768	8192	4096	2048	2048	
5 kHz	65536	16384	4096	2048	2048		
2.5 kHz	32768	8192	2048	2048	2048		
1 kHz	16384	4096	2048	2048			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-2 RBW and window function length in Spectrum trace and [1] (Cont'd)

Span \ RBW	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*		262144	65536	32768	8192	2048	2048	2048
50/62.5 MHz*	262144	65536	32768	8192	2048	2048	2048	
25/31.25 MHz*	65536	32768	8192	2048	2048	2048		
10 MHz	32768	8192	4096	2048	2048			
5 MHz	16384	4096	2048	2048	2048			
2.5 MHz	8192	2048	2048	2048				
1 MHz	4096	2048	2048					
500 kHz	2048	2048						
250 kHz	2048	2048						
100 kHz	2048							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-2 RBW and window function length in Spectrum trace and [1] (Cont'd)

Span \ RBW	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*		524288	262144	65536	16384	4096	2048	2048
510 MHz*		262144	131072	32768	8192	2048	2048	2048
255 MHz		131072	65536	16384	4096	2048	2048	2048
100/125 MHz		65536	32768	8192	2048	2048	2048	2048
50/62.5 MHz	131072	32768	16384	4096	2048	2048	2048	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table D-3　RBW and Window Function Length in Spectrum trace and [2]

RBW / Span	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*							524288
10 MHz						524288	262144
5 MHz						262144	131072
2.5 MHz					524288	131072	65536
1 MHz					262144	65536	16384
500 kHz				524288	131072	32768	8192
250 kHz			524288	262144	65536	16384	4096
100 kHz			262144	65536	16384	8192	2048
50 kHz		524288	131072	32768	8192	4096	2048
25 kHz	524288	262144	65536	16384	4096	2048	2048
10 kHz	262144	65536	16384	8192	2048	2048	
5 kHz	131072	32768	8192	4096	2048		
2.5 kHz	65536	16384	4096	2048	2048		
1 kHz	32768	8192	2048	2048			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-3 RBW and Window Function Length in Spectrum trace and [2] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*		524288	131072	65536	16384	4096	2048	2048
50/62.5 MHz*	524288	131072	65536	16384	4096	2048	2048	
25/31.25 MHz*	131072	65536	16384	4096	2048	2048		
10 MHz	65536	16384	8192	2048	2048			
5 MHz	32768	8192	4096	2048	2048			
2.5 MHz	16384	4096	2048	2048				
1 MHz	8192	2048	2048					
500 kHz	4096	2048						
250 kHz	2048	2048						
100 kHz	2048							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-3 RBW and Window Function Length in Spectrum trace and [2] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*			524288	131072	65536	16384	4096	2048
510 MHz*		524288	262144	65536	32768	8192	2048	2048
255 MHz		262144	131072	32768	16384	4096	2048	2048
100/125 MHz		131072	65536	16384	8192	2048	2048	2048
50/62.5 MHz	262144	65536	32768	8192	4096	2048	2048	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table D-4 RBW and Window Function Length in Spectrum trace and [3]

RBW / Span	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*							
10 MHz							524288
5 MHz						524288	262144
2.5 MHz						262144	131072
1 MHz					524288	131072	32768
500 kHz					262144	65536	16384
250 kHz				524288	131072	32768	8192
100 kHz			524288	131072	32768	16384	4096
50 kHz			262144	65536	16384	8192	2048
25 kHz		524288	131072	32768	8192	4096	2048
10 kHz	524288	131072	32768	16384	4096	2048	
5 kHz	262144	65536	16384	8192	2048		
2.5 kHz	131072	32768	8192	4096	2048		
1 kHz	65536	16384	4096	2048			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-4 RBW and Window Function Length in Spectrum trace and [3] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*			262144	131072	32768	8192	4096	2048
50/62.5 MHz*		262144	131072	32768	8192	4096	2048	
25/31.25 MHz*	262144	131072	32768	8192	4096	2048		
10 MHz	131072	32768	16384	4096	2048			
5 MHz	65536	16384	8192	2048	2048			
2.5 MHz	32768	8192	4096	2048				
1 MHz	16384	4096	2048					
500 kHz	8192	2048						
250 kHz	4096	2048						
100 kHz	2048							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-4 RBW and Window Function Length in Spectrum trace and [3] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*				262144	131072	32768	8192	2048
510 MHz*			524288	131072	65536	16384	4096	2048
255 MHz			262144	65536	32768	8192	2048	2048
100/125 MHz			131072	32768	16384	4096	2048	2048
50/62.5 MHz		131072	65536	16384	8192	2048	2048	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table D-5 RBW and Window Function Length in Spectrogram trace and [1]

RBW / Span	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*						524288	262144
10 MHz						262144	131072
5 MHz					524288	131072	65536
2.5 MHz					262144	65536	32768
1 MHz				524288	131072	32768	8192
500 kHz			524288	262144	65536	16384	4096
250 kHz			262144	131072	32768	8192	2048
100 kHz		524288	131072	32768	8192	4096	1024
50 kHz	524288	262144	65536	16384	4096	2048	1024
25 kHz	262144	131072	32768	8192	2048	1024	1024
10 kHz	131072	32768	8192	4096	1024	1024	
5 kHz	65536	16384	4096	2048	1024		
2.5 kHz	32768	8192	2048	1024	1024		
1 kHz	16384	4096	1024	1024			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-5 RBW and Window Function Length in Spectrogram trace and [1] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*		262144	65536	32768	8192	2048	1024	1024
50/62.5 MHz*	262144	65536	32768	8192	2048	1024	1024	
25/31.25 MHz*	65536	32768	8192	2048	1024	1024		
10 MHz	32768	8192	4096	1024	1024			
5 MHz	16384	4096	2048	1024	1024			
2.5 MHz	8192	2048	1024	1024				
1 MHz	4096	1024	1024					
500 kHz	2048	1024						
250 kHz	1024	1024						
100 kHz	1024							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-5 RBW and Window Function Length in Spectrogram trace and [1] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*		524288	262144	65536	16384	4096	2048	1024
510 MHz*		262144	131072	32768	8192	2048	1024	1024
255 MHz		131072	65536	16384	4096	1024	1024	1024
100/125 MHz		65536	32768	8192	2048	1024	1024	1024
50/62.5 MHz	131072	32768	16384	4096	1024	1024	1024	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table D-6 RBW and Window Function Length in Spectrogram trace and [2]

RBW / Span	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*							524288
10 MHz						524288	262144
5 MHz						262144	131072
2.5 MHz					524288	131072	65536
1 MHz					262144	65536	16384
500 kHz				524288	131072	32768	8192
250 kHz			524288	262144	65536	16384	4096
100 kHz			262144	65536	16384	8192	2048
50 kHz		524288	131072	32768	8192	4096	1024
25 kHz	524288	262144	65536	16384	4096	2048	1024
10 kHz	262144	65536	16384	8192	2048	1024	
5 kHz	131072	32768	8192	4096	1024		
2.5 kHz	65536	16384	4096	2048	1024		
1 kHz	32768	8192	2048	1024			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-6 RBW and Window Function Length in Spectrogram trace and [2] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*		524288	131072	65536	16384	4096	2048	1024
50/62.5 MHz*	524288	131072	65536	16384	4096	2048	1024	
25/31.25 MHz*	131072	65536	16384	4096	2048	1024		
10 MHz	65536	16384	8192	2048	1024			
5 MHz	32768	8192	4096	1024	1024			
2.5 MHz	16384	4096	2048	1024				
1 MHz	8192	2048	1024					
500 kHz	4096	1024						
250 kHz	2048	1024						
100 kHz	1024							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-6 RBW and Window Function Length in Spectrogram trace and [2] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*			524288	131072	65536	16384	4096	1024
510 MHz*		524288	262144	65536	32768	8192	2048	1024
255 MHz		262144	131072	32768	16384	4096	1024	1024
100/125 MHz		131072	65536	16384	8192	2048	1024	1024
50/62.5 MHz	262144	65536	32768	8192	4096	1024	1024	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Table D-7 RBW and Window Function Length in Spectrogram trace and [3]

RBW / Span	1 Hz	3 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1 kHz
100/125 MHz*							
50/62.5 MHz*							
25/31.25 MHz*							
10 MHz							524288
5 MHz						524288	262144
2.5 MHz						262144	131072
1 MHz					524288	131072	32768
500 kHz					262144	65536	16384
250 kHz				524288	131072	32768	8192
100 kHz			524288	131072	32768	16384	4096
50 kHz			262144	65536	16384	8192	2048
25 kHz		524288	131072	32768	8192	4096	1024
10 kHz	524288	131072	32768	16384	4096	1024	
5 kHz	262144	65536	16384	8192	2048		
2.5 kHz	131072	32768	8192	4096	1024		
1 kHz	65536	16384	4096	2048			

*: 25 MHz and 31.25 MHz can be set when MS2830A-005/105/007/009/109, MS2840A-005/105/009/109 is installed, or MS2850A.
50 MHz and 62.5 MHz can be set when MS2830A-077 or MS2840A-077/177 is installed.
100 MHz and 125 MHz can be set when MS2830A-078 or MS2840A-078/178 is installed.
When using the MS2850A, the settings different from the above table are required for the span of 50 MHz or higher.

Table D-7 RBW and Window Function Length in Spectrogram trace and [3] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
100/125 MHz*			262144	131072	32768	8192	4096	1024
50/62.5 MHz*		262144	131072	32768	8192	4096	1024	
25/31.25 MHz*	262144	131072	32768	8192	4096	1024		
10 MHz	131072	32768	16384	4096	1024			
5 MHz	65536	16384	8192	2048	1024			
2.5 MHz	32768	8192	4096	1024				
1 MHz	16384	4096	1024					
500 kHz	8192	2048						
250 kHz	4096	1024						
100 kHz	1024							
50 kHz								
25 kHz								
10 kHz								
5 kHz								
2.5 kHz								
1 kHz								

The following is applied to the MS2850A.

Table D-7 RBW and Window Function Length in Spectrogram trace and [3] (Cont'd)

RBW / Span	3 kHz	10 kHz	30 kHz	100 kHz	300 kHz	1 MHz	3 MHz	10 MHz
1 GHz*				262144	131072	32768	8192	2048
510 MHz*			524288	131072	65536	16384	4096	1024
255 MHz			262144	65536	32768	8192	2048	1024
100/125 MHz			131072	32768	16384	4096	1024	1024
50/62.5 MHz		131072	65536	16384	8192	2048	1024	

*: 510 MHz can be set when the MS2850A-033/133/034/134 is installed.
1 GHz can be set when the MS2850A-034/134 is installed.

Appendix E IQ Data Time Actually Required

IQ data time actually required

In FFT and filtering processing, additional IQ data time is required for calculation in addition to the specified capture time. The Signal Analyzer function automatically calculates the data length required for calculation to capture the data. However, note that some data such as digitized data already include IQ data.

The IQ data time actually captured for the Spectrum trace is as shown below.

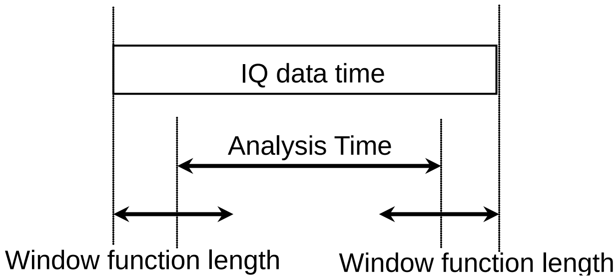


Figure E-1 IQ data time for the Spectrum trace

The Spectrum trace uses the FFT method for calculation, so data with window function length is captured as required data length for calculation in addition to the specified analysis time.

The IQ data time actually captured for the Power vs Time trace is as shown below.

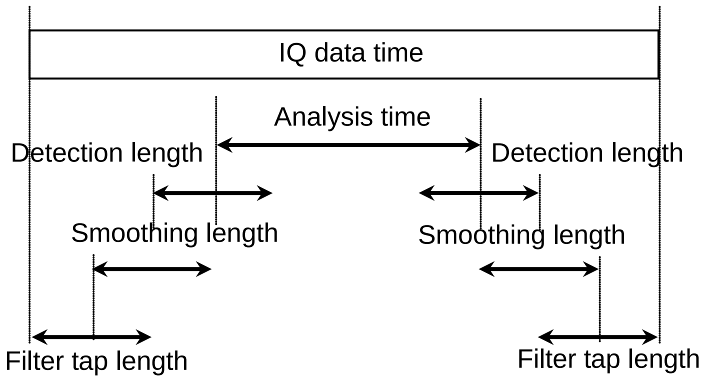


Figure E-2 IQ data time for the Power vs Time trace

The Power vs Time trace performs filtering processing, smoothing processing, and detection processing depending on the setting, so the data required for the calculations is captured, which is longer than the analysis time.

The minimum capture time for the Frequency vs Time trace is as shown below.

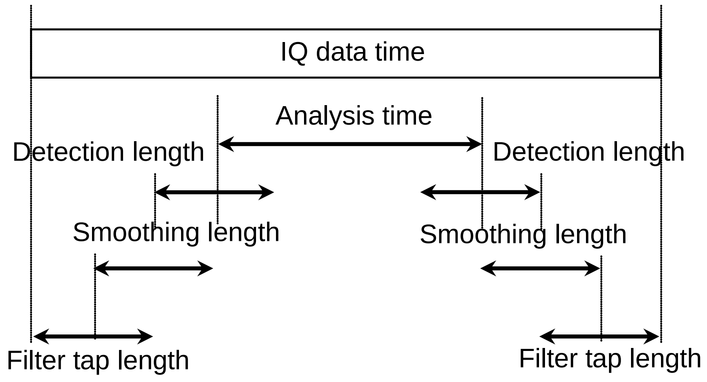


Figure E-3 IQ data time for the Frequency vs Time trace

The Frequency vs Time trace performs band limiting processing, so the data required for the calculation is captured, which is longer than the analysis time. It also performs smoothing processing and detection processing depending on the setting, so the data required for processing is captured.

The minimum capture time for the CCDF trace is as shown below.

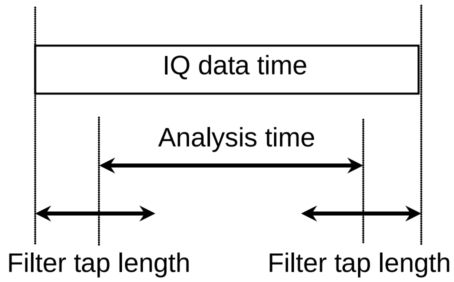


Figure E-4 IQ data time for the CCDF trace

The CCDF trace performs filtering processing depending on the setting, so the data required for the calculation is captured, which is longer than the analysis time.

The minimum capture time for the Spectrogram trace is as shown below.

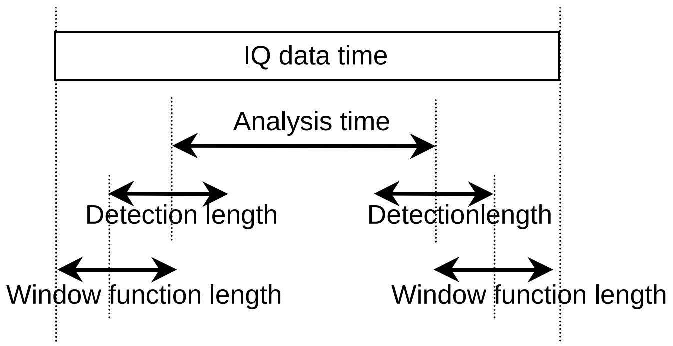


Figure E-5 IQ data time for the Spectrogram trace

The Spectrogram trace uses the FFT method for calculation, so data with window function length is captured as required data length for calculation in addition to the specified analysis time. It also performs smoothing processing and detection processing depending on the setting, so the data required for processing is captured.

Auto mode and Manual mode for capture time

When Capture Time is set to the Auto mode, the data length required for calculation is automatically set to the minimum data length. This makes the IQ data time actually captured the shortest, allowing the user to obtain analysis results in the shortest time. On the other hand, if Capture Time is set to the Manual mode, the data length required for calculation is always maximized to capture IQ data. This makes the time to obtain analysis results longer, but allows the user to use the same IQ data for analysis with multiple traces.

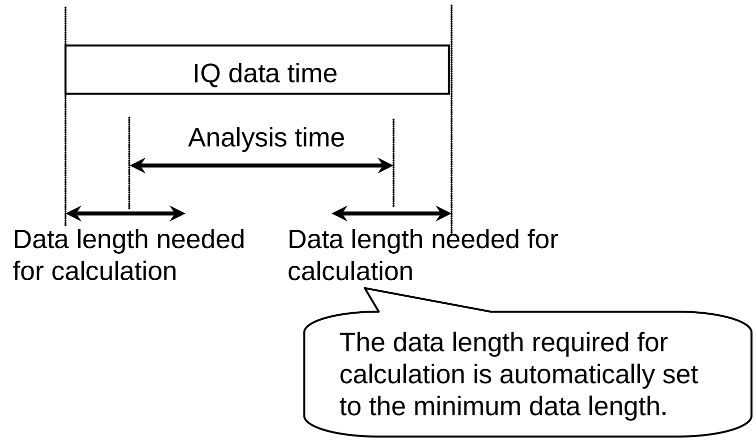


Figure E-6 IQ data time in the Auto mode

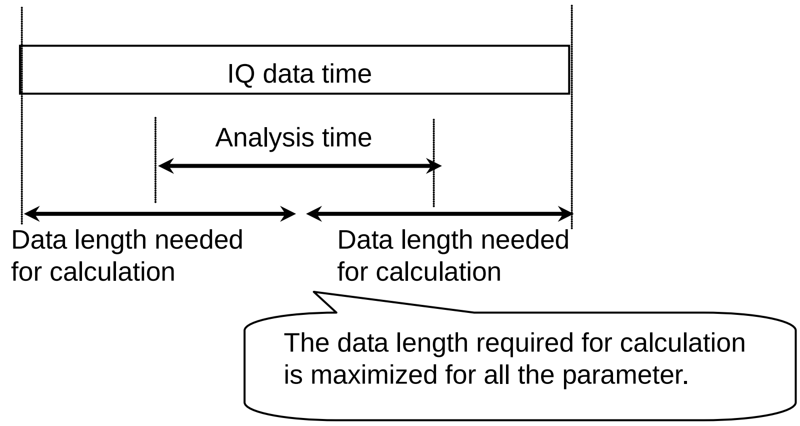


Figure E-7 IQ data time in the Manual mode

Appendix F Saving Waveform CSV DATA

This appendix describes the trace-data file used when a signal analyzer application is used to save trace data (data displayed on the screen) to a file.

Trace data to be saved

Trace Mode trace data (trace data displayed on the screen) selected from Spectrum/Power vs Time/Freq. vs Time/Spectrogram/CCDF

If Sub-Trace is displayed, Sub-Trace data is saved at the same time.

Default file name

WaveDataYYYYMMDD_NNN.csv: YYYYMMDD is a date and NNN is a suffix number.

Save folder

\Anritsu Corporation\Signal Analyzer\User Data\Trace Data\Signal Analyzer

Table F-1 Spectrum trace file information

<table>
<tr><th>Line number</th><th colspan="2">Recorded Information</th><th>Remarks</th></tr>
<tr><td>1</td><td colspan="2">"Main-Trace", "Start Freq (Hz)", "Stop Freq (Hz)", "Center Freq (Hz)", "Span Freq (Hz)"</td><td>Data title</td></tr>
<tr><td>2</td><td colspan="2">The data for the above</td><td>Main-Trace: "Spectrum"</td></tr>
<tr><td>3</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>4</td><td colspan="2">"Analysis Start Time (ms)", "Analysis Time Length (ms)", "Capture Time (ms)", "ATT (dB)"</td><td>Data title</td></tr>
<tr><td>5</td><td colspan="2">The data for the above</td><td></td></tr>
<tr><td>6</td><td colspan="2">Blank</td><td></td></tr>
<tr><td rowspan="2">7</td><td>When Scale = Log</td><td>When Scale = Lin</td><td rowspan="2">Data title
Without Preamplifier option installed,
"Pre-Amp" not displayed.</td></tr>
<tr><td>Log Scale Unit display
"Ref Level (dBm)", "Pre-Amp"
or "Ref Level (dBuV)", "Pre-Amp"
or "Ref Level (dBmV)", "Pre-Amp"
or "Ref Level (dBmV)", "Pre-Amp"
or "Ref Level (V)", "Pre-Amp"
or "Ref Level (W)", "Pre-Amp"
or "RefLevel (dBuV (emf))", "Pre-Amp"
or "Ref Level (dBuV/m)", "Pre-Amp"</td><td>"Ref Level (V)", "Pre-Amp"</td></tr>
<tr><td>8</td><td>The data for the above</td><td>The data for the above</td><td>Reference level (Log): 0.001 dB resolution
Reference level (Lin): A three-digit index is displayed.

Pre-Amp: "On" or "Off"</td></tr>
<tr><td>9</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>10</td><td colspan="2">"RBW (Hz)", "Marker Result"</td><td>Data title</td></tr>
<tr><td>11</td><td colspan="2">The data for the above</td><td>Marker Result:
"Integration" or "Density" or "Peak (Fast)" or "Peak (Accuracy)"</td></tr>
<tr><td>12</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>13</td><td colspan="2">"Detection", "Trace Point"</td><td>Data title</td></tr>
<tr><td>14</td><td colspan="2">The data for the above</td><td>Detection: "Average" or "Positive" or "Negative"</td></tr>
</table>

Table F-1 Spectrum trace file information (Cont'd)

Line number	Recorded Information		Remarks
15	Blank		
16	"Storage Mode"		Data title
17	The data for the above		Storage Mode: "Lin Average" or "Max Hold" or "Min Hold" or "Off"
18	Blank		
19	When Scale = Log	When Scale = Lin	Data title
	"Wave Data (dBm)"	"Wave Data (V)"	
20	Trace data at the Trace Point – 0 position (Log)	Trace data at the Trace Point – 0 position (Lin)	Trace data (Log): 0.001 dBm resolution Trace data (Lin): A three-digit index is displayed. Includes Offset value
–	–	–	
20 + Trace Point – 1	Trace data at the Trace Point – 1 position (Log)	Trace data at the Trace Point – 1 position (Lin)	Same as above

Table F-2 Power vs Time trace file information

Line number	Recorded Information		Remarks
1	"Main-Trace", "Center Freq (Hz)", "Span Freq (Hz)"		Data title
2	The data for the above		Main-Trace: "Power vs Time"
3	Blank		
4	"Analysis Start Time (ms)", "Analysis Time Length (ms)", "Capture Time (ms)", "ATT (dB)"		Data title
5	The data for the above		
6	Blank		
7	When Scale = Log Same as Spectrum trace	When Scale = Lin Same as Spectrum trace	Data title Same as Spectrum trace
8	The data for the above	The data for the above	Same as Spectrum trace
9	Blank		
10	"Filter Type", "Roll-off Factor", "Bandwidth (Hz)", "Freq. Offset (Hz)", "Smoothing", "Time Length (us)"		Data title
11	Filter Type, Roll-off Factor, Bandwidth, Freq Offset, Smoothing, Smoothing Time Length		Filter Type: "Rect" or "Gaussian" or "Nyquist" or "Root Nyquist" or "Off" Roll-off Factor: 0.01 resolution Smoothing: "On" or "Off"
12	Blank		
13	"Detection", "Trace Point"		Data title
14	The data for the above		Detection: "Pos&Neg" or "Positive" or "Negative" or "Average"
15	Blank		

Table F-2 Power vs Time trace file information (Con’d)

<table>
<tr><th>Line number</th><th colspan="2">Recorded Information</th><th>Remarks</th></tr>
<tr><td>16</td><td colspan="2">“Storage Mode”</td><td>Data title</td></tr>
<tr><td>17</td><td colspan="2">The data for the above</td><td>Storage Mode: “Lin Average” or “Max Hold” or “Min Hold” or “Off”</td></tr>
<tr><td>18</td><td colspan="2">Blank</td><td></td></tr>
<tr><td rowspan="2">19</td><td>When Scale = Log</td><td>When Scale = Lin</td><td rowspan="2">Data title</td></tr>
<tr><td>“Wave Data (dBm)”, “(neg)”</td><td>“Wave Data (V)”, “(neg)”</td></tr>
<tr><td>20</td><td>Trace data at the Trace Point – 0 position (Log), trace data (Log-neg)</td><td>Trace data at the Trace Point – 0 position (Lin), trace data (Lin-neg)</td><td>Trace data (Log): 0.001 dBm resolution
Trace data (Lin): A three-digit index is displayed.
Trace data (Log-neg): Neg data that is only recorded when Detection = Pos&Neg
Trace data (Lin-neg): Neg data that is only recorded when Detection = Pos&Neg and that is displayed as a three-digit index

Includes Offset value</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td></td></tr>
<tr><td>20 + Trace Point – 1</td><td>Trace data at the Trace Point – 1 position (Log), trace data (Log-neg)</td><td>Trace data at the Trace Point – 1 position (Lin), trace data (Lin-neg)</td><td>Same as above</td></tr>
</table>

Table F-3 Freq vs Time trace file information

Line number	Recorded Information		Remarks
1	"Main-Trace", "Center Freq (Hz)", "Span Freq (Hz)"		Data title
2	The data for the above		Main-Trace: "Frequency vs Time"
3	Blank		
4	"Analysis Start Time (ms)", "Analysis Time Length (ms)", "Capture Time (ms)", "ATT (dB)"		Data title
5	The data for the above		
6	Blank		
7	When Scale = Log Same as Spectrum trace	When Scale = Lin Same as Spectrum trace	Data title Same as Spectrum trace
8	The data for the above	The data for the above	Same as Spectrum trace
9	Blank		
10	"Bandwidth (Hz)", "Freq. Offset (Hz)", "Smoothing", "Time Length (us)"		Data title
11	The data for the above		Smoothing: "On" or "Off" Time Length: Smoothing Time Length
12	Blank		
13	"Detection", "Trace Point"		Data title
14	The data for the above		Detection: "Pos&Neg" or "Positive" or "Negative" or "Average"
15	Blank		
16	"Storage Mode"		Data title
17	The data for the above		Storage Mode: "Lin Average", "Max Hold", "Min Hold", "Off"
18	Blank		

Table F-3 Freq vs Time trace file information (Con'd)

Line number	Recorded Information		Remarks
19	When Scale Unit = Hz	When Scale Unit = ΔHz	Data title
	"Wave Data (Hz)", "(neg)"	"Wave Data (Delta Hz)", "(neg)"	
20	Trace data at the Trace Point – 0 position (Hz), trace data (Hz-neg)	Trace data at the Trace Point – 0 position (Delta Hz), trace data (Delta Hz-neg)	Trace data (Hz): 0.001 Hz resolution Trace data (Delta Hz): 0.001 Hz resolution Trace data (Hz-neg): Neg data that is only recorded when Detection = Pos&Neg Trace data (Delta Hz-neg): Neg data that is only recorded when Detection = Pos&Neg
–	–	–	
20 + Trace Point – 1	Trace data at the Trace Point – 1 position (Hz), trace data (Hz-neg)	Trace data at the Trace Point – 1 position (Delta Hz), trace data (Delta Hz-neg)	Same as above

Table F-4 Phase vs Time trace file information

Line number	Recorded Information		Remarks
1	"Main-Trace", "Center Freq (Hz)", "Span Freq (Hz)"		Data title
2	The data for the above		Main-Trace: "Phase vs Time"
3	Blank		
4	"Analysis Start Time (ms)", "Analysis Time Length (ms)", "Capture Time (ms)", "ATT (dB)"		Data title
5	The data for the above		
6	Blank		
7	When Scale = Log Same as Spectrum trace	When Scale = Lin Same as Spectrum trace	Data title Same as Spectrum trace
8	The data for the above	The data for the above	Same as Spectrum trace
9	Blank		
10	"Bandwidth (Hz)"		Data title
11	The data for the above		
12	Blank		
13	"Detection", "Trace Point"		Data title
14	The data for the above		Detection: "Positive" or "Negative" or "Sample" or "Average"
15	Blank		
16	"Storage Mode"		Data title
17	The data for the above		Storage Mode: "Off"
18	Blank		

Table F-4 Phase vs Time trace file information (Cont'd)

Line number	Recorded Information		Remarks
19	"Phase Offset"		Data title
20	The data for the above		
21	Blank		
22	"Wave Data (degree)"		Data title
23	Trace data at the Trace Point – 0 position (degree)		Trace data (degree): 0.001 degree resolution
–	–	–	
23 + Trace Point – 1	Trace data at the Trace Point – 1 position (degree)		Same as above

Table F-5 Spectrogram trace file information

Line number	Recorded Information		Remarks
1	"Main-Trace", "Start Freq (Hz)", "Stop Freq (Hz)","Center Freq (Hz)", "Span Freq (Hz)"		Data title
2	The data for the above		Main-Trace: "Spectrogram"
3	Blank		
4	"Analysis Start Time (ms)", "Analysis Time Length (ms)", "Capture Time (ms)", "ATT (dB)"		Data title
5	The data for the above		
6	Blank		
7	When Scale = Log	When Scale = Lin	Data title
	Same as Spectrum trace	Not available	Same as Spectrum trace
8	The data for the above	The data for the above	Same as Spectrum trace
9	Blank		
10	"RBW (Hz)", "Marker Result"		Data title
11	The data for the above		Marker Result: "Integration" or "Density" or "Peak (Fast)" or "Peak (Accuracy) "
12	Blank		
13	"Detection", "Freq Trace Point", "Time Trace Point"		Data title
14	The data for the above		Detection: "Average" or "Positive" or "Negative"
15	Blank		
16	"Storage Mode"		Data title
17	The data for the above		Storage Mode: "Lin Average" or "Max Hold" or "Min Hold" or "Off"
18	Blank		

Table F-5 Spectrogram trace file information (Cont'd)

Line number	Recorded Information	Remarks
19	"Wave Data Time Trace 0 (dBm)", "Wave Data Time Trace 1 (dBm)", ……"Wave Data Time Trace 0 (dBm)", "Wave Data Time Trace" + NT-1 + "(dBm)"	Data title NT is the number of trace points in the time direction.
20	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point 0 position in the frequency direction	Trace data (Log): 0.001 dB resolution NT is the number of trace points in the time direction. Includes Offset value
21	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point 1 position in the frequency direction<	Same as above
	–	–
20 + NF – 1	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point NF - 1 position in the frequency direction	NF is the trace point in the frequency direction.

Table F-6 CCDF trace file information

<table>
<tr><th>Line number</th><th colspan="2">Recorded Information</th><th>Remarks</th></tr>
<tr><td>1</td><td colspan="2">“Main-Trace”, “Center Freq (Hz)”, “Span Freq (Hz)”</td><td>Data title</td></tr>
<tr><td>2</td><td colspan="2">The data for the above</td><td>Main-Trace: “CCDF”</td></tr>
<tr><td>3</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>4</td><td colspan="2">“Analysis Start Time (ms)”, “Analysis Time (ms)”, “Capture Time (ms)”, “ATT (dB)”</td><td>Data title</td></tr>
<tr><td>5</td><td colspan="2">The data for the above</td><td>Same as Spectrum trace</td></tr>
<tr><td>6</td><td colspan="2">Blank</td><td></td></tr>
<tr><td rowspan="2">7</td><td>When Scale = Log</td><td>When Scale = Lin</td><td rowspan="2">Data title
Same as Spectrum trace</td></tr>
<tr><td>Same as Spectrum trace</td><td>Same as Spectrum trace</td></tr>
<tr><td>8</td><td>The data for the above</td><td>The data for the above</td><td>Same as Spectrum trace</td></tr>
<tr><td>9</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>10</td><td colspan="2">“Method”, “Filter Type”, “Bandwidth (Hz)”, “Freq. Offset (Hz)”</td><td>Data title</td></tr>
<tr><td>11</td><td colspan="2">The data for the above</td><td>Method: “CCDF” or “APD”
Filter Type: “Rect” or “Off”</td></tr>
<tr><td>12</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>13</td><td colspan="2">“Data Count”</td><td>Data title</td></tr>
<tr><td>14</td><td colspan="2">The data for the above</td><td></td></tr>
<tr><td>15</td><td colspan="2">Blank</td><td></td></tr>
<tr><td>16</td><td colspan="2">“Avg. Power (dBm)”, “Max Power (dBm)”, “Crest Factor (dB)”</td><td>Data title</td></tr>
<tr><td>17</td><td colspan="2">The data for the above</td><td>Includes Offset value</td></tr>
<tr><td>18</td><td colspan="2">Blank</td><td></td></tr>
</table>

Table F-6 CCDF trace file information (Cont'd)

Line number	Recorded Information				Remarks
19	"Wave Data (%)", "(Reference)"				Data title When Reference Trace = Off, "(Reference)" is not recorded.
20	When Method = APD		When Method = CCDF		Trace data (Log): 0.0001% resolution When Reference Trace = Off, Reference Trace data is not recorded.
	Accumulated value (%) at –50.00 dB	Accumulated Reference Trace value (%) at –50.00 dB	Accumulated value (%) at 0.00 dB	Accumulated Reference Trace value (%) at 0.00 dB	
21	Accumulated value (%) at –49.99 dB	Accumulated Reference Trace value (%) at –49.99 dB	Accumulated value (%) at 0.01 dB	Accumulated Reference Trace value (%) at 0.01 dB	Same as above
–	–	–	–	–	
5020	Accumulated value (%) at 00.00 dB	Accumulated Reference Trace value (%) at 00.00 dB	Accumulated value (%) at 50.00 dB	Accumulated Reference Trace value (%) at 50.00 dB	Same as above
–	–	–	-	-	
10020	Accumulated value (%) at 50.00 dB	Accumulated Reference Trace value (%) at 50.00 dB	-	-	Same as above

Appendix

Appendix F

When a sub-trace is displayed, the information below is recorded after the last main trace line.

Table F-7 Additional Power vs Time trace file information when Sub-Trace is displayed

Line number	Recorded Information		Remarks
+1	Blank		
+2	“Sub-Trace”		Data title
+3	“Power vs Time”		
+4	Blank		
+5	“Analysis Start Time (ms)”, “Analysis Time (ms)”		Data title
+6	The data for the above		Same as Spectrum trace
+7	Blank		
+8	Blank		
+9	“Detection”, “Trace Point”		Data title
+10	The data for the above		Detection: “Pos&Neg” or “Positive” or “Negative” or “Average”
+11	Blank		
+12	When Scale = Log	When Scale = Lin	Data title
	“Wave Data (dBm)”, “(neg)”	“Wave Data (V)”, “(neg)”	
+13	Trace data at the Trace Point – 0 position (Log), trace data (Log-neg)	Trace data at the Trace Point – 0 position (Lin), trace data (Lin-neg)	Trace data (Log): 0.001 dB resolution Trace data (Lin): A three-digit index is displayed. Trace data (Log-neg): Neg data that is only recorded when Detection = Pos&Neg Trace data (Lin-neg): Neg data that is only recorded when Detection = Pos&Neg and that is displayed as a three-digit index Includes Offset value
–	–	–	
+13 + Trace Point – 1	Trace data at the Trace Point – 1 position (Log), trace data (Log-neg)	Trace data at the Trace Point – 1 position (Lin), trace data (Lin-neg)	Same as above

When a sub-trace is displayed, the information below is recorded after the last main trace line.

Table F-8 Additional Spectrogram trace file information when Sub-Trace is displayed

Line number	Recorded Information	Remarks
+1	Blank	
+2	“Sub-Trace”	Data title
+3	“Spectrogram”	
+4	Blank	
+5	“Analysis Start Time (ms)”, “Analysis Time (ms)”	Data title
+6	The data for the above	Same as Spectrum trace
+7	Blank	
+8	“RBW (Hz)”	Data title
+9	The data for the above	
+10	Blank	
+11	“Detection”, “Trace Point”	Data title
+12	The data for the above	Detection: “Pos&Neg” or “Positive” or “Negative” or “Average”
+13	Blank	
+14	“Wave Data Time Trace 0 (dBm)”, “Wave Data Time Trace 1 (dBm)”, ……“Wave Data Time Trace 0 (dBm)”, “Wave Data Time Trace” + NT-1 + “(dBm)”	Data title NT is the number of trace points in the time direction.
+15	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point 0 position in the frequency direction	Trace data (Log): 0.001 dB resolution NT is the number of trace points in the time direction. Includes Offset value
+16	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point 1 position in the frequency direction	Same as above
–	–	–
15 + NF – 1	……The time-direction trace data (Log)[0], (Log)[1], and (Log)[NT-1] at the trace point NF - 1 position in the frequency direction	NF is the trace point in the frequency direction.<

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Symbol and Numbers

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