MX269021A
LTE Uplink Measurement Software
Operation Manual
Operation

18th 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 MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation), MS2830A Signal Analyzer Operation Manual (Mainframe Operation), or MS2850A Signal Analyzer Operation Manual (Mainframe Operation). Please also refer to them before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-W3015AE-18.0

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.

MX269021A
LTE Uplink Measurement Software
Operation Manual Operation

29 October 2007 (First Edition)
30 September 2020 (18th Edition)

Copyright © 2007-2020, ANRITSU CORPORATION.
All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.
The operational instructions of this manual may be changed without prior notice.
Printed in Japan

Equipment Certificate

Anritsu Corporation guarantees that this equipment was inspected at shipment and meets the published specifications.

Anritsu Warranty

- During the warranty period, Anritsu Corporation will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is 6 months from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for damage or financial loss of the customer due to the use of or a failure to use this equipment, unless the damage or loss is caused due to Anritsu Corporation’s intentional or gross negligence.

Anritsu Corporation Contact

In the event that this equipment malfunctions, please contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the PDF version.

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.

Software End-User License Agreement (EULA)

Please carefully read and accept this Software End-User License Agreement (hereafter this EULA) before using (includes executing, copying, installing, registering, etc.) this Software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment, etc.). By using this Software, you shall be deemed to have agreed to be bound by the terms of this EULA, and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu specified equipment (hereafter Equipment) for the purposes set out in this EULA.

Article 1. Grant of License and Limitations

1. You may not to sell, transfer, rent, lease, lend, disclose, sublicense, or otherwise distribute this Software to third parties, whether or not paid therefor.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer, disassemble, decompile, modify or create derivative works of this Software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

Article 2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for direct, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, and damages claimed by third parties, arising out of or related to your use or inability to use this Software, unless the damages are caused due to Anritsu's intentional or gross negligence.

Article 3. Limitation of Liability

1. If a fault (bug) is discovered in this Software, failing this Software to operate as described in the operation manual or specifications even though you have used this Software as described in the manual, Anritsu shall at its own discretion, fix the bug, or replace the software, or suggest a workaround, free-of-charge, provided, however, that the faults caused by the following items and any of your lost or damaged data whatsoever shall be excluded from repair and the warranty.
   i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
   ii) If this Software has been used in conjunction with other non-Anritsu-approved software.
   iii) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
   iv) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, or any devices other than this Equipment, etc.
2. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs or replacement by Anritsu engineers necessitated by the above faults shall be borne by you.
3. The warranty period for faults listed in Section 1 of this Article shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair or replacement, whichever is longer.

Article 4. Export Restrictions

You shall not use or otherwise export or re-export directly or indirectly this Software except as authorized by the laws and regulations of Japan and the United States, etc. In particular, this Software shall not be exported or re-exported (a) into any Japan or US embargoed countries or (b) to anyone restricted by the Japanese export control regulations, or the US Treasury Department's list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. In using this Software, you warrant that you are not located in any such embargoed countries or on any such lists. You also agree that you will not use or otherwise export or re-export this Software for any purposes prohibited by the Japanese and US laws and regulations, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction, and conventional weapons.

Article 5. Change of Terms

Anritsu may change without your approval the terms of this EULA if the changes are for the benefit of general customers, or are reasonable in light of the purpose of this EULA and circumstances of the changes. At the time of change, Anritsu will inform you of those changes and its effective date, as a general rule 45 days, in advance on its website, or in writing or by e-mail.

Article 6. Termination

1. Anritsu may terminate this EULA immediately if you violate any conditions described herein. This EULA shall also be terminated immediately by Anritsu if there is any good reason that it is deemed difficult to continue this EULA, such as your violation of Anritsu copyrights, patents, etc. or any laws and ordinances, or if it turns out that you belong to an antisocial organization or has a socially inappropriate relationship with members of such organization.
2. You and Anritsu may terminate this EULA by a written notice to the other party 30 days in advance.

Article 7. Damages

If Anritsu suffers any damages or loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

Article 8. Responsibility after Termination

Upon termination of this EULA in accordance with Article 6, you shall cease all uses of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

Article 9. Negotiation for Dispute Resolution

If matters of interpretational dispute or items not covered under this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

Article 10. Governing Law and Court of Jurisdiction

This EULA shall be governed by and interpreted in accordance with the laws of Japan without regard to the principles of the conflict of laws thereof, and any disputes arising from or in relation to this EULA that cannot be resolved by negotiation described in Article 9 shall be subject to and be settled by the exclusive agreed jurisdiction of the Tokyo District Court of Japan.

Revision History:

February 29th, 2020

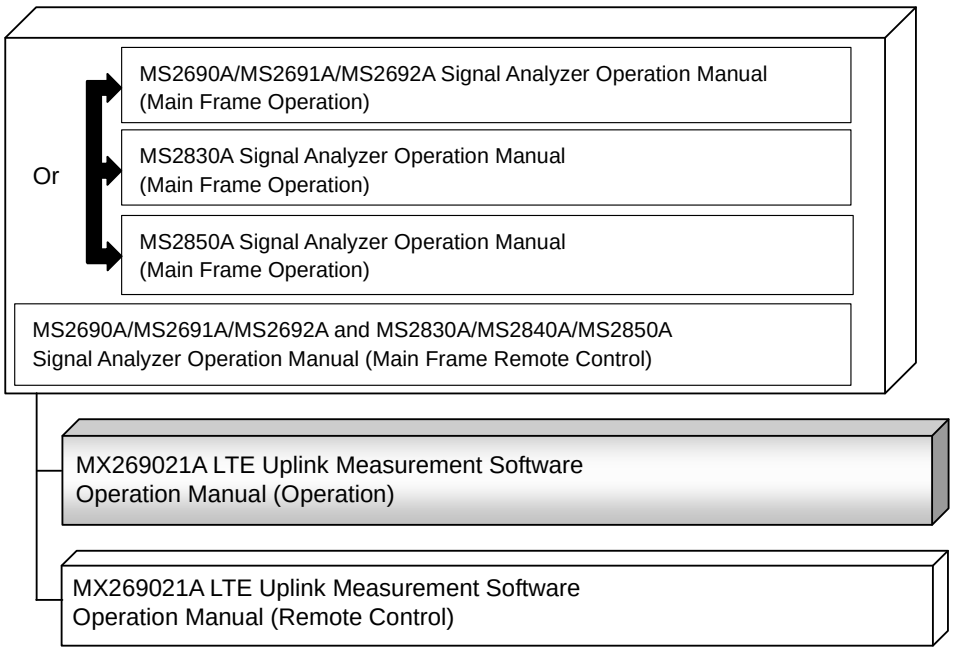
Cautions Against Computer Virus Infection

- 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 flash drive 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.
- Protection against malware (malicious software such as viruses).
  This equipment runs on Windows Operating System.
  To connect this equipment to network, the following is advised.
  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

About This Manual

■ **Composition of Operation Manuals**

The operation manuals for the MX269021A LTE Uplink Measurement Software are comprised as shown in the figure below.



- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)

These manuals describe basic operating methods, maintenance procedures, common functions, and common remote control of the signal analyzer mainframe.

- LTE Uplink Measurement Software Operation Manual (Operation)

<This document>

This manual describes basic operating methods, and functions of the LTE Uplink Measurement Software.

- LTE Uplink Measurement Software Operation Manual (Remote Control)

This manual describes remote control of the LTE Uplink Measurement Software.

Convention Used in This Manual

Throughout this document, the use of MS269x Series is assumed unless otherwise specified. If using MS2830A or MS2850A, change MS269xA to read MS2830A, MS2850A.

In this document, [ ] indicates a panel key.

Table of Contents

About This Manual..... I

Chapter 1 Overview..... 1-1

1.1 Product Overview 1-2
1.2 Product Configuration 1-3
1.3 Specifications..... 1-4

Chapter 2 Preparation..... 2-1

2.1 Part Names..... 2-2
2.2 Signal Path Setup 2-14
2.3 Application Startup and Selection..... 2-15
2.4 Initialization and Calibration..... 2-16

Chapter 3 Measurement 3-1

3.1 Basic Operation 3-3
3.2 Setting Frequency..... 3-6
3.3 Setting Level 3-11
3.4 Capturing IQ Data..... 3-13
3.5 Setting Common Items 3-17
3.6 Setting Measurement Items..... 3-45
3.7 Setting Marker..... 3-80
3.8 Setting Trigger 3-86
3.9 EVM 3-89
3.10 Constellation 3-92
3.11 EVM vs Subcarrier..... 3-95
3.12 EVM vs Symbol..... 3-98
3.13 Time Based EVM..... 3-100
3.14 EVM vs Demod-Symbol..... 3-101
3.15 Spectral Flatness 3-102
3.16 In-Band Emission..... 3-104
3.17 Summary..... 3-106
3.18 Power vs Time Display 3-129
3.19 Power vs Time - Burst 3-132
3.20 Power vs Time - Transient..... 3-134
3.21 Saving Measurement Results..... 3-136

Chapter 4 Digitize Function 4-1
4.1 Saving IQ Data 4-2
4.2 Replay Function 4-7

Chapter 5 Performance Test 5-1
5.1 Overview of Performance Test 5-2
5.2 Performance Test Items 5-3

Chapter 6 Other Functions 6-1
6.1 Selecting Other Functions 6-2
6.2 Setting Title 6-2
6.3 Erasing Warmup Message 6-2

Appendix A Error Messages A-1

Appendix B Default Value List B-1

Appendix C LTE Uplink Signal Configuration C-1

Appendix D Measurement Results D-1

Index Index-1

IV.

Chapter 1 Overview

This chapter provides an overview of the MX269021A LTE Uplink Measurement Software and describes the product configuration.

1.1 Product Overview 1-2
1.2 Product Configuration 1-3
1.2.1 Standard configuration 1-3
1.2.2 Option 1-3
1.2.3 Applicable parts 1-3
1.3 Specifications 1-4

1.1 Product Overview

The MS2690/MS2691/MS2692A, MS2830A, or MS2850A Signal Analyzer enables high-speed, high-accuracy, and simple measurements of transmission characteristics of base stations and mobile stations for various mobile communications types. The MS2690A/MS2691A/MS2692A, MS2830A, or MS2850A is equipped with high-performance signal analyzer and spectrum analyzer functions as standard, with optional measurement software allowing modulation analysis functionality supporting various digital modulation modes.

The MX269021A LTE Uplink Measurement Software (hereinafter, referred to as "MX269021A") is a software option for measuring RF characteristics of LTE (FDD) Uplink specified by 3GPP.

The MX269021A provides the following measurement features.

- Modulation accuracy measurement
- Carrier frequency measurement
- Transmitter power measurement

MS2830A-005/105 and MS2830A-006/106 is required to use the MX269021A on MS2830A.

1.2 Product Configuration

1.2.1 Standard configuration

Table 1.2.1-1 lists the standard configuration of the MX269021A.

Table 1.2.1-1 Standard configuration

Item	Model Name/Symbol	Product Name	Q'ty	Remarks
Application	MX269021A	LTE Uplink Measurement Software	1	
Accessory	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Option

Tables 1.2.2-1 list the option for the MX269021A. This is sold separately.

Table 1.2.2-1 Option

Option No.	Product Name	Remarks
MX269021A-001	LTE-Advanced FDD Uplink Measurement Software	Only for MS269xA, MS2830A, MS2850A

1.2.3 Applicable parts

Table 1.2.3-1 lists the applicable parts for the MX269021A.

Table 1.2.3-1 Applicable parts

Model Name /Symbol	Product Name	Remarks
W3015AE	MX269021A LTE Uplink Measurement Software Operation Manual (Operation)	English, printed version
W3065AE	MX269021A LTE Uplink Measurement Software Operation Manual (Remote Control)	English, printed version

1.3 Specifications

Table 1.3-1 shows the specifications for the MX269021A.
When MS2830A, MS2850A is used, this software's specification is specified by the condition below, unless otherwise noted.

Attenuator Mode: Mechanical Atten Only

Table 1.3-1 Specifications

Item	Specification
Common Specifications	
Channel bandwidth	1.4, 3, 5, 10, 15, 20 MHz
Target signal	Uplink
Span setting	The LTE-Advanced is selectable when MX269021A-001 is installed. When LTE is selected: Span = 31.25 MHz fixed When LTE-Advanced is selected, and when Option 077/177/078/178 is not installed: Span = 31.25 MHz When LTE-Advanced is selected, and when Option 077/177 is installed: Span = 62.5 MHz When LTE-Advanced is selected, and when Option 078/178 is installed, or When LTE-Advanced is selected and MS2850A: Span = 125 MHz
Capture Time	The condition "When Span = 62.5 MHz and 125 MHz" is applied when MX269021A-001 is installed. ・When Span = 31.25 MHz Capture Time = Auto: 1 Frame Capture Time = Manual: 1 to 200 Frame ・When Span = 62.5 MHz Capture Time = Auto: 1 Frame Capture Time = Manual: 1 to 100 Frame ・When Span = 125 MHz Capture Time = Auto: 1 Frame Capture Time = Manual: 1 to 50 Frame

Table 1.3-1 Specifications (Continued)

Item	Specification
Modulation/Frequency Measurement	
Measurement frequency ranges	MS269x Series: 400 to 5000 MHz MS2830A: 400 to 5000 MHz MS2830A-040: 400 to 3600 MHz MS2850A: 400 to 5000 MHz (Span = 31.25 MHz) 800 to 5000 MHz (Span = 62.5 MHz or 125 MHz)
Measurement level range	MS269x Series: –15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) –15 to +10 dBm (at Pre-Amp On) MS2830A: –15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) MS2850A: –15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) –15 to +10 dBm (at Pre-Amp On)

Table 1.3-1 Specifications (Continued)

Item	Specification
Carrier frequency accuracy	After CAL execution at 18 to 28°C For a signal of EVM = 1% For Measurement Interval = 10 Subframe MS269x Series: ±(accuracy of reference frequency × carrier frequency + 8 Hz) MS2830A: ±(accuracy of reference frequency × carrier frequency + 8 Hz) (At the input level is –4 dBm when MS2830A-045 is installed) MS2850A: ±(accuracy of reference frequency × carrier frequency + 8 Hz)
Residual EVM	After CAL execution at 18 to 28°C, For Measurement Interval = 10 Subframe The condition "When Span = 62.5 MHz or 125 MHz" is applied when MX269021A-001 is installed. MS269x Series: <1.0% (rms) (When Span = 31.25 MHz) <1.3% (rms) (When Span = 62.5 MHz or 125 MHz) MS2830A: <1.2% (rms) (When Span = 31.25 MHz) <1.3% (rms) (When Span = 62.5 MHz or 125 MHz) (At the input level is –4 dBm when MS2830A-045 is installed) MS2850A: <1.3% (rms) (When Span = 31.25 MHz) <1.3% (rms) (When Span = 62.5 MHz or 125 MHz)
Transmitter power accuracy	After CAL execution, input attenuator ≥ 10 dB, at 18 to 28°C, the input signal measured is within the measurement level range and below the value set in Input Level, when Span = 31.25 MHz. MS269x Series: ±0.6 dB (at Pre-Amp Off, or Pre-Amp not installed.) ±1.1 dB (at Pre-Amp On) MS2830A: ±0.6 dB (at Pre-Amp Off, or Pre-Amp not installed.) MS2850A: ±0.6 dB (at Pre-Amp Off, or Pre-Amp not installed.) ±1.1 dB (at Pre-Amp On) Transmitter power accuracy is calculated from an RSS (root summed square) error of the absolute amplitude accuracy and the in-band frequency characteristics of the MS2690A/MS2691A/MS2692A, MS2830A, or MS2850A.
Measurement target channel signal	Measurement target channel When LTE is selected: PUSCH, PUCCH, SRS, PRACH When LTE-Advanced is selected: PUSCH, PUCCH Measures and displays the result per channel. The channel setting is mutually exclusive.

Table 1.3-1 Specifications (Continued)

Item	Specification
Waveform display	Provides functions for displaying waveforms below. Constellation EVM vs Subcarrier EVM vs Symbol Time Based EVM EVM vs Demod-Symbol Spectral Flatness In-Band Emission Power vs Time
Adjacent Channel Power Measurement	
Measurement method	Executes the adjacent channel power measurement function of the Spectrum Analyzer or Signal Analyzer.
Occupied Bandwidth Measurement	
Measurement method	Executes the occupied bandwidth measurement function of the Spectrum Analyzer or Signal Analyzer.
Channel Power Measurement	
Measurement method	Executes the channel power measurement function of the Spectrum Analyzer or Signal Analyzer.
Spectrum Emission Mask Measurement	
Measurement method	Executes the spectrum emission mask measurement function of the Spectrum Analyzer.
Digitize function	
Function overview	Capable of outputting captured waveform data to internal storage device or external storage device.
Waveform data	Format: I, Q (32 bit floating point binary format) Level: Assumes as $\sqrt{I^2+Q^2}$ = 1 for 0 dBm input Level accuracy: Same as the absolute amplitude accuracy and in-band frequency characteristics of the signal analyzer.

Table 1.3-1 Specifications (Continued)

Item	Specification
Replay Function	
Function overview	Analyzes traces of saved waveform data Format: I, Q (32 bit floating point binary format) Sampling rate: The condition "When Span = 62.5 MHz and 125 MHz" is applied when MX269021A-001 is installed. MS269xA, MS2830A 50 MHz (when Span = 31.25 MHz) 100 MHz (when Span = 62.5 MHz) 200 MHz (when Span = 125 MHz) MS2850A 50 MHz (when Span = 31.25 MHz) 81.25 MHz (when Span = 62.5 MHz) 162.5 MHz (when Span = 125 MHz)
Component Carrier (CC) allocated condition	
Maximum number of CCs	2
Channel bandwidth of each CC	1.4, 3, 5, 10, 15, 20 MHz
Frequency offset range of each CC	–(Span – Channel bandwidth of each CC)/2 to (Span – Channel bandwidth of each CC)/2

Chapter 2 Preparation

This chapter describes the preparations required for using the application you are using. Refer to the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)*, *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* or *MS2850A Signal Analyzer Operation Manual (Mainframe Operation)* for common features not included in this manual.

2.1 Part Names 2-2
2.1.1 Front panel 2-2
2.1.2 Rear panel 2-9
2.2 Signal Path Setup 2-14
2.3 Application Startup and Selection 2-15
2.3.1 Launching application 2-15
2.3.2 Selecting application 2-15
2.4 Initialization and Calibration 2-16
2.4.1 Initialization 2-16
2.4.2 Calibration 2-16

2.1 Part Names

This section describes the panel keys for operating the instrument and connectors used to connect external devices. For general points of caution, refer to the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)*, *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* or *MS2850A Signal Analyzer Operation Manual (Mainframe Operation)*.

2.1.1 Front panel

This section describes the front-panel keys and connectors.

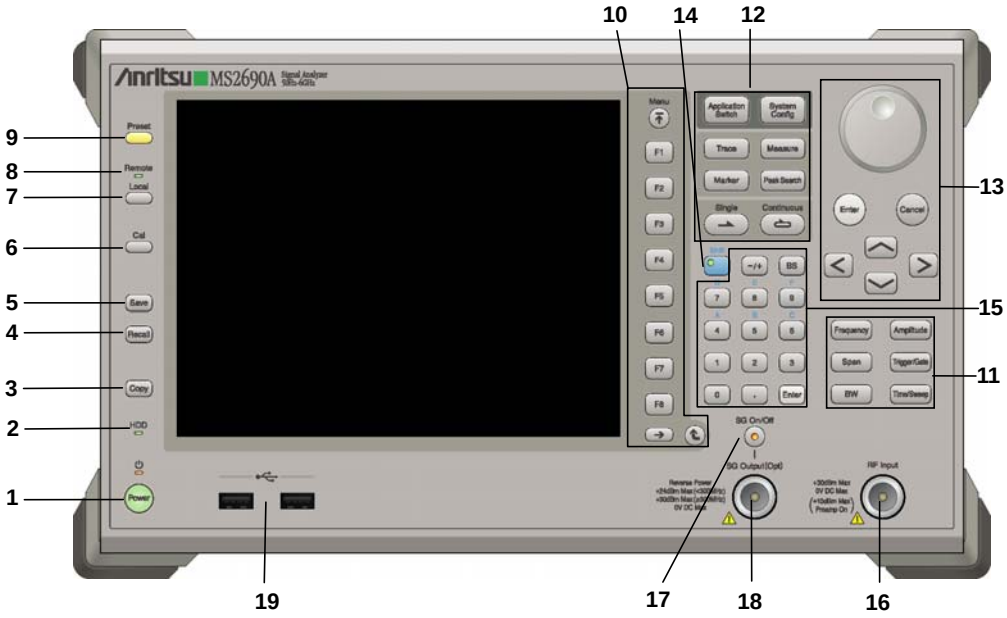


Figure 2.1.1-1 MS269x series front panel

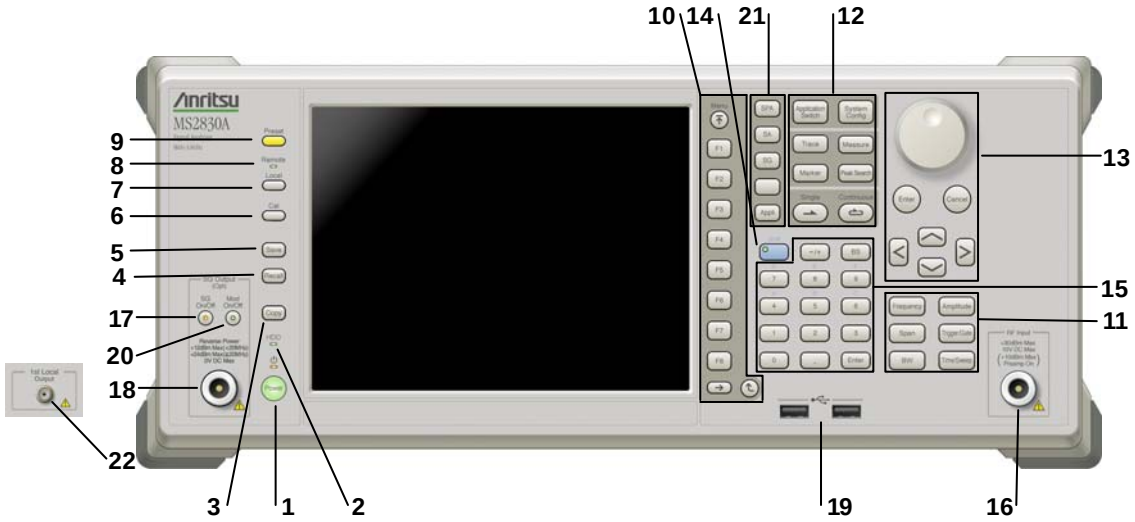


Figure 2.1.1-2 MS2830A/MS2850A front panel (MS2830A Example)

1

Power Switch

Press to switch between the standby state (AC power supplied) and power-on state. The Power lamp lights orange at Standby and green at Power On. Press the power switch for about 2 seconds.

2

Hard disk access lamp (MS269x series, MS2830A)

Lights up when the internal hard disk is accessed.

SSD access lamp (MS2850A)

Lights up when the internal SSD is accessed .

3

Copy key

Press to capture display screen and save to file.

4

Recall key

Press to recall parameter file.

5

Save key

Press to save parameter file.

6

Cal key

Press to display the Calibration menu.

7

Local key

Press to return to local operation from remote control via GPIB, Ethernet, or USB (B), and enable panel settings.

8

Remote lamp

Lights when in remote-control state.

9

Preset key

Resets parameters to initial settings.

10

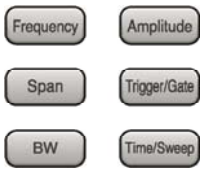
Function keys

Selects or configures function menu displayed on the right of the screen. The function menu is provided in multiple pages and layers.

Press → to fetch next function menu page. The current page number is displayed at the bottom of the function menu, as in “1 of 2”.

Sub-menus may be displayed when a function menu is pressed. Press ↩ to go back to the previous menu. Press Menu to go back to the top menu.

11



Main function keys 1

Press to set or execute main functions.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Frequency Press to set frequency parameters.

Amplitude Press to set level parameters.

Span No function is assigned to this key.

Trigger/Gate Press to set trigger parameters.

BW No function is assigned to this key.

Time/Sweep Press to set measurement item parameters.

12

Main function keys 2

Press to set or execute main functions.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Application Switch Press to switch application.

System Config Press to display Configuration screen.

Trace Press to set the trace items or to switch the operation window.

Measure Press to set measurement item parameters.

Marker Use when switching graph marker operation.

Peak Search Press to set parameters related to the peak search function.

Single Press to start single measurement.

Continuous Press to start continuous measurements.

13

Rotary knob/Cursor key/Enter key/Cancel key

The rotary knob and cursor keys select display items or change settings.

Press Enter to set the entered or selected data.

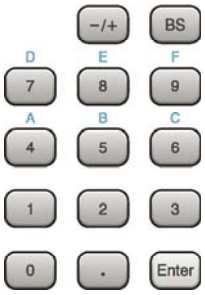
Press Cancel to cancel input or selected data.

14

Shift key

Operates keys with functions in blue characters on panel. Press the Shift key so the key lamp is green and then press the target key.

15



Numeric keypad

Enters numbers on parameter setup screens.

Press BS to delete the last entered digit or character.

[A] to [F] can be entered by pressing keys 4 to 9 while the Shift key lamp Shift is green.

16 RF Input

RF Input connector

Inputs RF signal. This is an N type input connector.
For the MS2830A with the MS2830A-045 and the MS2850A, a K type input connector is installed.

17 SG On/Off

RF Output Control key (when MS269xA-020/120, MS2830A-020/120/021/121 is installed)

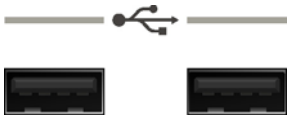
Press SG On/Off to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The RF output control key lamp lights orange when the RF signal output is set to On.
This cannot be installed on the MS2830A with the MS2830A-044/045, or on the MS2850A.

18 SG Output(Opt)

RF Output connector (when MS269xA-020/120, MS2830A-020/120/021/121 installed)

Outputs RF signal, when the Vector Signal Generator option is installed.
This is an N type output connector.
This cannot be installed on the MS2830A with the MS2830A-044/045, or on the MS2850A

19



USB connector (type A)

Connect the accessory USB keyboard, mouse or USB memory.

20

Modulation control key (when MS2830A-020/120/021/121 installed)

Press to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The lamp on the key lights up in green in the modulation On state.
This cannot be installed on the MS2830A with the MS2830A-044/045, or on the MS2850A.

21

Application key (MS2830A, MS2850A)

Press to switch between applications.

Press to display the Spectrum Analyzer main screen.

Press to display the Signal Analyzer main screen, when MS2830A-005/105/007/006/106/009/109/077/078 or MS2850A are installed.

Press to display the Signal Generator main screen, when Vector Signal Generator option is installed. (MS2830A only)

This is a blank key. Not used. (MS2830A only)

Displays the main screen of the application that is selected using the Application Switch (Auto), or displays that of the pre-selected application (Manual).
For details, refer to 3.5.4 “Changing application layout” in *MS2830A Signal Analyzer Operation Manual (Mainframe Operation) or MS2850A Signal Analyzer Operation Manual (Mainframe Operation)*.

22

1st Local Output connector (MS2830A, MS2850A)
This is installed with the MS2830A-044/045, or MS2850A.
Supplies local signal and bias current to the external mixer, and receives the IF signal with its frequency converted.

2.1.2 Rear panel

This section describes the rear-panel connectors.

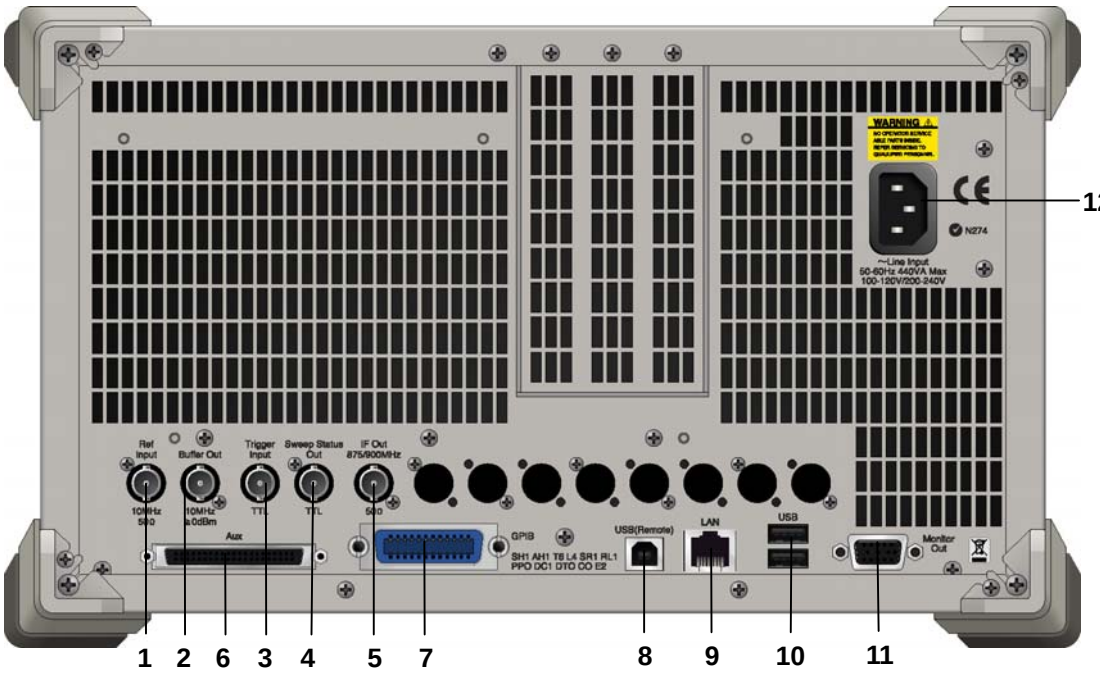


Figure 2.1.2-1 MS269x series rear panel

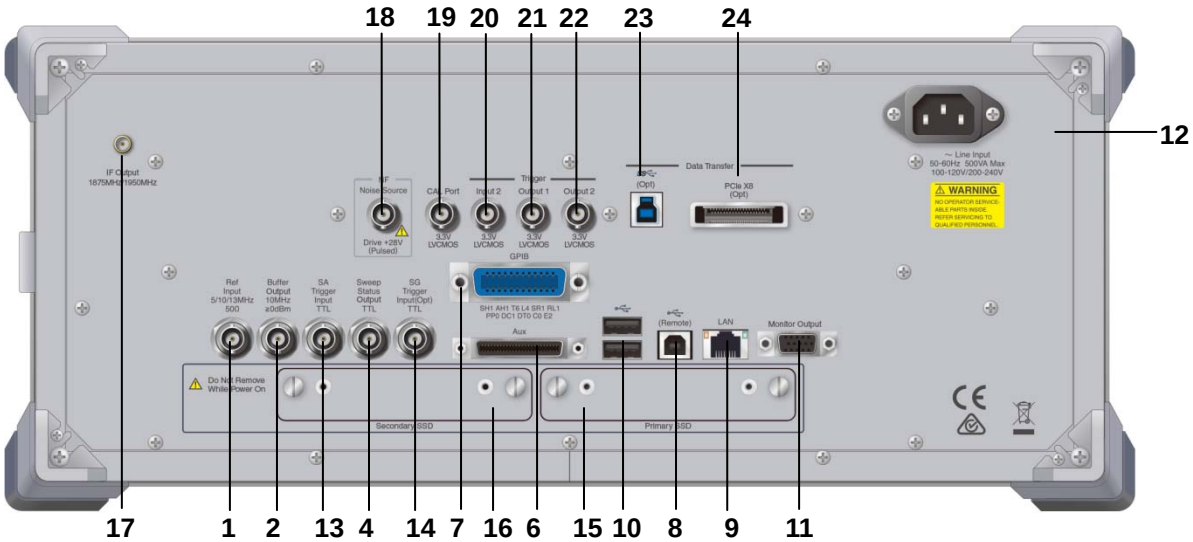


Figure 2.1.2-2 MS2830A/MS2850A rear panel (MS2850A Example)

1

Ref Input connector (reference frequency signal input connector)

Inputs external reference frequency signal. It is for inputting reference frequency signals with higher accuracy than the instrument's internal reference signal, or for synchronizing the frequency of the MS2690A/MS2691A/MS2692A or MS2830A, MS2850A to that of other equipment. The following frequencies are supported:

MS269x series: 10 MHz/13 MHz
MS2830A, MS2850A: 5 MHz/10 MHz/13 MHz

2

Buffer Out connector (reference frequency signal output connector)

Outputs the internal reference frequency signal (10 MHz). It is for synchronizing frequencies between other equipment and the MS2690A/MS2691A/MS2692A or MS2830A, MS2850A.

3

Trigger Input connector (MS269x series only)

Inputs trigger signal from external device.

4

Sweep Status Out connector

Outputs signal when internal measurement is performed or measurement data is obtained.

5

IF Out connector (MS269x series only)

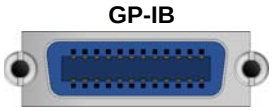
Not used.

6

AUX connector

Not used.

7



GPIB connector

For external control via GPIB.

8 USB(Remote)

USB connector (type B)
For external control via USB.

9 LAN

Ethernet connector
Connects PC or Ethernet network.

10 USB

USB connector (type A)
Used to connect a USB keyboard or mouse or the USB memory supplied.

11 **Monitor Out**

Monitor Out connector
Connects external display.

12

AC inlet
Supplies power.

13

SA Trigger Input connector (MS2830A, MS2850A)
This is a BNC connector for inputting external trigger signal (TTL) for SPA and SA applications.

14

SG Trigger Input connector (MS2830A)
This is a BNC connector for inputting external trigger signal (TTL) for Vector Signal Generator option.

15	**HDD** or **Primary HDD/SSD**	HDD slot (MS2830A) SSD slot (MS2850A)	This is a standard HDD slot. This is a standard SSD slot.
16	**HDD(Opt)** or **Secondary HDD/SSD**	HDD slot for Option (MS2830A) SSD slot (MS2850A)	This is a HDD slot for the options. This is a SSD slot for the options.

17

IF output connector (MS2830A, MS2850A)
This is installed with the MS2830A-044/045 or on the MS2850A.
Monitor output of the internal IF signal.

18

Noise Source connector
Supply (+28 V) of the Noise Source Drive.
This is available when the Option 017/117 is installed.

19

CAL Port connector (Future extensions) (MS2850A)

20

Trigger Input 2 connector (MS2850A)
Input the trigger signal (3.3 V LVCMOS) for SPA and SA applications.

21

Trigger Output 1 connector (MS2850A)
Output the trigger signal (3.3 V LVCMOS).

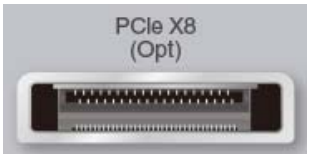
22

Trigger Output 2 connector (MS2850A)
Output the trigger signal (3.3 V LVCMOS).

23

USB 3.0 connector (MS2850A)
This is available when the MS2850A-054/154 is installed.

24



PCIe X8 connector (MS2850A)

This is available when the MS2850A-053/153 is installed.

2.2 Signal Path Setup

As shown in Figure 2.2-1, connect the instrument and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector. To prevent an excessive level signal from being input, do not input the signal before setting the input level using this application.

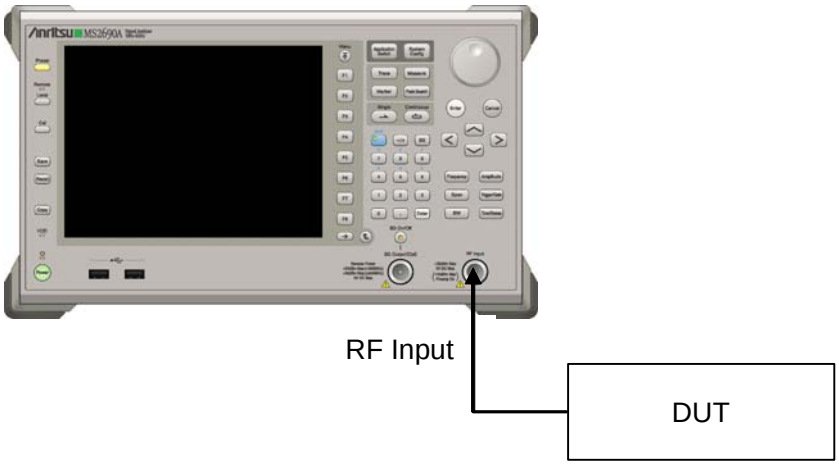


Figure 2.2-1 Signal path setup example

Set the reference signal and/or trigger signal paths from external sources, as required.

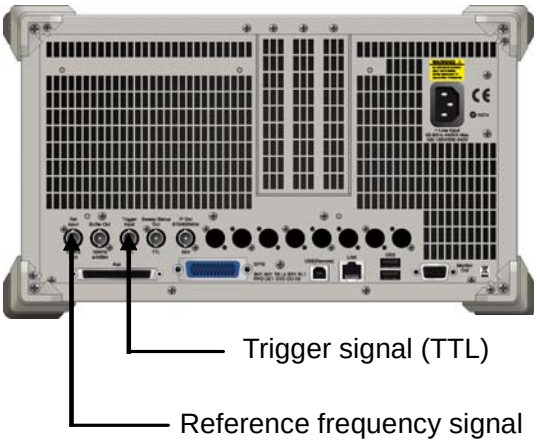


Figure 2.2-2 External signal input

2.3 Application Startup and Selection

To use this application, it is necessary to load (start up) and select the application.

2.3.1 Launching application

The application startup procedure is described below.

Note:

The XXX indicates the application name currently in use.

<Procedure>

1. Press System Config to display the Configuration screen.
2. Press F4 (Application Switch Settings) to display the Application Switch Registration screen.
3. Press F1 (Load Application Select), and move the cursor to "XXX" in the **Unloaded Applications** list.
   If "XXX" is displayed in the **Loaded Applications** list, this means that the application is already loaded.
   If "XXX" appears in neither the **Loaded Applications** nor **Unloaded Applications** list, this means that the application has not been installed.
4. Press F7 (Set) to load the application. If "XXX" is displayed in the **Loaded Applications** list, this means that the application is already loaded.

2.3.2 Selecting application

The selection procedure is described below.

<Procedure>

1. Press Application Switch to display the Application Switch menu.
2. Press the menu function key displaying "XXX".

The application can also be selected with mouse, by clicking "XXX" on the task bar.

2.4 Initialization and Calibration

This section describes the parameter settings and the preparations required before starting measurement.

2.4.1 Initialization

After selecting this application, first perform initialization. Initialization returns the settable parameters to their default value in order to clear the measurement status and measurement results.

Note:

When another software application is switched to or this application is unloaded (ended), the application keeps the parameter settings at that time. The parameter values that were last set will be applied when this application is selected next time.

The initialization procedure is as follows.

<Procedure>

1. Press Preset to display the Preset function menu.
2. Press F1 (Preset).

2.4.2 Calibration

Perform calibration before performing measurement. Calibration sets the level accuracy frequency characteristics for the input level to flat, and adjusts level accuracy deviation caused by internal temperature fluctuations. Calibration should be performed when first performing measurement after turning on power, or if beginning measurement when there is a difference in ambient temperature from the last time calibration was performed.

<Procedure>

1. Press Cal to display the Application Cal function menu.
2. Press F1 (SIGANA All).

For details on calibration functionality only executable with this instrument, refer to the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation), MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*or *MS2850A Signal Analyzer Operation Manual (Mainframe Operation)*.

Chapter 3 Measurement

This section describes the measurement function, the parameter contents and the setting methods for this application.

3.1 Basic Operation 3-3
3.1.1 Screen layout 3-3
3.1.2 Function menu 3-4
3.1.3 Performing measurement 3-5
3.2 Setting Frequency 3-6
3.3 Setting Level 3-11
3.4 Capturing IQ Data 3-13
3.4.1 Setting capture time 3-15
3.4.2 Averaging IQ data 3-15
3.5 Setting Common Items 3-17
3.5.1 Demodulation Reference Signal (PUSCH) 3-23
3.5.2 Demodulation Reference Signal (PUCCH) 3-29
3.5.3 PRACH (PRACH) 3-36
3.5.4 Sounding Reference Signal (SRS) 3-38
3.6 Setting Measurement Items 3-45
3.6.1 Modulation Analysis 3-45
3.6.2 Power vs Time 3-69
3.6.3 Adjacent Channel Power Measurement (ACP) 3-77
3.6.4 Channel Power Measurement (Channel Power) 3-78
3.6.5 Occupied Bandwidth Measurement (OBW) 3-79
3.6.6 Spectrum Emission Mask Measurement (SEM) 3-79
3.7 Setting Marker 3-80
3.8 Setting Trigger 3-86
3.9 EVM Display 3-89
3.10 Constellation 3-92
3.11 EVM vs Subcarrier 3-95
3.12 EVM vs Symbol 3-98
3.13 Time Based EVM 3-100
3.14 EVM vs Demod-Symbol 3-101
3.15 Spectral Flatness 3-102
3.16 In-Band Emission 3-104
3.17 Summary 3-106
3.17.1 PUSCH SUMMARY 3-110
3.17.2 PUCCH SUMMARY 3-118
3.17.3 PRACH SUMMARY 3-124
3.17.4 SRS SUMMARY 3-126

3.18 Power vs Time Display 3-129
3.19 Power vs Time - Burst 3-132
3.20 Power vs Time - Transient 3-134
3.21 Saving Measurement Results 3-136

3.1 Basic Operation

3.1.1 Screen layout

This section describes the screen layout of this application.

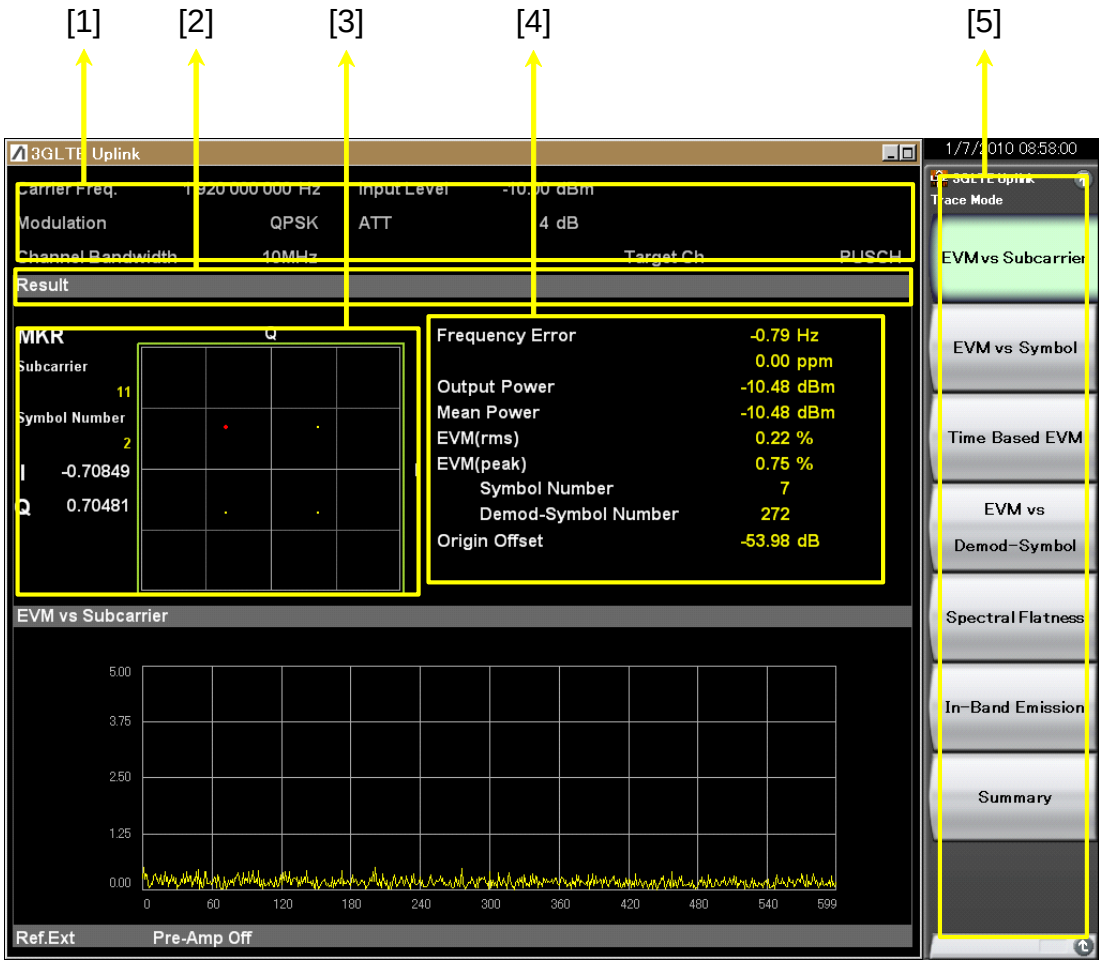


Figure 3.1.1-1 Screen layout

[1] Measurement parameter
Displays the specified parameter.

[2] Status message
Displays signal status.

[3] Constellation
Displays the constellation of the selected symbol.

[4] Result window
Displays the measurement results.

[5] Function menu
Displays the functions executable with function keys.

[6] Graph window
Displays the graph of the measurement results.

3.1.2 Function menu

This section describes the main function menu on the main screen.

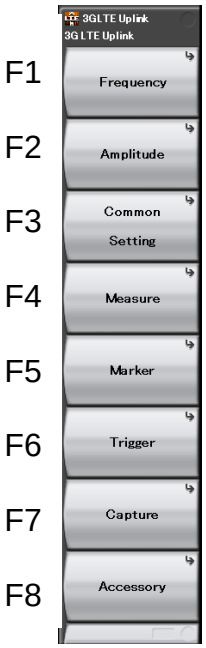


Figure 3.1.2-1 Main function menu

Table 3.1.2-1 Main function menu

Menu Display	Function
Frequency	Sets a frequency ☞3.2 “Setting Frequency”
Amplitude	Sets a level. ☞3.3 “Setting Level”
Common Setting	Sets common items. ☞3.5 “Setting Common Items”
Measure	Sets measurement items. ☞3.6 “Setting Measurement Items”
Marker	Sets a marker. ☞3.7 “Setting Marker”
Trigger	Sets a trigger. ☞ 3.8 “Setting Trigger”
Capture	Configures a setting for IQ data capture. ☞ 3.4 “Capturing IQ Data”
Accessory	Performs settings for other functions. ☞6.1 “Selecting Other Functions”

3.1.3 Performing measurement

There are two measurement modes: single and continuous. Measurement is performed once in the single measurement mode, and continuously in the continuous measurement mode.

Single Measurement

After capturing an input signal based upon the settings of Capture Time, the selected measurement items are measured only for the measurement count (Storage Count) before measurement is stopped.

<Procedure>

1. Press .

Continuous Measurement

Following capture of an input signal based on the settings of Capture Time, the selected measurement items are continuously measured for the measurement count (Storage Count), and this procedure is repeated. Measurement will continue even if parameters are changed or the window display is changed. Measurement will be stopped if another application is selected or if the Replay function is executed.

<Procedure>

1. Press .

Note:

The two measurement modes are not available when the Replay function is executed. For the Replay function, analysis starts when the IQ data file is specified.

4.2 “Replay Function”

3.2 Setting Frequency

Configures settings related to frequency. Pressing F1 (Frequency) on the main function menu displays the Frequency function menu. Pressing Frequency displays the Frequency function menu and opens the Carrier Frequency dialog box.

Note:

You cannot set a frequency when the Replay function is executed.

Carrier Frequency

■ Summary

Sets a carrier frequency.

■ Setting range

300 MHz to the upper limit of the main unit
(When MS2830A-077/177/078/178 is installed, or MS2850A)
100 MHz to the upper limit of the main unit
(MS269xA, MS2830A other than above)

E-UTRA Operating Band

■ Summary

Sets the E-UTRA Operating Band. This setting is used to calculate the Spectral Flatness measurement result displayed on the Summary screen.

☞ 3.17 “Summary”

■ Options

Operating Band Setting

For Operating Band, selects either “Standard” set by Band Number or “User” set by highest and lowest frequencies of user setting.

Operating Band Number

Sets the Band number when Operating Band Setting is set to Standard.

Operating Band Lowest Frequency

Sets the lowest frequency when Operating Band Setting is set to User.

Operating Band Highest Frequency

Sets the highest frequency when Operating Band Setting is set to User.

E-UTRA Operating Band: Operating Band Setting

■ Summary

For Operating Band, selects either “Standard” set by Band Number or “User” set by highest and lowest frequencies of user setting.

■ Options

Standard	Use the setting of Operating Band.
User	Use User setting

E-UTRA Operating Band: Operating Band Number

■ Summary

Sets the Band number when Operating Band Setting is set to Standard.

■ Setting range

0 to 28, 30, 31, 65, 66, 68, 70

■ Details

Table 3.2-1 shows how the lower limit frequency (F_{UL_low}) and upper limit frequency (F_{UL_high}) are specified for each transmission frequency band corresponding to the E-UTRA Operating Band setting. If 0, 15, or 16 is specified as the setting, the following frequencies are handled as being in the frequency band.

Minimum Carrier Frequency – Maximum Span / 2
to Maximum Carrier Frequency + Maximum Span / 2

Table 3.2-1 E-UTRA Operating Band and the F_{UL_low} and F_{UL_high} settings

E-UTRA Operating Band	Lower limit frequency (F_{UL_low}) [MHz]	Higher limit frequency (F_{UL_high}) [MHz]
0,15,16	Minimum Carrier Frequency – Maximum Span / 2	Maximum Carrier Frequency + Maximum Span / 2
1	1920	1980
2	1850	1910
3	1710	1785
4	1710	1755
5	824	849
6	830	840
7	2500	2570
8	880	915
9	1749.9	1784.9
10	1710	1770
11	1427.9	1447.9
12	699	716
13	777	787
14	788	798
17	704	716
18	815	830
19	830	845
20	832	862
21	1447.9	1462.9
22	3410	3490
23	2000	2020
24	1626.5	1660.5
25	1850	1915
26	814	849
27	807	824
28	703	748
30	2305	2315
31	452.5	457.5
65	1920	2010
66	1710	1780
68	698	728
70	1695	1710

E-UTRA Operating Band: Operating Band Lowest Frequency

■ Summary

Sets the lowest Frequency when Operating Band is set to User.

■ Setting range

Minimum Carrier Frequency – Maximum Span Frequency / 2
to Maximum Carrier Frequency + Maximum Span Frequency / 2

Note:

The value can be set as long as the highest frequency is bigger than the lowest frequency.

E-UTRA Operating Band: Operating Band Highest Frequency

■ Summary

Sets the highest frequency when Operating Band Setting is User.

■ Setting range

Minimum Carrier Frequency – Maximum Span Frequency / 2
to Maximum Carrier Frequency + Maximum Span Frequency / 2

Note:

The value can be set as long as the highest frequency is bigger than the lowest frequency.

Span

■ Summary

Sets the frequency span

■ Options

Auto	Judges automatically from Freq. Offset and Channel Bandwidth of each CC.
31.25 MHz	Captures with the Span fixed to 31.25 MHz.
62.5 MHz	Captures with the Span fixed to 62.5 MHz. (When MS269xA-004/104/077/177/078/178 or MS2830A-077/177/078/178 is installed, or MS2850A.)
125 MHz	Captures with the Span fixed to 125 MHz. (When MS269xA-004/104/078/178 or MS2830A-078/178 is installed, or MS2850A.)

Note:

When Standard is LTE, the Span is fixed to 31.25 MHz and cannot be edited.

The Span is fixed and cannot be edited during replay.

The maximum span is defined as below.

31.25 MHz	When neither MS269xA-004/104/077/177/078/178 nor MS2830A-077/177/078/178 is installed.
62.5 MHz	When neither MS269xA-004/104/078/178 nor MS2830A-078/178 is installed and when MS269xA-077/177 or MS2830A-077/177 is installed.
125 MHz	When MS269xA-004/104/078/178 or MS2830A-078/178 is installed, or MS2850A.

3.3 Setting Level

Configures settings related to level. Pressing F2 (Amplitude) on the main function menu displays the Amplitude function menu. Pressing Amplitude displays the Amplitude function menu and opens the Input Level dialog box.

Note:

You cannot set a level when the Replay function is executed.

Input Level

■ Summary

Sets the input level from the target DUT.

■ Setting range

For Pre-Amp: On
(–80.00 + Offset Value) to (10.00 + Offset Value) dBm
For Pre-Amp: Off:
(–60.00 + Offset Value) to (30.00 + Offset Value) dBm

Lowest ATT Setting

■ Summary

Sets the lowest ATT setting to 0 dB/4 dB/10 dB.

■ Options

0 dB	The lowest ATT setting is 0 dB.
4 dB	The lowest ATT setting is 4 dB.
10 dB	The lowest ATT setting is 10 dB.

Note:

When MS2830A-045 is installed and 4 dB is selected, the lowest ATT value becomes 10 dB.

Pre-Amp

■ Summary

Turns the Pre-Amp function On/Off.

■ Options

On	Enables the Pre-Amp function.
Off	Disables the Pre-Amp function.

Offset

■ Summary

This turns on/off the Offset function.

■ Options

On	Enables the offset function.
Off	Disables the offset function.

Offset Value

■ Summary

This sets the level correction coefficient.

■ Setting range

–99.99 to 99.99 dB

■ Setting example

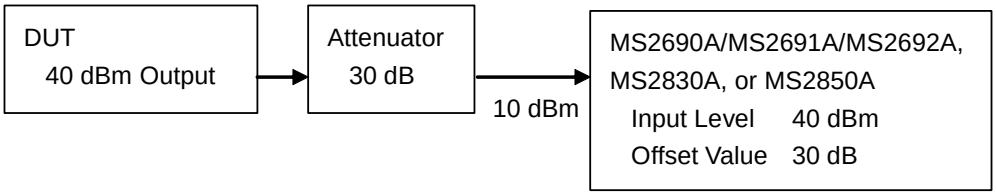


Figure 3.3-1 Input level and offset level setting example

3.4 Capturing IQ Data

This section describes the settings of IQ data. Pressing F7 (Capture) on the Main function menu displays the Capture function menu.

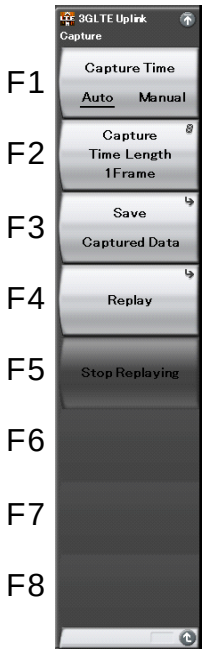


Figure 3.4-1 Capture function menu

Table 3.4-1 Capture function menu

Menu Display	Function
Capture Time (Auto/Manual)	Switches between the two capture modes of IQ data (auto setting and manual setting).
Capture Time Length	Sets the capture time length of IQ data.
Save Captured Data	Saves the captured IQ data. ☞ Chapter 4 Digitize Function
Replay	Replays the captured IQ data. ☞ Chapter 4 Digitize Function
Stop Replaying	Stops replaying the captured IQ data. ☞ Chapter 4 Digitize Function

Capture Time

■ Summary

Switches between the two capture modes of IQ data.

■ Options

Auto, Manual

Capture Time Length

■ Summary

Sets the capture time length of IQ data.

■ Setting range

When Target Channel is PUSCH/PUCCH/SRS in Power vs Time measurement

3 to 200	When Span=31.25 MHz
3 to 100	When Span=62.5 MHz
3 to 50	When Span=125 MHz

Other than the above

1 to 200	When Span=31.25 MHz
1 to 100	When Span=62.5 MHz
1 to 50	When Span=125 MHz

Note:

When Span is Auto, the Span is set to the value displayed on the screen.
(When Standard is LTE, the Span is fixed to 31.25 MHz)

3.4.1 Setting capture time

Sets the capture mode from Capture Time and the capture time length from Capture Time Length.

- Auto

The data necessary to measure one frame for each measurement is always captured. The Auto mode is set by default for this application.

- Manual

In this mode, the number of frames measured for each measurement can be specified. Specify the number of frames for Capture Time Length. The frames in the interval specified for Capture Time Length must always be continuous. If Capture Time Length is specified, the Manual mode is automatically used.

When measuring ACP, Channel Power, and OBW using the Replay function, save the IQ data in the Manual mode.

3.4.2 Averaging IQ data

The averaging method differs according to the capture time mode.

- Auto

In the Auto mode, capture of one frame starts at the trigger timing. After the measurement is completed, capture of another frame starts at the next trigger timing. The average and maximum values are calculated from the measurement results at each storage count. The frames of multiple measurements are not necessarily consecutive.

The storage count and the capture count are the same in single measurement. In continuous measurement, the average and maximum values are calculated from the last data of the storage count after measurement has been performed the number of times corresponding to the storage count.

- Manual

In the Manual mode, if measurement starts at the trigger timing, frames are continuously captured for the number specified by Capture Time Length. After each frame measurement, the average and maximum values are calculated from the measurement results at each storage count.

In single measurement, the storage count is reached at each capture. In continuous measurement, the single measurement operation is performed repeatedly.

In the Manual mode, the maximum Storage Count always depends on the maximum capture time length and the measurement items. (Refer to the description of “Storage Count” in Section 3.6.1.3 or 3.6.2.1.)

3.5 Setting Common Items

This section describes the settings for the common items. Pressing F3 (Common Setting) on the main function menu displays the Common Setting function menu.

Standard

■ Summary

Switches the measurement standard (LTE / LTE-Advanced).

■ Options

LTE, LTE-A

Note:

This is unavailable when the MX269021A-001 LTE-Advanced FDD Uplink Measurement Software is not installed.

During replay, the standards can be switched only when Span is 31.25 MHz.

Contiguous Mode

■ Summary

Switches the Contiguous Mode.

■ Options

On	Sets the Contiguous Mode to On.
Off	Sets the Contiguous Mode to Off.

Note:

The setting is unavailable when Standard is LTE.

Target Channel

■ Summary

Sets the measurement target channel.

■ Options

Selects the channel to be measured from PUSCH, PUCCH, PRACH, and Sounding Reference Signal (SRS) by setting Include or Exclude.

Incl	The channel is measured.
Excl	The channel is not measured.

Note:

Because the specified channel settings are mutually exclusive, the measurement using a mixed signal is not possible. In addition, the measurement for each Channel is performed on a UE basis. The measurement for multiple pieces of UE is unavailable.

PRACH or SRS cannot be selected when Standard is LTE-A

Number of CCs

■ Summary

Sets the number of target CCs to measure.

■ Options

1, 2

Note:

This is unavailable when Standard is LTE.

Synchronization CC#

■ Summary

Sets CC# as a target of frame synchronization.

■ Options

CC#0	Performs frame synchronization only for CC#0.
CC#1	Performs frame synchronization only for CC#1.
Each CC	Performs frame synchronization for each CC individually.

Note:

This is unavailable when Standard is LTE.
Each CC cannot be selected when Contiguous Mode is On.
CC#1 cannot be selected when Number of CCs is 1.

Setting/Result Target CC#

■ Summary

Selects a target CC# for parameter setting and measurement results display in measurement items for individual CC.

■ Options

0	CC#0 is a target for parameter setting and measurement results display.
1	CC#1 is a target for parameter setting and measurement results display.

Note:

This is unavailable when Standard is LTE.

CC#1 cannot be selected when Number of CCs is 1.

In-Band Em. Carr. Leak Freq.

■ Summary

Sets the position of carrier leak frequency in LTE-Advanced in-band emission measurement.

■ Options

At Carrier Frequency

Sets carrier leak frequency to Carrier Frequency.

At Each CC Center

Sets carrier leak frequency to center frequency of each CC.

Note:

This is unavailable when Standard is LTE.

It is also unavailable when CC#0 Status and CC#1 Status are both On.

Carrier Leak Rejection

■ Summary

Sets whether to remove carrier leak at the center frequency of CA bandwidth, CC#0, and CC#1 individually in LTE-Advanced CA measurement.

■ Check Box

At Carrier Frequency

Sets whether to remove carrier leak at the center of CA bandwidth (frequency set for Carrier Frequency).

On Removes carrier leak.

Off Does not remove carrier leak.

At CC#0 Center

Sets whether to remove carrier leak at the CC#0 center (frequency set for CC#0 Frequency Offset).

On Removes carrier leak.

Off Does not remove carrier leak.

At CC#1 Center

Sets whether to remove carrier leak at the CC#1 center (frequency set for CC#1 Frequency Offset).

On Removes carrier leak.

Off Does not remove carrier leak.

Note:

The setting is unavailable when Standard is LTE.

The measurement results of Origin Offset are always carrier leak elements at the center of CC#0 and CC#1, regardless of the selections of check boxes.

CC Status

■ Summary

Switches On and Off the selected CC at Setting/Result Target CC#.

■ Options

On	The CC selected by Setting/Result Target CC# is regarded as Allocated.
Off	The CC selected by Setting/Result Target CC# is regarded as Non-allocated.

Note:

This is unavailable when Standard is LTE.

CC Frequency Offset

■ Summary

Sets Frequency Offset of the selected CC against Carrier Frequency.

■ Setting range

–(Span – Channel Bandwidth) / 2
to +(Span – Channel Bandwidth) / 2 Hz

Note:

This is unavailable when Standard is LTE.
When Contiguous Mode is On, Frequency Offset between CC#0 and CC#1 is limited to the multiples of 300 kHz.
When Frequency Span is Auto, the above setting range is set according to the maximum span.
When Frequency Span is Auto, the span is automatically set as below.

31.25 MHz	The case where the absolute value of CC Edge frequency that is farthest from the center frequency is 15.625 MHz or below
62.5 MHz	The case where the absolute value of CC Edge frequency that is farthest from the center frequency is 31.25 MHz and that does not correspond to the above.
125 MHz	The case that does not correspond to the above.

Channel Bandwidth

■ Summary

Selects a band of an input signal.

■ Options

1.4 MHz	Analyzes an input signal as a 1.4-MHz band.
3 MHz	Analyzes an input signal as a 3-MHz band.
5 MHz	Analyzes an input signal as a 5-MHz band.
10 MHz	Analyzes an input signal as a 10-MHz band.
15 MHz	Analyzes an input signal as a 15-MHz band.
20 MHz	Analyzes an input signal as a 20-MHz band.

DMRS Parameters

■ Summary

Sets whether to automatically or manually set the Demodulation RS parameter for the channel specified for Target Channel.

■ Options

Auto, Manual

Note:

If Target Channel is set to PRACH, this function is not supported.
If Target Channel is set to SRS, "SRS Parameters" is displayed.

Demodulation Reference Signal

■ Summary

Sets the DMRS parameter for the specified Target Channel.

Note:

The menu key name differs according to the Target Channel setting.
Demodulation Reference Signal: Target Channel is PUSCH/PUCCH.
PRACH: Target Channel is PRACH.
Sounding Reference Signal: Target Channel is SRS.

For descriptions of each channel, see the following table.

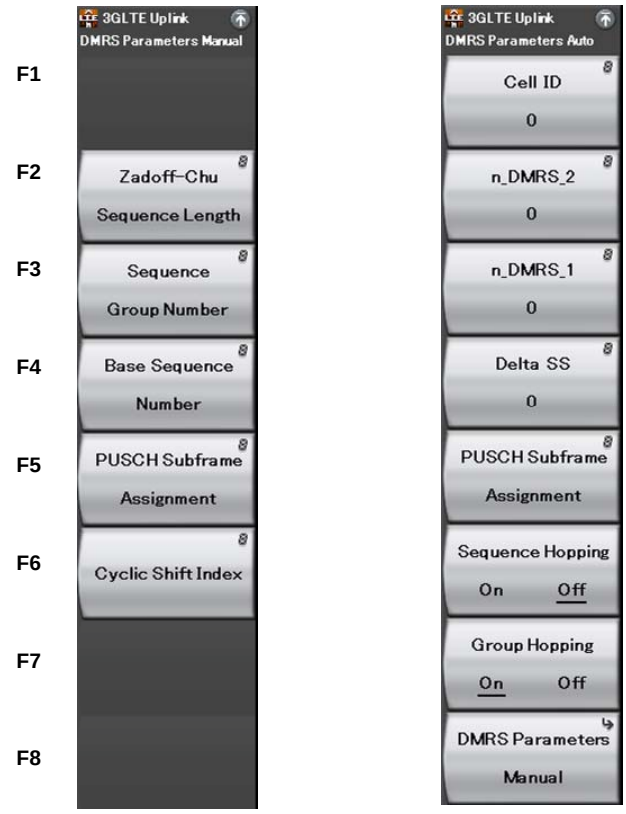
Table 3.5-1 Channel descriptions

Channel name	References
PUSCH	3.5.1 Demodulation Reference Signal (PUSCH)
PUCCH	3.5.2 Demodulation Reference Signal (PUCCH)
PRACH	3.5.3 PRACH(PRACH)
SRS	3.5.4 Sounding Reference Signal (SRS)

3.5.1 Demodulation Reference Signal (PUSCH)

Sets the Demodulation Reference Signal parameters when Target Channel is set to the PUSCH channel.

Pressing F7 (Demodulation Reference Signal) on page 2 of the Common Setting function menu displays the DMRS Parameter function menu. The menu screen differs depending on whether the F6 setting (DMRS Parameters) on page 2 of the Common Setting function menu is Auto or Manual.



When DMRS Parameter is Manual When DMRS Parameter is Auto

Figure 3.5.1-1 Demodulation Reference Signal (PUSCH) setting screen

When DMRS Parameter is set to Manual (Refer to the left screen, Figure 3.5.1-1)

Table 3.5.1-1 Description of the screen when DMRS Parameter is set to Manual (PUSCH)

Menu Display	Function
Zadoff-chu Sequence Length	Sets the Zadoff-chu sequence length.
Sequence Group Number	Sets the Sequence Group Number value for each Slot.
Base Sequence Number	Sets the Base Sequence Number value for each Slot.
PUSCH Subframe Assignment	Assigns the PUSCH Subframe Assignment value to each Slot.
Cyclic Shift Index	Sets the Cyclic Shift Index value for each Slot.

Zadoff-chu Sequence Length

■ Summary

Sets the Zadoff-Chu Sequence Length value for each SubFrame from 0 to 9.

■ Setting range

1 to 1320	Channel Bandwidth: 20 MHz
1 to 990	Channel Bandwidth: 15 MHz
1 to 660	Channel Bandwidth: 10 MHz
1 to 330	Channel Bandwidth: 5 MHz
1 to 198	Channel Bandwidth: 3 MHz
1 to 79	Channel Bandwidth: 1.4 MHz

Sequence Group Number

■ Summary

Sets the Sequence Group Number value for each Slot from 0 to 19.

■ Setting range

0 to 29	A value can be set for each Slot from 0 to 19.

Base Sequence Number

■ Summary

Sets the Base Sequence Number value for each Slot from 0 to 19.

■ Setting range

0 to 1 A value can be set for each Slot from 0 to 19.

Note:

If DMRS Parameter=Auto and Sequence Hopping=OFF, the value for each Slot is automatically set to 0.

Even if DMRS Parameter=Auto and Sequence Hopping=ON, if the Number Of RB setting is less than 6, 0 is set.

☞ 3.6.1.1 “Analysis Time”

PUSCH Subframe Assignment

■ Summary

Sets the PUSCH Subframe Assignment to Subframe0 to 9 individually.

■ Options

On, Off

Cyclic Shift Index

■ Summary

Sets the Cyclic Shift Index value for each Slot from 0 to 19.

■ Setting range

0 to 11 A value can be set for each Slot from 0 to 19.

When DMRS Parameter is set to Auto (Refer to the right screen, Figure 3.5.1-1)

Table 3.5.1-2 Description of the screen when DMRS Parameter is set to Auto (PUSCH)

Menu Display	Function
Cell ID	Sets the Cell ID value.
N_DMRS_2	Sets the N_DMRS_2 value.
N_DMRS_1	Sets the N_DMRS_1 value.
Delta SS	Sets the Delta SS value.
PUSCH Subframe Assignment	Sets the presence of Subframe 0 to 9.
Sequence Hopping	Switches Sequence Hopping between ON and OFF.
Group Hopping	Switches Group Hopping between ON and OFF.
DMRS Parameter Manual	Switches to the DMRS Parameter Manual menu screen. ☞ Left screen, Figure 3.5.1-1

Cell ID

■ Summary

Sets the Cell ID.

■ Setting range

0 to 503

n_DMRS_2

■ Summary

Sets n_DMRS_2.

■ Options

0, 2, 3, 4, 6, 8, 9, 10

n_DMRS_1

■ Summary

Sets n_DMRS_1.

■ Options

0, 2, 3, 4, 6, 8, 9, 10

Delta SS

■ Summary

Sets Delta ss.

■ Setting range

0 to 29

PUSCH Subframe Assignment

■ Summary

Sets the PUSCH Subframe Assignment for each SubFrame from 0 to 9.

■ Options

On, Off

Sequence Hopping

■ Summary

Switches Sequence Hopping between ON and OFF.

■ Options

On, Off

Note:

If the Group Hopping setting is switched to ON while this parameter setting is ON, the Sequence Hopping setting automatically becomes OFF.

Group Hopping

■ Summary

Switches Group Hopping between ON and OFF.

■ Options

On, Off

Note:

If the Sequence Hopping setting is switched to ON while this parameter setting is ON, the Group Hopping setting automatically becomes OFF.

DMRS Parameter Manual

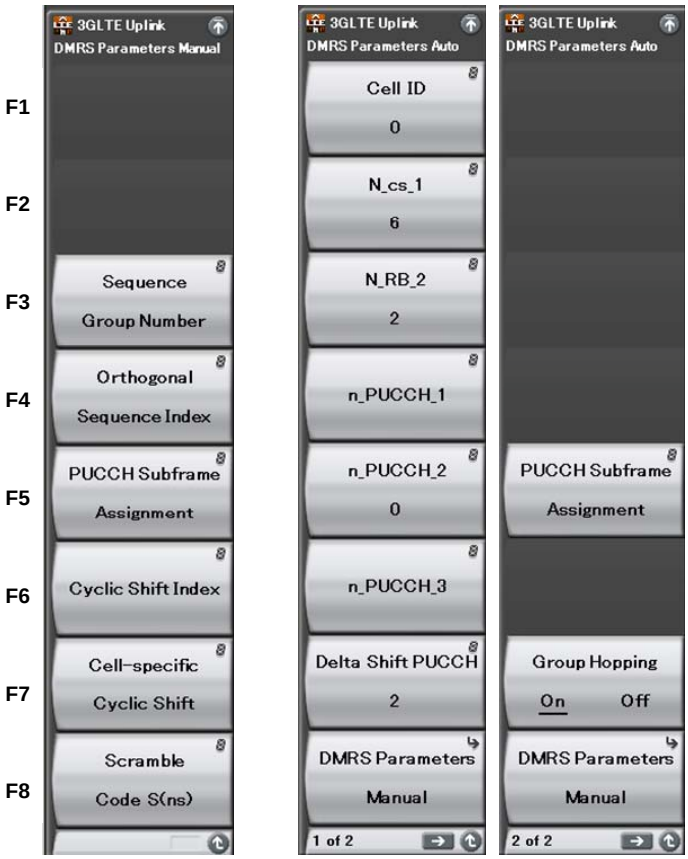
■ Summary

The left image in Figure 3.5.1-1 (When DMRS Parameter is Manual.) is displayed. The automatically calculated values can be confirmed by pressing the menu keys for each parameter below. However, the values cannot be set.

- Zadoff-Chu Sequence Length
- Sequence Group Number
- Base Sequence Number
- Cyclic Shift Index

3.5.2 Demodulation Reference Signal (PUCCH)

Sets the Demodulation Reference Signal parameters when Target Channel is set to the PUCCH channel. Pressing F7 (Demodulation Reference Signal) on page 2 of the Common Setting function menu displays the DMRS Parameter function menu. The menu screen differs depending on whether the F6 setting (DMRS Parameters) on page 2 of the Common Setting function menu is Auto or Manual.



When DMRS Parameter is Manual | When DMRS Parameter is Auto (1/2) | When DMRS Parameter is Auto (2/2)

Figure 3.5.2-1 Demodulation Reference Signal (PUCCH) setting screen

When DMRS Parameter is set to Manual (Refer to the left screen, Figure 3.5.2-1)

Table 3.5.2-1 Description of the screen when DMRS Parameter is set to Manual (PUCCH)

Menu Display	Function
Sequence Group Number	Sets the Sequence Group Number value for each Slot.
Orthogonal Sequence Index	Sets the Orthogonal Sequence Index value for each Slot.
PUCCH Subframe Assignment	Sets the presence of Subframe 0 to 9.
Cyclic Shift Index	Sets the Cyclic Shift Index value at each symbol position for each Subframe.
Cell-specific Cyclic Shift	Sets the Cell-specific Cyclic Shift value for symbol positions in each subframe.
Orthogonal Sequence Index	Sets the Orthogonal Sequence Index value for each Slot.

Sequence Group Number

■ Summary

Sets the Sequence Group Number value for each Slot from 0 to 19.

■ Setting range

0 to 29 A value can be set for each Slot from 0 to 19.

Orthogonal Sequence Index

■ Summary

Sets the Orthogonal Sequence Index value for each Slot from 0 to 19.

■ Setting range

0 to 2 (When PUCCH Format = 1, 1a, 1b)

The index can be set for Slot 0 to 19 individually.

0 to 4 (When PUCCH Format = 3)

The index can be set for Slot 0 to 19 individually.

Note:

This is unavailable when PUCCH Format is set to 2, 2a, or 2b.

PUCCH Subframe Assignment

■ Summary

Sets the PUCCH Subframe Assignment for each SubFrame from 0 to 9.

■ Options

On, Off

Cyclic Shift Index

■ Summary

Sets the Cyclic Shift Index value for each SubFrame from 0 to 9. This can be set to Symbol0 to 13 individually.

■ Setting range

0 to 11 This can be set to Symbol0 to 13 in Subframe0 to 9.

Cell-specific Cyclic Shift

■ Summary

Sets the Cell-specific Cyclic Shift value for each SubFrame from 0 to 9. This can be set to Symbol0 to 13 individually.

■ Setting range

0 to 255 This can be set to Symbol0 to 13 in Subframe0 to 9.

Note:

This parameter can be set only when PUCCH format is set to 3.

Scramble Code S (ns)

■ Summary

Sets the Scramble Code value for each Slot from 0 to 19.

■ Setting range

0 to 1 A value can be set for Slot0 to 19.

When DMRS Parameter is set to Auto (Refer to the right screen 1/2, Figure 3.5.2-1)

Table 3.5.2-2 Description of the screen when DMRS Parameter is set to Auto 1/2 (PUCCH)

Menu Display	Function
Cell ID	Sets the Cell ID value.
N_cs_1	Sets the N_cs_1 value.
N_RB_2	Sets the N_RB_2 value.
n_PUCCH_1	Sets the n_PUCCH_1 value.
n_PUCCH_2	Sets the n_PUCCH_2 value.
n_PUCCH_3	Sets the n_PUCCH_3 value
Delta Shift PUCCH	Sets the Delta Shift PUCCH value.
DMRS Parameters Manual	Switches to the DMRS Parameter Manual menu screen. Left screen, Figure 3.5.2-1

Cell ID

■ Summary

Sets the Cell ID.

■ Setting range

0 to 503

N_cs_1

■ Summary

Sets N_cs_1.

■ Setting range

0 to 7

N_RB_2

■ Summary

Sets N_RB_2.

■ Setting range

0 to 98 Channel Bandwidth: 20 MHz
0 to 74 Channel Bandwidth: 15 MHz
0 to 49 Channel Bandwidth: 10 MHz
0 to 24 Channel Bandwidth: 5 MHz
0 to 14 Channel Bandwidth: 3 MHz
0 to 5 Channel Bandwidth: 1.4 MHz

The minimum value is 1 when N_cs_1 is 0.

n_PUCCH_1

■ Summary

Sets n_PUCCH_1.

■ Setting range

0 to 7199Channel Bandwidth: 20 MHz
0 to 5399Channel Bandwidth: 15 MHz
0 to 3599Channel Bandwidth: 10 MHz
0 to 1799Channel Bandwidth: 5 MHz
0 to 1079Channel Bandwidth: 3 MHz
0 to 431 Channel Bandwidth: 1.4 MHz

n_PUCCH_2

■ Summary

Sets n_PUCCH_2.

■ Setting range

The range differs according to the N_RB_2 value.

0 to (N_RB_2 × 12 + Ceiling (N_cs_1/8) × (12 – N_cs_1 – 2) – 1)

n_PUCCH_3

■ Summary

Sets n_PUCCH_3.

■ Setting range

0 to 499 Channel Bandwidth: 20 MHz
0 to 374 Channel Bandwidth: 15 MHz
0 to 249 Channel Bandwidth: 10 MHz
0 to 124 Channel Bandwidth: 5 MHz
0 to 74 Channel Bandwidth: 3 MHz
0 to 29 Channel Bandwidth: 1.4 MHz

Note:

This parameter can be set only when PUCCH format is set to 3.

Delta Shift PUCCH

■ Summary

Sets Delta Shift PUCCH.

■ Setting range

1 to 3

DMRS Parameter Manual

■ Summary

The left image in Figure 3.5.2-1 (When DMRS Parameter is Manual.) is displayed. The automatically calculated values can be confirmed by pressing the menu keys for each parameter below. However, the values cannot be set.

- Sequence Group Number
- Cyclic Shift Index
- Orthogonal Sequence Index
- Cell-specific Cyclic Shift
- Scramble Code S (ns)

When DMRS Parameter is set to Auto (Refer to the right screen 2/2 Figure 3.5.2-1)

Table 3.5.2-3 the screen when DMRS Parameter is set to Auto 2/2 (PUCCH)

Menu Display	Function
PUCCH Subframe Assignment	Sets the presence of Subframe 0 to 9. ☞ Table 3.5.2-1 PUCCH Subframe Assignment
Group Hopping	Switches Group Hopping between ON and OFF.
DMRS Parameters Manual	Switches to the DMRS Parameter Manual menu screen. ☞Left screen, Figure 3.5.2-1

PUCCH Subframe Assignment

■ Summary

Sets the PUCCH Subframe Assignment for each SubFrame from 0 to 9.

■ Options

On, Off

Group Hopping

■ Summary

Switches Group Hopping between ON and OFF.

DMRS Parameter Manual

■ Summary

The left image in Figure 3.5.2-1 (When DMRS Parameter is Manual.) is displayed. The automatically calculated values can be confirmed by pressing the menu keys for each parameter below. However, the values cannot be set.

- Sequence Group Number
- Cyclic Shift Index
- Orthogonal Sequence Index
- Cell-specific Cyclic Shift
- Scramble Code S (ns)

3.5.3 PRACH (PRACH)

Sets the channel parameters when Target Channel is set to PRACH. Pressing F7 (PRACH) on page 2 of the Common Setting function menu displays the PRACH function menu.

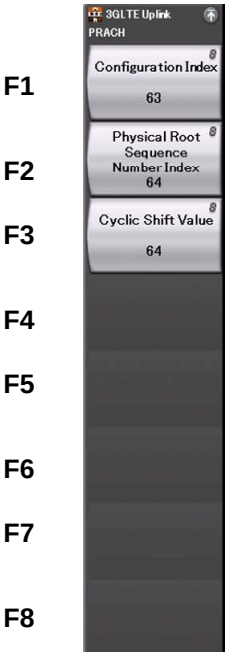


Figure 3.5.3-1 PRACH menu screen

Table 3.5.3-1 PRACH menu description

Menu Display	Function
Configuration Index	Sets the Configuration Index value.
Physical Root Sequence Number Index	Sets the Physical Root Sequence Number Index value.
Cyclic Shift Value	Sets the cyclic shift value.

Configuration Index

■ Summary

Sets the Configuration Index value.

■ Setting range

0 to 63

Note:

1) Some values cannot be set and they are automatically set to the bigger one of the closest values.

   For 30: 31 is specified.
   For 46: 47 is specified.
   For 60, 61, or 62: 63 is specified.

2) Depending on the setting for this parameter, more than one Preamble might be allocated to 1 frame, in compliance with 3GPP TS36.211. However, the measurement target is the Preamble signal at the location to which the trigger applies.

3) The Preamble Format value switches according to this parameter setting.

Table 3.5.3-2 Preamble Format values

Configuration Index	Preamble Format
0 to 15	0
16 to 31	1
32 to 47	2
48 to 63	3

Physical Root Sequence Number Index

■ Summary

Sets Physical Root Sequence Number Index.

■ Setting range

1 to 838

Cyclic Shift Value

■ Summary

Sets Cyclic Shift Value.

■ Setting range

0 to 838

3.5.4 Sounding Reference Signal (SRS)

Sets the channel parameters when Target Channel is set to SRS.

Pressing F7 (Sounding Reference Signal) on page 2 of the Common Setting function menu displays the SRS function menu. The menu screen differs depending on whether the F6 setting (SRS Parameters) on page 2 of the Common Setting function menu is Auto or Manual.

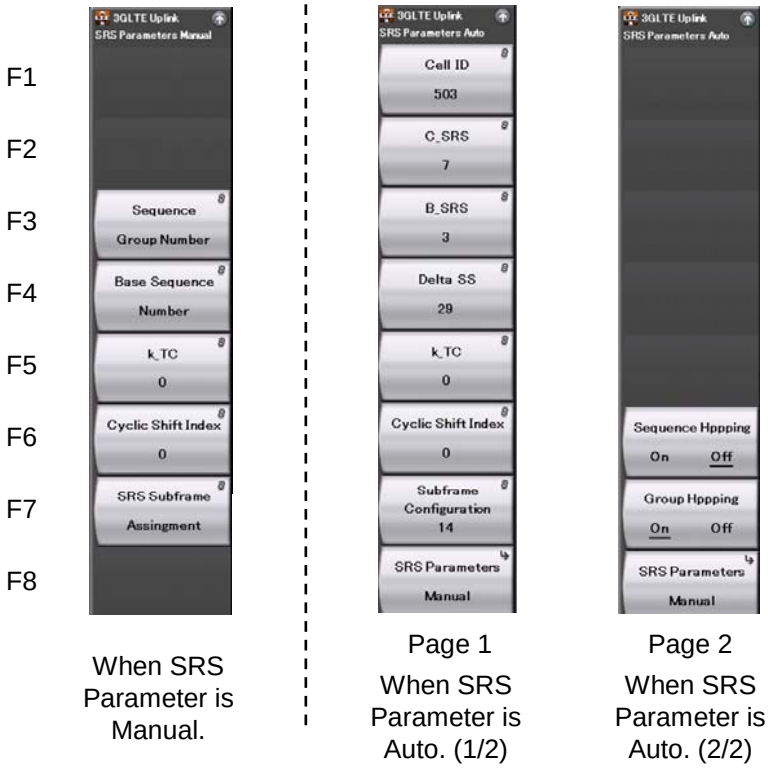


Figure 3.5.4-1 Sounding Reference Signal (SRS) setting screen

When SRS Parameter is set to Manual (Refer to the left screen, Figure 3.5.4-1)

Table 3.5.4-1 Description of the screen when SRS Parameter is set to Manual

Menu Display	Function
Sequence Group Number	Sets the Sequence Group Number value for each Subframe.
Base Sequence Number	Sets the Base Sequence Number value for each Subframe.
k_TC	Sets the k_TC value.
Cyclic Shift Index	Sets the cyclic shift index.
SRS Subframe Assignment	Sets SRS Sub frame Assignment to ON or OFF for each Subframe.

Sequence Group Number

■ Summary

Sets the Sequence Group Number value for each Subframe from 0 to 9.

■ Setting range

0 to 29 A value can be set for each Subframe from 0 to 9.

Base Sequence Number

■ Summary

Sets the Base Sequence Number value for each Subframe from 0 to 9.

■ Setting range

0 to 1 A value can be set for each Subframe from 0 to 9.

Note:

If SRS Parameter=Auto and Sequence Hopping=OFF, the value for each subframe is automatically set to 0.

However, even if SRS Parameter=Auto and Sequence Hopping=ON, if the Number Of RB setting is less than 12, the value for each subframe is automatically set to 0.

k_TC

■ Summary

Sets the Transmission Comb k_TC value.

■ Setting range

0 Set this to 0 if measuring a signal for which the SRS is allocated to an even subcarrier.

1 Set this to 1 if measuring a signal for which the SRS is allocated to an odd subcarrier.

Cyclic Shift Index

■ Summary

Sets the cyclic shift index.

■ Setting range

0 to 7

SRS Subframe Assignment

■ Summary

Sets the SRS Subframe Assignment for each SubFrame from 0 to 9.

■ Options

On, Off

Note:

If this parameter does not match the settings for Start Subframe of Analysis Time and Measurement Interval, *** might be displayed as the measurement result.

Ex: To transmit the SRS by using a SubframeNumber value from 1 to 2.
SRS Sub frame Assignment: Select Subframe 1 and Subframe 2.
Set Start Subframe to 1 and Measurement Interval to 2.

☞ 3.6.1.1 “Analysis Time”

When SRS Parameter is set to Auto (Refer to the right 1/2 screen, Figure 3.5.4-1)

Table 3.5.4-2 Description of the menu when SRS Parameter is set to Auto (1/2)

Menu Display	Function
Cell ID	Sets the Cell ID value.
C_SRS	Sets the C_SRS value.
B_SRS	Sets the B_SRS value.
Delta SS	Sets the Delta SS value.
k_TC	Sets the k_TC value. ☞ k_TC in Table 3.5.4-1
Cyclic Shift Index	Sets the cyclic shift index.
Subframe Configuration	Sets the Subframe Configuration value.
SRS Parameters Manual	Switches to the SRS Parameter Manual menu screen. ☞Left screen, Figure 3.5.4-1

Cell ID

■ Summary

Sets the Cell ID value.

■ Setting range

0 to 503

C_SRS

■ Summary

Sets the SRS BanddwidthB_SRS value and the SRS band.

■ Setting range

0 to 7

B_SRS

■ Summary

Specifies the SRS BandwidthB_SRS value to set the STS band.

■ Setting range

0 to 3

Note:

If ChannelBW is set to 1.4M, 3M, or 5M, the setting range for Number of RBs might be exceeded depending on the value set for C_SRS. In such a case, the error message “SRS Mapping over the physical resource limit” is displayed.

Delta SS

■ Summary

Sets the Delta SS value.

■ Setting range

0 to 29

Cyclic Shift Index

■ Summary

Sets the cyclic shift index.

■ Setting range

0 to 7

Subframe Configuration

■ Summary

Sets the Subframe Configuration value. The subframes transmitted by the SRS are completely determined by this value.

■ Setting range

0	SubframeNumber to be transmitted: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
1	SubframeNumber to be transmitted: 0, 2, 4, 6, 8
2	SubframeNumber to be transmitted: 1, 3, 5, 7, 9
3	SubframeNumber to be transmitted: 0, 5
4	SubframeNumber to be transmitted: 1, 6
5	SubframeNumber to be transmitted: 2, 7
6	SubframeNumber to be transmitted: 3, 8
7	SubframeNumber to be transmitted: 0, 1, 5, 6,
8	SubframeNumber to be transmitted: 2, 3, 7, 8,
9	SubframeNumber to be transmitted: 0
10	SubframeNumber to be transmitted: 1
11	SubframeNumber to be transmitted: 2
12	SubframeNumber to be transmitted: 3
13	SubframeNumber to be transmitted: 0, 1, 2, 3, 4, 6, 8
14	SubframeNumber to be transmitted: 0, 1, 2, 3, 4, 5, 6, 8

SRS Parameter Manual

■ Summary

The left image in Figure 3.5.4-1 (When DMRS Parameter is Manual.) is displayed. The automatically calculated values can be confirmed by pressing the menu keys for each parameter below. However, the values cannot be set.

- Sequence Group Number
- Base Sequence Number

When SRS Parameter is set to Auto (Refer to the right 2/2 screen, Figure 3.5.4-1)

Table 3.5.4-3 Description of the menu when SRS Parameter is set to Auto (2/2)

Menu Display	Function
SRS Subframe Assignment	Sets SRS Sub frame Assignment to ON or OFF for each Subframe. ☞ Table 3.5.4-1 SRS Subframe Assignment
Sequence Hopping	Sets the Sequence Hopping value.
Group Hopping	Sets the Group Hopping value.
SRS Parameters Manual	Switches to the SRS Parameter Manual menu screen. ☞ Left screen, Figure 3.5.4-1

SRS Subframe Assignment

■ Summary

Sets the SRS Subframe Assignment for each SubFrame from 0 to 9.

■ Options

On, Off

Note:

If this parameter does not match the settings for Start Subframe of Analysis Time and Measurement Interval, *** might be displayed as the measurement result.

Ex: To transmit the SRS by using a SubframeNumber value from 1 to 2.
SRS Sub frame Assignment: Select Subframe 1 and Subframe 2.
Set Start Subframe to 1 and Measurement Interval to 2.
☞ 3.6.1.1 “Analysis Time”

Sequence Hopping

■ Summary

Switches Sequence Hopping ON/OFF.

■ Options

On. Off

Note:

If the Group Hopping setting is switched to ON while this parameter setting is ON, the Sequence Hopping setting automatically becomes OFF.

Group Hopping

■ Summary

Switches Group Hopping ON/OFF.

■ Options

On, Off

Note:

If the Sequence Hopping setting is switched to ON while this parameter setting is ON, the Group Hopping setting automatically becomes OFF.

SRS Parameter Manual

■ Summary

The left image in Figure 3.5.4-1 (When DMRS Parameter is Manual.) is displayed. The automatically calculated values can be confirmed by pressing the menu keys for each parameter below. However, the values cannot be set.

- Sequence Group Number
- Base Sequence Number

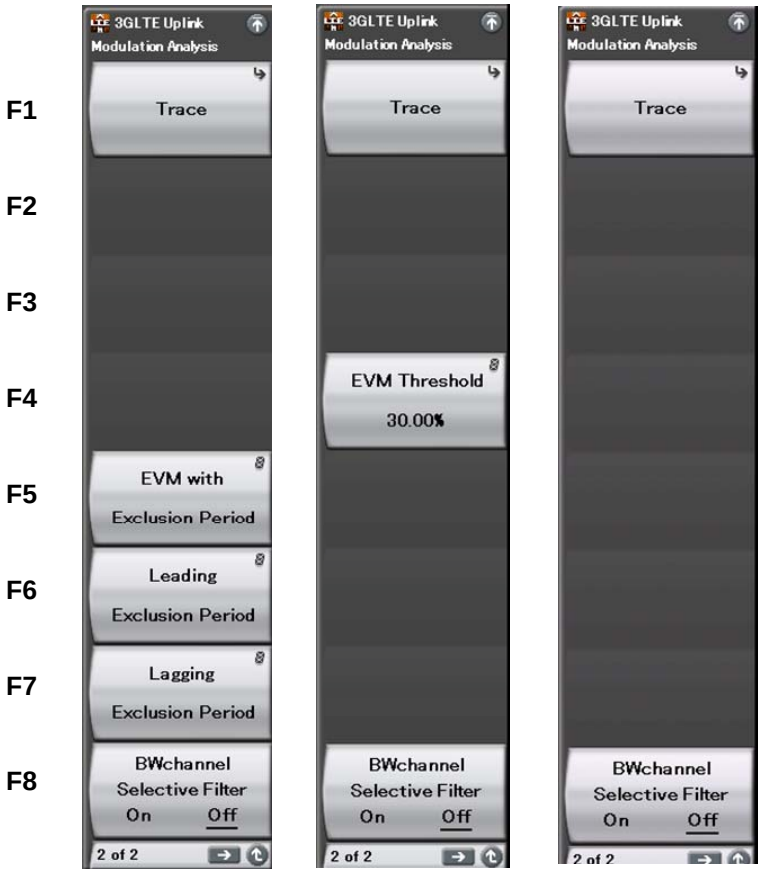
3.6 Setting Measurement Items

Sets measurement items. Pressing F4 (Measure) on the main function menu or Measure displays the Measure function menu.

3.6.1 Modulation Analysis

Sets Modulation Analysis. Pressing F1 (Modulation Analysis) on the Measure function menu displays the Modulation Analysis function menu. The Modulation Analysis function menu consists of two pages that are toggled by pressing →.

Figure 3.6.1-1 Modulation Analysis function menu (1/2)



Page 2 (PUSCH) | Page 2 (PRACH) | Page 2 (PUCCH/SRS)

Figure 3.6.1-2 Modulation Analysis function menu (2/2)

Table 3.6.1-1 Modulation Analysis function menu

Menu Display	Function
Analysis Time	Sets the measurement position. ☞ 3.6.1.1 “Analysis Time”
PUSCH Modulation Scheme	Sets PUSCH Modulation Scheme.
PUCCH Format	Sets PUCCH Format.
Channel Bandwidth	Sets Channel Bandwidth. ☞ 3.5 “Setting Common Items”
First RB Number	Sets first RB number of transmitted RBs.
PRACH Frequency Offset	Sets the frequency position of the PRACH signal.
Number of RBs	Sets number of transmitted RBs.
EVM Window Length	Sets the FFT window length.
Detail Settings	Sets details of measured signal.
Trace	Sets the Trace. ☞ 3.6.1.2 “Trace (other than Summary)”
EVM with Exclusion Period	Sets whether to include the rising interval of slot separation to the EVM calculation.
Leading Exclusion Period	Sets the EVM measurement excluded interval length of front part of all Subframes on PUSCH measurement.
Lagging Exclusion Period	Sets the EVM measurement excluded interval length of rear part of all Subframes on PUSCH measurement.
EVM Threshold	When the measured EVM (rms) exceeds the set value while measuring PRACH, the measurement result status is judged as Signal Abnormal.
BWchannel Selective Filter	Sets this parameter to filter the signals out of the transmission bands.

PUSCH Modulation Scheme

■ Summary

Sets PUSCH Modulation Scheme.

■ Options

QPSK

Analyzes an input signal as a QPSK modulated signal.

16QAM

Analyzes an input signal as a 16QAM modulated signal.

64QAM

Analyzes an input signal as a 64QAM modulated signal.

AUTO

Analyzes an input signal after judging its modulation scheme automatically.

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH.

PUCCH Format

■ Summary

Sets PUCCH Format.

■ Options

1	Sets PUCCH Format to 1.
1a	Sets PUCCH Format to 1a.
1b	Sets PUCCH Format to 1b.
2	Sets PUCCH Format to 2.
2a	Sets PUCCH Format to 2a.
2b	Sets PUCCH Format to 2b.
3	Sets PUCCH Format to 3.

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUCCH.
Format 3 is unavailable when Standard is LTE.

First RB Number

■ Summary

Assigns the first number of RB to transmit when the Target Channel is PUSCH, PUCCH, or SRS.
Sets for each SubFrame from 0 to 9 individually when Target Channel is PUSCH or PUCCH.

■ Setting range

(Target Channel=PUSCH or PUCCH)

0 to 99	Channel Bandwidth: 20 MHz
0 to 74	Channel Bandwidth: 15 MHz
0 to 49	Channel Bandwidth: 10 MHz
0 to 24	Channel Bandwidth: 5 MHz
0 to 14	Channel Bandwidth: 3 MHz
0 to 5	Channel Bandwidth: 1.4 MHz

(Target Channel= SRS)

0 to 96	Channel Bandwidth: 20 MHz
0 to 71	Channel Bandwidth: 15 MHz
0 to 46	Channel Bandwidth: 10 MHz
0 to 21	Channel Bandwidth: 5 MHz
0 to 11	Channel Bandwidth: 3 MHz
0 to 2	Channel Bandwidth: 1.4 MHz

3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified when Target Channel is not set to PRACH.
When the Target Channel is PUSCH or PUCCH, Subframe0 to 9 can be set collectively by specifying a value for All Subframe.
When the Target Channel is PUCCH, the setting is available only when DMRS Parameters is Manual.
When the Target Channel is SRS, the setting is available only when DMRS Parameters is Manual.

PRACH Frequency Offset

■ Summary

Sets the frequency position of the PRACH signal. The unit is RB.

■ Setting range

0 to 94	Channel Bandwidth: 20 MHz
0 to 69	Channel Bandwidth: 15 MHz
0 to 44	Channel Bandwidth: 10 MHz
0 to 19	Channel Bandwidth: 5 MHz
0 to 9	Channel Bandwidth: 3 MHz
0	Channel Bandwidth: 1.4 MHz

3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PRACH.

Number of RBs

■ Summary

Sets number of transmitted RBs when Target Channel is set to PUSCH or SRS. .

■ Setting range

(Target Channel=PUSCH)

1 to (100–First RB Number)	Channel Bandwidth: 20 MHz
1 to (75–First RB Number)	Channel Bandwidth: 15 MHz
1 to (50–First RB Number)	Channel Bandwidth: 10 MHz
1 to (25–First RB Number)	Channel Bandwidth: 5 MHz
1 to (15–First RB Number)	Channel Bandwidth: 3 MHz
1 to (6–First RB Number)	Channel Bandwidth: 1.4 MHz

(Target Channel=SRS)

4 to min(96,(100–First RB Number))	Channel Bandwidth: 20 MHz
4 to min(72,(75–First RB Number))	Channel Bandwidth: 15 MHz
4 to min(48,(50–First RB Number))	Channel Bandwidth: 10 MHz
4 to min(24,(25–First RB Number))	Channel Bandwidth: 5 MHz

4 to min (12,(15–First RB Number)) Channel Bandwidth: 3 MHz
4 Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH/SRS.
When Target Channel is SRS, the setting is available only when DMRS Parameters is Manual.

EVM Window Length (When Target Channel is other than PRACH.)

■ Summary

Sets the FFT window length. There are two setting methods: Ts and W.

If the channel bandwidth is changed, the setting is restored to the default value according to the changed channel bandwidth. (See Table 3.6.1-2.)

■ Setting range

Ts : 0 to 142

W : when Channel Bandwidth is set to 1.4 MHz: 0 to 8
when Channel Bandwidth is set to 3 MHz: 0 to 17
when Channel Bandwidth is set to 5 MHz: 0 to 35
when Channel Bandwidth is set to 10 MHz: 0 to 71
when Channel Bandwidth is set to 15 MHz: 0 to 106
when Channel Bandwidth is set to 20 MHz: 0 to 142

☞ 3.5 “Setting Common Items”

Table 3.6.1-2 Default value of Channel Bandwidth and EVM Window Length

Channel Bandwidth	EVM Window Length (W)	Conversion from W to Ts
1.4 MHz	5	×16
3 MHz	12	×8
5 MHz	32	×4
10 MHz	66	×2
15 MHz	102	×(2048 / 1536)
20 MHz	136	×1

EVM with Exclusion Period

■ Summary

Changes the EVM measurement length and sets whether to include the rising and falling interval of slot separation to the EVM calculation.

■ Options

On Included in EVM calculation.

Off Not included in EVM calculation.

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH.

Leading Exclusion Period

■ Summary

Sets the EVM measurement excluded interval length of front part of all Subframes on PUSCH measurement.

■ Setting range

0 to 70 μs Resolution 10 ns

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH.

Lagging Exclusion Period

■ Summary

Sets the EVM measurement excluded interval length of back part of all Subframes on PUSCH measurement.

■ Setting range

0 to 70 μs Resolution 10 ns

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH.

EVM Threshold

■ Summary

When the measured EVM (rms) exceeds the set value while measuring PRACH, the measurement result status is judged as Signal Abnormal.

■ Setting range

0.00 to 100.00 Resolution 0.01%

BWchannel Selective Filter

■ Summary

Sets the band filter On and Off.

■ Options

On

Off

EVM Window Length (Target Channel=PRACH)

■ Summary

Sets the FFT window length. The Ts and W setting methods are available, but both result in the same value. Note that the setting range varies according to the PRACH Configuration Index value (described in 3.5 "Setting Common Items").

■ Setting range

Ts(W):	PRACH Configuration Index: 0 to 15	0 to 3166
	PRACH Configuration Index: 16 to 31	0 to 21022
	PRACH Configuration Index: 32 to 47	0 to 6238
	PRACH Configuration Index: 48 to 63	0 to 21022

Detail Settings

■ Summary

Sets details of measured signal.

■ Options

Channel Estimation

Sets the Channel Estimation function to On/Off.

Equalization Mode

Sets the Equalization Table calculation method.

Detail Settings: Channel Estimation

■ Summary

Sets the Channel Estimation function to On/Off.

■ Check Box

On	Enables the Channel Estimation function.
Off	Disables the Channel Estimation function.

Detail Settings: Equalization Mode

■ Summary

Sets the Equalization Table calculation method.

■ Options

3GPP TS36.521 (2009-06)

Uses the 2009-06 version of 3GPP TS36.521 for measurement.

3GPP TS36.521 (2009-09)

Uses the 2009-09 version of 3GPP TS36.521 for measurement.

DMRS

Only the Demodulation RS of PUSCH/PUCCH is measured as the reference signal.

Note:

The value of this parameter only affects measurement if Target Channel is set to PUSCH or PUCCH.

3.6.1.1 Analysis Time

Sets the measurement position. Pressing F1 (Analysis Time) on page 1 of the Modulation Analysis function menu or Time/Sweep displays the Analysis Time function menu. However, this menu key is only valid if Target Channel is not set to PRACH.

The MX269021A captures data based on the value specified by Capture Time Length, and synchronizes the data in frame units. Also, the MX269021A analyzes the data in subframe units, and then displays the results. Specify the position to start synchronization for the captured data by using the Analysis Frame Position and Analysis Offset Time parameters. Specify the position to start analysis based on the synchronization point by using the Starting Subframe Number parameter. Specify the subframes to be analyzed by using the Measurement Interval parameter.

Even if the Measurement Interval setting is 2 or more, measurement is performed using a measurement signal for which the channel maps for each subframe are regarded as common.

Starting Subframe Number

■ Summary

This command sets the analysis start time. The starting subframe number is set to 3 in Table 3.6.1.1-1.

■ Setting range

0 to 9

Measurement Interval

■ Summary

Sets the analysis Subframe length (Measurement Interval). Each measurement result is the value averaged at the interval set by this parameter. Measurement Interval is set to 5 in Table 3.6.1.1-1.

■ Setting range

1 to (10 – Starting Subframe Number)

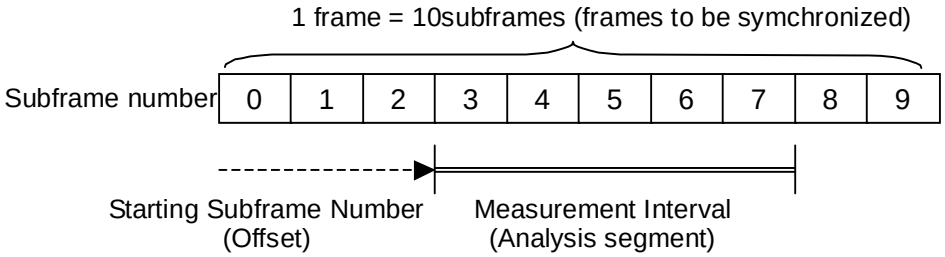


Figure 3.6.1.1-1 Setting example of Starting Subframe Number and Measurement Interval

Analysis Frame Position

■ Summary

This sets the analysis start position in frame units. This setting is enabled when Capture Time is set to Manual. If Storage Mode is Off, the setting range is determined assuming Storage Count is 1.

If the value of Capture Time Length or Storage Count changes, Analysis Frame Position is automatically set to a value in the setting range.

■ Setting range

0 to (Capture Time Length – Storage Count)

Analysis Offset Time

■ Summary

This sets the offset of the analysis start position in seconds based on Analysis Frame Position. This setting is enabled when Capture Time is set to Manual. If Storage Mode is Off, the setting range is determined assuming Storage Count is 1.

If the value of Capture Time Length, Storage Count, or Analysis Frame Position changes, Analysis Offset Time is automatically set to a value in the setting range.

■ Setting range

When Analysis Frame Position is set to 0 and the same value is set to Capture Time Length and Storage Count: 0 ms (fixed)

When Analysis Frame Position is set to 0 and the value set to Capture Time Length is greater than that set to Storage Count: 0 ms to 4.999999 ms

When Analysis Frame Position is set to 1 or greater and the value set to Capture Time Length equals (Storage Count + Analysis Frame Position): –4.999999 ms to 0 ms

Other than the above –4.999999 ms to 4.999999 ms

Figure 3.6.1.1-2 shows a parameter relationship example if Capture Time Length is set to 3, Analysis Frame Position is set to 1, Analysis Offset Time is set to a negative value, and Storage Count is set to 2.

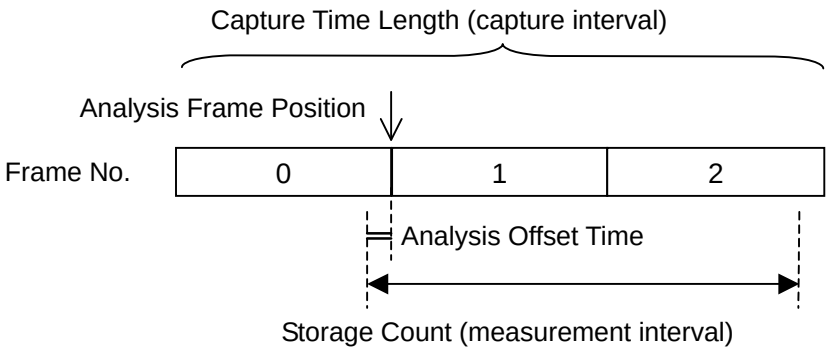


Figure 3.6.1.1-2 Setting example of Analysis Frame Position and Analysis Offset Time

3.6.1.2 Trace (other than Summary)

Sets the trace. Pressing F1 (Trace) on page 2 of the Modulation Analysis function menu or Trace displays the Trace function menu.

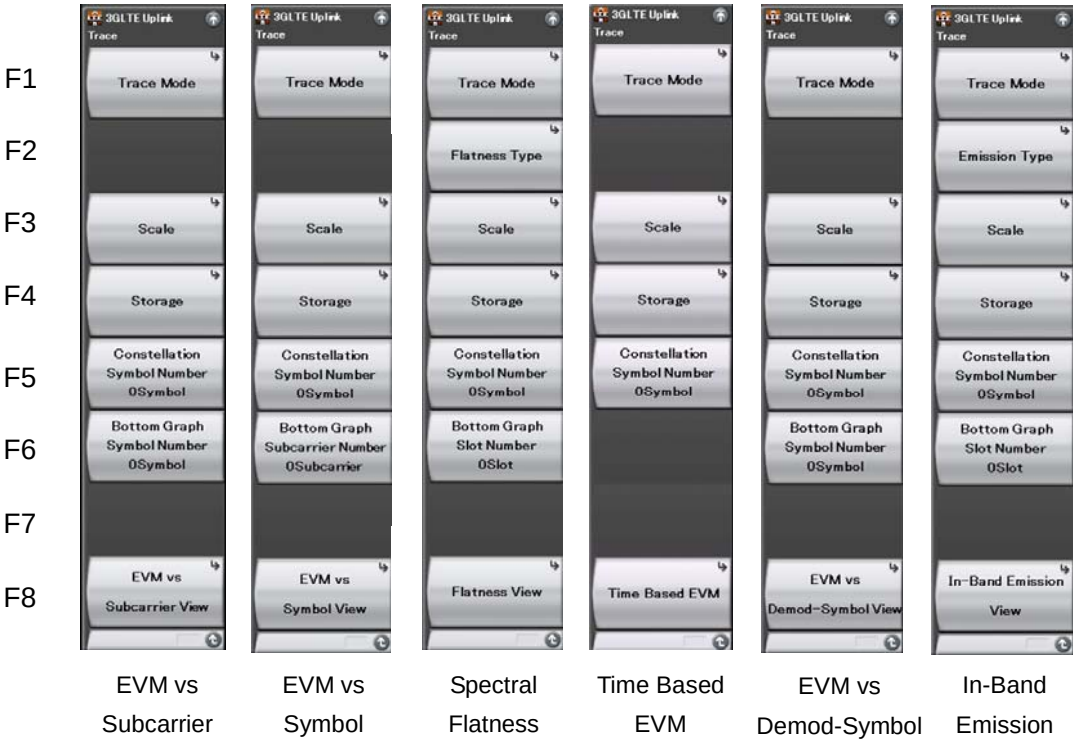


Figure 3.6.1.2-1 Trace function menu

Table 3.6.1.2-1 Trace function menu

Menu Display	Function
Trace Mode	Sets type of result displayed in a graph window.
Flatness Type	Sets the Spectral Flatness graph display Type.
Emission Type	Sets the In-Band Emission graph display Type.
Scale	Sets vertical scale of a graphical result.
Storage	Sets the storage mode.
Constellation Symbol Number	Sets symbol number of a constellation displayed.
Constellation Sequence Number	Sets preamble sequence number of a constellation displayed.
Bottom Graph Symbol Number	Sets symbol number of EVM vs Subcarrier or EVM vs Demod-Symbol displayed.
Bottom Graph Slot Number	Sets the Spectral Flatness or In-Band Emission display Slot number.
Bottom Graph Subcarrier Number	Sets subcarrier number of EVM vs Symbol displayed.
Bottom Graph Sequence Number	Sets preamble sequence number of EVM vs Symbol displayed.
EVM vs Subcarrier View	Sets whether to enable averaging in EVM vs Subcarrier, and the display type.
EVM vs Symbol View	Sets whether to enable averaging in EVM vs Symbol, and the display type.
Time Based EVM View	Sets whether to enable averaging in Time Based EVM, and the display type.
EVM vs Demod-Symbol View	Sets whether to enable averaging in EVM vs Demod-Symbol, and the display type.
Flatness View	Sets whether to enable averaging in Spectral Flatness, and the display type.
In-Band Emission View	Sets whether to enable averaging for In-Band Emission, and the display type.

Trace Mode

■ Summary

Sets type of result displayed in a graph window.

■ Options

EVM vs Subcarrier

Displays EVM vs Subcarrier in the graph window.

EVM vs Symbol

Displays EVM vs Symbol in the graph window.

Spectral Flatness

Displays Spectral Flatness in the graph window.

Time Based EVM

Displays Time Based EVM in a graph window.

EVM vs Demod-Symbol

Displays EVM vs Demod-Symbol in a graph window.

In-Band Emission

Displays In-Band Emission in a graph window.

Summary

Displays EVM of each channel and power of each slot in a graph window.

Note:

Constellation is not displayed when Trace Mode is set to Summary.

Table 3.6.1.2-2 The availability of graph display according to Target Channel

Trace Mode	PUSCH	PUCCH	PRACH	SRS
EVM vs Subcarrier	Yes	Yes	Yes	Yes
EVM vs Symbol	Yes	Yes		
Spectral Flatness	Yes	Yes	Yes	Yes
Time Based EVM	Yes			
EVM vs Demod-Symbol	Yes			
In-Band Emission	Yes	Yes		
Summary	Yes	Yes	Yes	Yes

Flatness Type

■ Summary

Sets the spectral flatness graph display type.

■ Options

Amplitude	Displays Amplitude of Spectral Flatness.
Difference Amplitude	Displays Difference Amplitude of Spectral Flatness.
Phase	Displays Phase of Spectral Flatness.
Group Delay	Displays Group Delay of Spectral Flatness.

In-Band Emission Type

■ Summary

Sets the In-Band Emission graph display type.

■ Options

General & IQ Image	Displays a measurement graph based on the 1RB Power value.
DC	Displays a measurement graph based on the Total RB Power value.

Scale

■ Summary

Sets vertical scale of a graphical result.

■ Options

EVM Unit	Sets a unit of EVM (%/dB).
EVM Scale	Sets the scale upper limit value of EVM (2/5/10/20%, –40/–20/0 dB).
Flatness Scale	Sets a scale of Spectral Flatness.

Scale: Flatness Scale

■ Summary

Sets a scale of Spectral Flatness.

■ Setting range

Amplitude	Sets the upper and lower limit values of Amplitude in Spectral Flatness (±10/±3/±1 dB).
Difference Amplitude	Sets the upper and lower limit values of Difference Amplitude in Spectral Flatness (±1/±0.3/±0.1 dB).
Phase	Sets the upper and lower limit values of Phase in Spectral Flatness (±60/±20/±6 degree).
Group Delay	Sets the upper and lower limit values of Group Delay in Spectral Flatness (500/100/50/10/1 ns).

Storage

■ Summary

Sets the storage mode.
This parameter is invalid when Storage: Count is under 2.

■ Options

Mode	Sets the storage mode.
Count	Sets the number of measurements.

Storage: Mode

■ Summary

Sets the storage mode.

■ Options

Off	Updates data for every sweeping.
Average	Displays the average for every sweeping.
Average & Max	Displays the average value, maximum value, and minimum value (of only specified result values) for each sweep.

Storage: Count

■ Summary

Sets the number of measurements.

■ Setting range

2 to 9999 When Capture Time is set to Auto.

2 to Capture Time Length

When Capture Time is set to Manual ,and Target Channel is set to other than PRACH.

2 to Capture Time Length/2

When Capture Time is set to Manual, and Target Channel is set to PRACH.

Constellation Symbol Number

■ Summary

Sets symbol number of the constellation displayed.

Note:

These settings are enabled only for Constellation.

■ Setting range

0 to (Measurement Interval × 14 Symbol) –1

☞ 3.6.1.1 “Analysis Time”

Constellation Sequence Number

■ Summary

Sets preamble sequence number of the constellation displayed.

Note:

These settings are enabled only for Constellation.

■ Setting range

When Preamble Format is 0 to 1:

0

When Preamble Format is 2 to 3

0 to 1

Bottom Graph Symbol Number

■ Summary

Sets symbol number of EVM vs Subcarrier displayed.

Note:

These settings are enabled only for EVM vs Subcarrier or EVM vs Demod-Symbol.

This parameter can be set when EVM vs Subcarrier View or EVM vs Demod-Symbol View is Each Symbol.

■ Setting range

0 to (Measurement Interval × 14 Symbol) –1

☞ 3.6.1.1 “Analysis Time”

Bottom Graph Sequence Number

■ Summary

Sets preamble sequence number of EVM vs Subcarrier displayed.

Note:

These settings are enabled only for EVM vs Subcarrier

This parameter can be set when EVM vs Symbol View is Each Preamble Sequence.

■ Setting range

When Preamble Format is 0 to 1

0

When Preamble Format is 2 to 3

0 to 1

Bottom Graph Slot Number

■ Summary

Sets the Spectral Flatness or In-Band Emission display Slot number.

Note:

The Spectral Flatness or In-Band Emission display Slot number is set.

This parameter can be set when Flatness View or In-Band EmissionView is Each Slot.

■ Setting range

0 to (Measurement Interval × 2) –1

☞ 3.6.1.1 “Analysis Time”

Bottom Graph Subcarrier Number

■ Summary

Sets subcarrier number of EVM vs Symbol displayed.

Note:

These settings are enabled only for EVM vs Symbol.

This parameter can be set when EVM vs Symbol View is Each Subcarrier.

■ Setting range

0 to 1199	Channel Bandwidth: 20 MHz
0 to 899	Channel Bandwidth: 15 MHz
0 to 599	Channel Bandwidth: 10 MHz
0 to 299	Channel Bandwidth: 5 MHz

0 to 179	Channel Bandwidth: 3 MHz
0 to 71	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

EVM vs Subcarrier View

■ Summary

Sets whether to enable averaging in EVM vs Subcarrier, and the display type.

■ Options

Each Symbol — Displays EVM vs Symbol of the subcarrier set by Bottom Graph Subcarrier Number.

Averaged over all Symbols — Displays EVM vs Subcarrier of the analysis Subframe length set in Measurement Interval.

Each Preamble Sequence — Displays EVM vs Subcarrier of the Preamble Sequence position set in Bottom Graph Preamble Sequence Number.

Averaged over all Preamble Sequences — Displays EVM vs Subcarrier of the Preamble Sequence averaging length

Graph View — Selects a graph display type of EVM vs Subcarrier from the average (RMS), and the average and peak value (RMS&Peak).

Note:

This is fixed to Each Symbol when Target Channel is PUCCH.
This is fixed to Preamble Format when Target Channel is PRACH and Preamble Format is 0 or 1.

☞ 3.6.1.1 “Analysis Time”

EVM vs Symbol View

■ Summary

Sets whether to enable averaging in EVM vs Symbol, and the display type.

■ Options

Each Subcarrier — Displays EVM vs Symbol of Subcarrier set in EVM vs Symbol Subscriber Number.

Averaged over all Subcarriers — Displays EVM vs Symbol in all subcarriers.

Graph View — Selects a graph display type of EVM vs Subcarrier from the average (RMS), and the average and peak value (RMS&Peak).

Spectral Flatness View

■ Summary

Sets whether to enable averaging for Spectral Flatness, and the display type.

■ Options

Each Slot — Displays the Spectral Flatness data of the Slot number specified for Bottom GraphSlot Number.

Averaged over all Slots — Displays the Spectral Flatness data of the average analysis subframe length (in Slot units) specified for Measurement Interval.

Graph View — Selects the graph display type for the spectral flatness from Avg (average) or Avg&Peak (average and peak value). When Avg&Peak (average and peak) is selected, three waveforms (Avg, MAX, and MIN) are displayed.

Note:

This is fixed to Each Slot when Target Channel is PUCCH.

Time Based EVM View

■ Summary

Sets whether to enable averaging for Time Based EVM, and the display type.

■ Options

Graph View — Selects a graph display type of Time Based EVM from the average (RMS), and the average and peak value (RMS&Peak).

EVM vs Demod-Symbol View

■ Summary

Sets whether to enable averaging in EVM vs Symbol, and the display type.

■ Options

Each Symbol — Displays the EVM vs Demod-Symbol value of the Symbol number specified for Bottom Graph Symbol Number.

Averaged over all Symbols — Displays the EVM vs Demod-Symbol of the average of analyze subframe length (in units of symbol) set for Measurement Interval.

Graph View — Selects a graph display type of EVM vs Demod-Symbol from the average (RMS), and the average and peak value (RMS&Peak).

In-Band Emission View

■ Summary

Sets whether to enable averaging for In-Band Emission, and the display type.

■ Options

Each Slot — Displays the In-Band Emission data of the Slot number specified for Bottom GraphSlot Number.

Averaged over all Slots — Displays the In-Band Emission value of the average of all Slot values.

Graph View — Selects the In-Band Emission graph display type from average values (Avg) and average and peak values (Avg&Peak). Three waveforms (the AvgEmission waveform, MAXEmission waveform, and MINEmission waveform) are displayed when the display type is average and peak values (Avg&Peak).

Emission Graph Type — Selects the In-Band Emission Graph Type from Both (RB&Subc), RB, and Subc.

Note:

This is fixed to Each Slot when Target Channel is PUCCH.

3.6.1.3 Trace (Summary)

Sets Trace. Pressing F1 (Trace) on page 2 of the Modulation Analysis function menu or pressing Trace displays the Trace function menu.

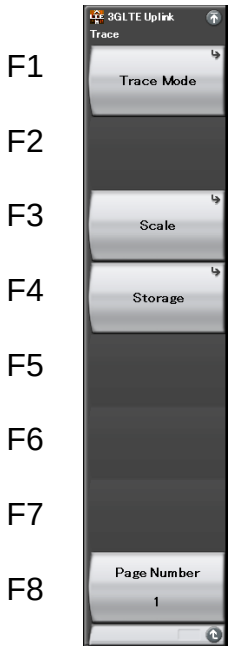


Figure 3.6.1.3-1 Trace (Summary) function menu

Table 3.6.1.3-1 Trace function menu

Menu Display	Function
Trace Mode	Sets a graphical result in the graph window.
Scale	Sets the unit of EVM.
Storage	Sets the storage mode.
Page Number	Sets the page number to be displayed.

Trace Mode

■ Summary

Sets a graphical result in the graph window.

Note:

The Trace function menu differs according to this function setting.

■ Options

EVM vs Subcarrier

Displays EVM vs Subcarrier.

EVM vs Symbol

Displays EVM vs Symbol.

Time Based EVM

Displays Time Based EVM.

EVM vs Demod-Symbol

Displays EVM vs Demod-Symbol.

Spectral Flatness

Displays Spectral Flatness.

In-Band Emission

Displays In-Band Emission.

Summary

Displays the EVM data for each channel and the power of each slot.

Note:

Constellation is not displayed when Trace Mode is set to Summary.

Scale

■ Summary

Sets vertical scale of a graphical result.

■ Options

EVM Unit Sets the unit of EVM (%/dB).

Storage

■ Summary

Sets the storage mode.

This parameter is invalid when the maximum value of the below-mentioned Storage : Count is under 2.

■ Options

Mode Sets the storage mode.

Count Sets the number of measurements.

Storage: Mode

■ Summary

Sets the storage mode.

■ Options

Off	Updates data for every sweeping.
Average	Displays the average for every sweeping.
Average & Max	Displays the average value, maximum value, and minimum value (of only specified Output Power and Mean Power result values) for each sweep.

Storage: Count

■ Summary

Sets the number of measurements.

■ Setting range

2 to 9999 When Capture Time is set to Auto.

2 to Capture Time Length

When Capture Time is set to Manual, and Target Channel is set to other than PRACH.

2 to Capture Time Length/2

Capture Time is set to Manual, and Target Channel is set to PRACH.

Page Number

■ Summary

Sets the page number.

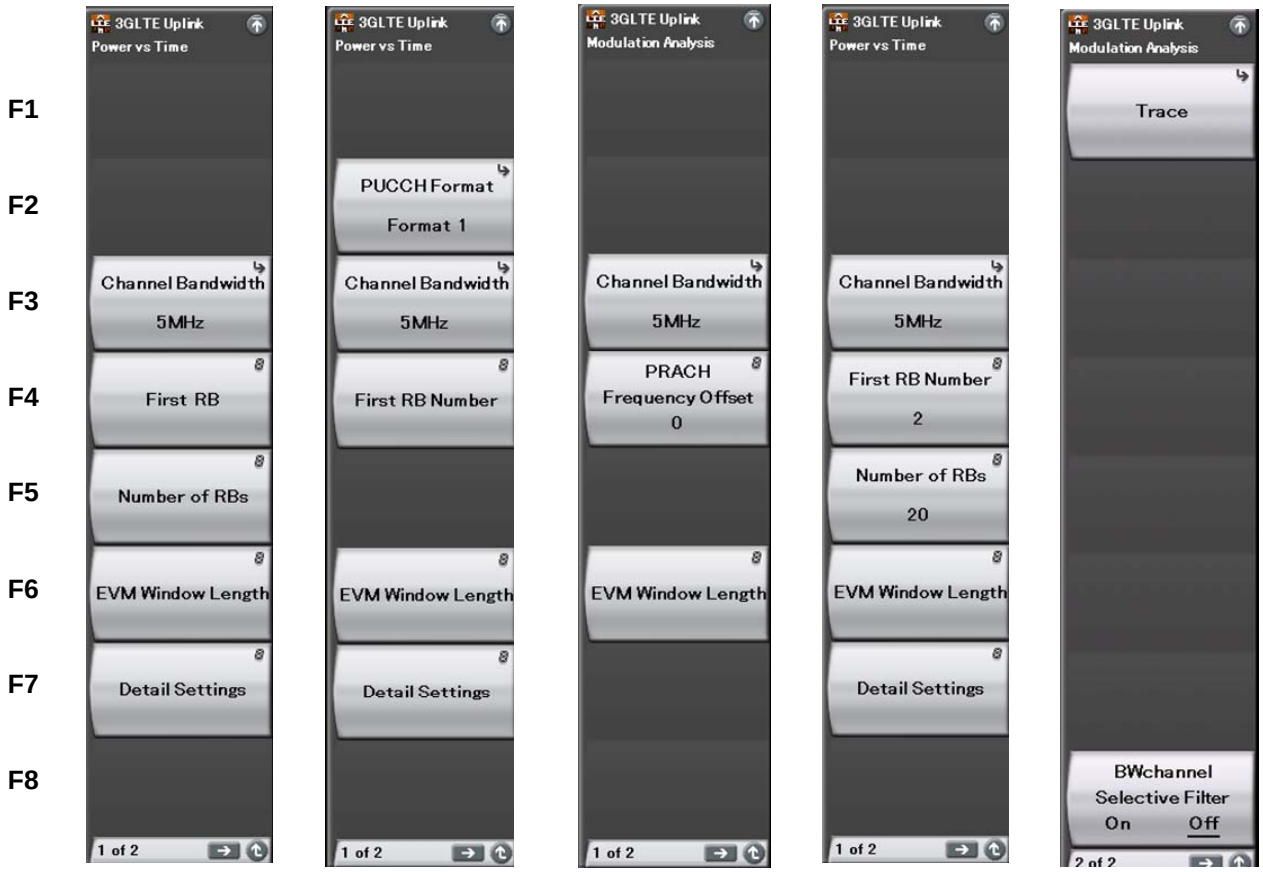
■ Setting range

1 to 14	When TargetChannel is PUSCH
1 to 11	When TargetChannel is PUCCH
1 to 6	When TargetChannel is SRS
1 to 2	When TargetChannel is PRACH

3.6.2 Power vs Time

Sets Power vs Time. Pressing F2 (Power vs Time) on the Measure function menu displays the Power vs Time function menu.

The Power vs Time function menu consists of two pages that are toggled by pressing →.



Page 1 (PUSCH)	Page 1 (PUCCH)	Page 1 (PRACH)	Page 1 (SRS)	Page 2

Figure 3.6.2-1 Power vs Time function menu

Table 3.6.2-1 Power vs Time function menu

Menu Display	Function
PUCCH Format	Sets PUCCH Format.
Channel Bandwidth	Sets Channel Bandwidth. ☞ 3.5 “Setting Common Items”
First RB Number	Sets first RB number of transmitted RBs.
PRACH Frequency Offset	Sets the frequency position of the PRACH signal.
Number of RBs	Sets number of transmitted RBs.
EVM Window Length	Sets the FFT window length.
Detail Settings	Sets details of measured signal.
Trace	Sets the trace. ☞ 3.6.1.2 “Trace (other than Summary) ”
BWchannel Selective Filter	Sets this parameter to filter the signals out of the transmission bands.

PUCCH Format

■ Summary

Sets PUCCH Format.

■ Options

1	Sets PUCCH Format to 1.
1a	Sets PUCCH Format to 1a.
1b	Sets PUCCH Format to 1b.
2	Sets PUCCH Format to 2.
2a	Sets PUCCH Format to 2a.
2b	Sets PUCCH Format to 2b.
3	Sets PUCCH Format to 3.

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUCCH.

Format 3 is unavailable when Standard is LTE.

First RB Number

■ Summary

Assigns the first number of RB to transmit when the Target Channel is PUSCH, PUCCH, or SRS.

Sets for each SubFrame from 0 to 9 individually when Target Channel is PUSCH or PUCCH.

■ Setting range

(Target Channel=PUSCH or PUCCH)

0 to 99	Channel Bandwidth: 20 MHz
0 to 74	Channel Bandwidth: 15 MHz
0 to 49	Channel Bandwidth: 10 MHz

0 to 24	Channel Bandwidth: 5 MHz
0 to 14	Channel Bandwidth: 3 MHz
0 to 5	Channel Bandwidth: 1.4 MHz

(Target Channel= SRS)

0 to 96	Channel Bandwidth: 20 MHz
0 to 71	Channel Bandwidth: 15 MHz
0 to 46	Channel Bandwidth: 10 MHz
0 to 21	Channel Bandwidth: 5 MHz
0 to 11	Channel Bandwidth: 3 MHz
0 to 2	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified when Target Channel is not set to PRACH.
When the Target Channel is PUSCH or PUCCH, Subframe0 to 9 can be set collectively by specifying a value for All Subframe.
When the Target Channel is PUCCH, the setting is available only when DMRS Parameters is Manual.
When the Target Channel is SRS, the setting is available only when DMRS Parameters is Manual.

PRACH Frequency Offset

■ Summary

Sets the frequency position of the PRACH signal. The unit is RB.

■ Setting range

0 to 94	Channel Bandwidth: 20 MHz
0 to 69	Channel Bandwidth: 15 MHz
0 to 44	Channel Bandwidth: 10 MHz
0 to 19	Channel Bandwidth: 5 MHz
0 to 9	Channel Bandwidth: 3 MHz
0	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PRACH.

Number of RBs

■ Summary

Sets number of transmitted RBs.

■ Setting range

(Target Channel=PUSCH)

1 to (100–First RB Number)	Channel Bandwidth: 20 MHz
1 to (75–First RB Number)	Channel Bandwidth: 15 MHz
1 to (50–First RB Number)	Channel Bandwidth: 10 MHz
1 to (25–First RB Number)	Channel Bandwidth: 5 MHz
1 to (15–First RB Number)	Channel Bandwidth: 3 MHz
1 to (6–First RB Number)	Channel Bandwidth: 1.4 MHz

(Target Channel=SRS)

4 to min(96,(100–First RB Number))	Channel Bandwidth: 20 MHz
4 to min(72,(75–First RB Number))	Channel Bandwidth: 15 MHz
4 to min(48,(50–First RB Number))	Channel Bandwidth: 10 MHz
4 to min(24,(25–First RB Number))	Channel Bandwidth: 5 MHz
4 to min(12,(15–First RB Number))	Channel Bandwidth: 3 MHz
4	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

Note:

The menu is displayed and the settings can be specified only when Target Channel is set to PUSCH/SRS.

EVM Window Length (When Target Channel is other than PRACH.)

■ Summary

Sets the FFT window length. There are two setting methods: Ts and W.

If the channel bandwidth is changed, the setting is restored to the default value according to the changed channel bandwidth. (See Table 3.6.1-2.)

■ Setting range

Ts :	0 to 142	
W :	when Channel Bandwidth is set to 1.4 MHz:	0 to 8
	when Channel Bandwidth is set to 3 MHz:	0 to 17
	when Channel Bandwidth is set to 5 MHz:	0 to 35
	when Channel Bandwidth is set to 10 MHz:	0 to 71
	when Channel Bandwidth is set to 15 MHz:	0 to 106
	when Channel Bandwidth is set to 20 MHz:	0 to 142

☞ 3.5 “Setting Common Items”

Table 3.6.2-2 Default value of Channel Bandwidth and EVM Window Length

Channel Bandwidth	EVM Window Length (W)	Conversion from W to Ts
1.4 MHz	5	×16
3 MHz	12	×8
5 MHz	32	×4
10 MHz	66	×2
15 MHz	102	×(2048 / 1536)
20 MHz	136	×1

Detail Settings

■ Summary

Sets details of measured signal.

■ Options

Channel Estimation

Sets the Channel Estimation function to On/Off.

Equalization Mode

Sets the Equalization Table calculation method.

Detail Settings: Channel Estimation

■ Summary

Sets the Channel Estimation function to On/Off.

■ Check Box

On	Enables the Channel Estimation function.
Off	Disables the Channel Estimation function.

Detail Settings: Equalization Mode

■ Summary

Sets the Equalization Table calculation method.

■ Options

3GPP TS36.521 (2009-06)

Uses the 2009-06 version of 3GPP TS36.521 for measurement.

3GPP TS36.521 (2009-09)

Uses the 2009-09 version of 3GPP TS36.521 for measurement.

DMRS

Only the Demodulation RS of PUSCH/PUCCH is measured as the reference signal.

Note:

The value of this parameter only affects measurement if Target Channel is set to PUSCH or PUCCH.

3.6.2.1 Trace

Sets the trace. Pressing F1 (Trace) on page 2 of the Power vs Time function menu or Trace displays the Trace function menu.

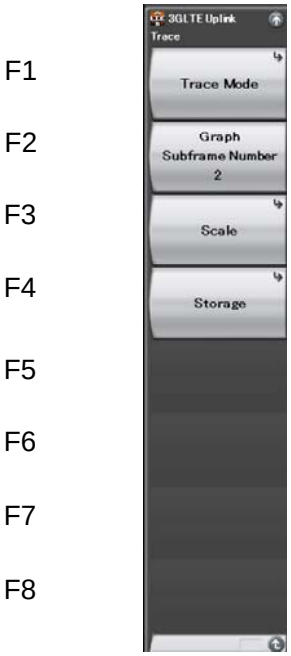


Figure 3.6.2.1-1 Trace function menu

Table 3.6.2.1-1 Trace function menu

Menu Display	Function
Trace Mode	Sets type of result displayed in a graph window.
Graph Subframe Number	Sets the target subframe number.
Scale	Sets vertical scale of a graphical result.
Storage	Sets the storage mode.

Trace Mode

■ Summary

Sets the result type to be displayed on the graph window.

■ Options

Burst	Displays the burst graph on the graph window.
Transient	Displays the transient graph on the graph window.
No Graph	The graph is not displayed on the graph window.

Graph Subframe Number

■ Summary

Sets the target subframe number.

Note:

The setting is available when Target Channel is PUSCH/PUCCH/SRS.

■ Setting range

0 to 20

Scale

■ Summary

Sets the vertical scale of in the graph.

■ Options

Reference Level Upper

Sets the upper limit of the vertical scale in the graph.

Reference Level Lower

Sets the lower limit of the vertical scale in the graph.

Scale: Reference Level Upper

■ Summary

Sets the upper limit of the vertical scale in the graph.

■ Setting range

–100 + Level Offset to 50 + Level Offset

Note:

This can be set as long as Reference Level Upper is bigger than Reference Level Lower.

Scale: Reference Level Lower

■ Summary

Sets the lower limit of the vertical scale in the graph.

■ Setting range

–100 + Level Offset to 50 + Level Offset

Note:

This can be set as long as Reference Level Upper is bigger than Reference Level Lower.

Storage

■ Summary

Sets the storage mode.
This parameter is invalid when the maximum value of the below-mentioned Storage: Count is under 2.

■ Options

Mode	Sets the storage mode.
Count	Sets the number of measurements.

Storage: Mode

■ Summary

Sets the storage mode.

■ Options

Off	Updates data for every sweeping.
On	Displays the average value, maximum value, and minimum value (of only specified result values) for each sweep.

Storage: Count

■ Summary

Sets the number of measurements.

■ Setting range

2 to 9999 When Capture Time is set to Auto.
2 to Capture Time Length/3
When Capture Time is set to Manual,
and Target Channel is set to other than PRACH.
2 to Capture Time Length/2
Capture Time is set to Manual,
and Target Channel is set to PRACH.

3.6.3 Adjacent Channel Power Measurement (ACP)

This calls the ACP function of the Signal Analyzer or Spectrum Analyzer functions. Settings of Carrier Frequency, Input level, Offset, Offset Value and Pre-Amp are automatically reflected on the corresponding parameters. Recall Current Application described in Section 3.6.2 "Recalling parameters" of the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, *MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, or *MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)* cannot be executed when this function is being recalled.

ACP (FFT)

■ Summary

The ACP function of the Signal Analyzer function is called, and the adjacent channel leakage power is measured according to the handed over parameter settings. This function is only enabled when Channel Bandwidth is set to 1.4, 3, and 5 MHz.

ACP (Swept)

■ Summary

The ACP function of the Spectrum Analyzer function is called, and the adjacent channel leakage power is measured according to the handed over parameter settings.

3.6.4 Channel Power Measurement (Channel Power)

This calls the Channel Power function of the Signal Analyzer or Spectrum Analyzer functions. Settings of Carrier Frequency, Input level, Offset, Offset Value and Pre-Amp are automatically reflected on the corresponding parameters. Recall Current Application described in Section 3.6.2 “Recalling parameters” of the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, *MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, or *MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)* cannot be executed when this function is being recalled.

Channel Power (FFT)

■ Summary

Recalls the Channel Power function of the Signal Analyzer function and measures the channel power for the reflected parameter settings.

Channel Power (Swept)

■ Summary

Recalls the Channel Power function of the Spectrum Analyzer function and measures the channel power for the reflected parameter settings.

3.6.5 Occupied Bandwidth Measurement (OBW)

This calls the OBW function of the Signal Analyzer or Spectrum Analyzer functions. Settings of Carrier Frequency, Input level, Offset, Offset Value and Pre-Amp are automatically reflected on the corresponding parameters. Recall Current Application described in Section 3.6.2 "Recalling parameters" of the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, *MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, or *MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)* cannot be executed when this function is being recalled.

OBW (FFT)

■ Summary

The OBW function of the Signal Analyzer function is called, and the occupied bandwidth is measured according to the handed over parameter settings.

OBW (Swept)

■ Summary

The OBW function of the Spectrum Analyzer function is called, and the occupied bandwidth is measured according to the handed over parameter settings.

3.6.6 Spectrum Emission Mask Measurement (SEM)

Recalls the Spectrum Emission Mask function of the Spectrum Analyzer function. Settings of Carrier Frequency, Input level, Offset, Offset Value and Pre-Amp are automatically reflected on the corresponding parameters. Recall Current Application described in Section 3.6.2 "Recalling parameters" of the *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, *MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*, or *MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)* cannot be executed when this function is being recalled.

Spectrum Emission Mask (Swept)

■ Summary

Recalls the Spectrum Emission Mask function of the Spectrum Analyzer function and measures the spectrum emission mask for the reflected parameter settings.

3.7 Setting Marker

Perform the marker-related settings. Pressing F5 (Marker) on the main function menu or Marker displays the Marker function menu. Also, pressing Peak Search displays page 2 of the Marker function menu.

The Marker function menu consists of 2 pages that are toggled by pressing →.

Note:

You cannot configure marker settings when Trace Mode is set to Summary.

Marker

■ Summary

Toggles marker function between On and Off.

■ Options

On	Enables the marker function.
Off	Disables the marker function.

Constellation Select

■ Summary

Sets the target of operation for the rotary knob and the cursor key to Constellation.

Note:

Not displayed during Power vs Time measurement.

Bottom Graph Select

■ Summary

Sets the target of operation for the rotary knob and the cursor key to the graph window.

Note:

Not displayed during Power vs Time measurement.

Constellation Marker Number

■ Summary

Sets the target of a marker (Subcarrier or Demod-Symbol) while constellation results are displayed.

■ Setting range

When Target Channel is not set to PRACH, and TraceMode is set to EVMvsSubcarrier, EVMvsSymbol, Spectral Flatness, or In-Band Emission:

0 to 1199	Channel Bandwidth: 20 MHz
0 to 899	Channel Bandwidth: 15 MHz
0 to 599	Channel Bandwidth: 10 MHz
0 to 299	Channel Bandwidth: 5 MHz
0 to 179	Channel Bandwidth: 3 MHz
0 to 71	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

When Target Channel is not set to PRACH, and EVM vs Demod Symbol or Time Based EVM is set:

0 to (Number of RB × 12) – 1

☞ 3.6.1.1 “Analysis Time”

When Target Channel is PRACH:

0 to PRACH Sequence Length (839) – 1

Note:

Not displayed during Power vs Time measurement.

Bottom Graph Marker Number

■ Summary

Sets the target of the marker on the Bottom Graph result display.

■ Setting range

When Target Channel is not set to PRACH, and TraceMode is set to EVM vs Subcarrier, Spectral Flatness (Amplitude, Phase), or In-Band Emission:

0 to 1199	Channel Bandwidth: 20 MHz
0 to 899	Channel Bandwidth: 15 MHz
0 to 599	Channel Bandwidth: 10 MHz
0 to 299	Channel Bandwidth: 5 MHz
0 to 179	Channel Bandwidth: 3 MHz
0 to 71	Channel Bandwidth: 1.4 MHz

☞ 3.5 “Setting Common Items”

When Target Channel is not set to PRACH, and TraceMode is set to Spectral Flatness (Difference Amplitude, Group Delay):

1 to 1198	Channel Bandwidth: 20 MHz
1 to 898	Channel Bandwidth: 15 MHz
1 to 598	Channel Bandwidth: 10 MHz
1 to 298	Channel Bandwidth: 5 MHz
1 to 178	Channel Bandwidth: 3 MHz
1 to 70	Channel Bandwidth: 1.4 MHz

When Target Channel is not set to PRACH, and TraceMode is set to EVM vs Symbol or Time Based EVM:

0 to (Measurement Interval × 14 Symbol) – 1

☞ 3.6.1.1 “Analysis Time”

When Target Channel is not set to PRACH, and EVM vs Demod Symbol or Time Based EVM is set:

0 to (Number of RBs × 12) – 1

☞ 3.6.1 “Modulation Analysis”

When Target Channel is set to PRACH and Trace Mode is set to EVM vs Subcarrier:

PRACH Frequency Offset × 12 × 12 + 13 – 605 to
PRACH Frequency Offset × 12 × 12 + 13 – 605 + 2047

When Target Channel is set to PRACH, and Trace Mode is set to Spectral Flatness (Amplitude, Phase):

PRACH Frequency Offset × 12 × 12 + 13 to
PRACH Frequency Offset × 12 × 12 + 13 + PRACH Sequence Length (839) – 1

When Target Channel is set to PRACH, and Trace Mode is set to Spectral Flatness (Difference Amplitude, Group Delay):

PRACH Frequency Offset × 12 × 12 + 13
to PRACH Frequency Offset × 12 × 12 + 13 + PRACH Sequence Length (839) – 2

Note:

Not displayed during Power vs Time measurement.

Graph Marker Number (Power vs Time)

■ Summary

Sets a marker target in the graph results during Power vs Time measurement.

■ Setting range

When Target Channel is PUSCH, PUCCH:

–30720 to 675839	Trace Mode: Burst
–1536 to 646655	Trace Mode: Transient

When Target Channel is PRACH:

–30720 to 58463	Trace Mode: Burst (Preamble Format0)
–30720 to 76319	Trace Mode: Burst (Preamble Format1)
–30720 to 86111	Trace Mode: Burst (Preamble Format2)
–30720 to 100895	Trace Mode: Burst (Preamble Format3)
–1536 to 29279	Trace Mode: Transient (Preamble Format0)
–1536 to 47135	Trace Mode: Transient (Preamble Format1)
–1536 to 56927	Trace Mode: Transient (Preamble Format2)
–1536 to 71711	Trace Mode: Transient (Preamble Format3)

When Target Channel is SRS:

–30720 to 675839	Trace Mode: Burst
26992 to 646655	Trace Mode: Transient

Note:

Displayed only during Power vs Time measurement.

Peak Search

■ Summary

When Trace Mode is not set to Spectral Flatness or In-Band Emission:

Moves the marker to the maximum level point within the measurement range. When there are multiple maximum level points, the point corresponding to the smallest value (left side of the scale) on the horizontal axis (Subcarrier, or Symbol) is selected.

When Spectral Flatness is selected for Trace Mode:

Regardless of the Graph View setting, the marker is moved to the maximum level point for the Average waveform data.

When In-Band Emission is selected for Trace Mode:

The marker is moved to the maximum level point in accordance with the In-Band Emission Graph Type setting. If Graph Type is set to Subcarrier or Both, Peak Search is performed for the average waveform data for each subcarrier. If Graph Type is set to RB, Peak Search is performed for the average waveform data for each RB.

Next Peak

■ Summary

When Trace Mode is not set to Spectral Flatness or In-Band Emission:

Moves the marker to the next largest level point after the current marker level within the measurement range. When there are multiple points, the point corresponding to the smallest value (left side of the scale) on the horizontal scale is selected. However, if the point is the same value as the marker level, the marker is moved to the next maximum point to the horizontal axis position of the marker.

Note that a search error occurs if Marker selection is executed when displaying a minimum value graph.

When Spectral Flatness is selected for Trace Mode:

Regardless of the Graph View setting, the marker is moved to the next largest level point for the Average waveform data.

When In-Band Emission is selected for Trace Mode:

Regardless of the In-Band Emission Graph Type setting, the marker is moved to the next largest level point. If Graph Type is set to Subcarrier or Both, Next Peak is performed for the average waveform data for each subcarrier. If Graph Type is set to RB, Next Peak is performed for the average waveform data for each RB.

Dip Search

■ Summary

Moves the marker to the minimum level position within the measurement range. If there are multiple minimum level points, the largest point (right side of the scale) on the horizontal axis is selected. (The measurement graph operation is the same as for Peak Search.)

Next Dip

■ Summary

Moves the marker to the next smallest level point after the current marker level within the measurement range. When there are multiple points, the point corresponding to the greatest value (right side of the scale) on the horizontal axis is selected. However, if the point is the same value as the marker level, the marker is moved to the next minimum point to the horizontal axis position of the marker.

(The measurement graph operation is the same as for Next Search.)

Note that a search error occurs if Marker selection is executed when displaying a maximum value graph.

3.8 Setting Trigger

Configures settings of a trigger. Pressing F6 (Trigger) on the main function menu or Trigger/Gate displays the Trigger function menu.

Trigger Switch

■ Summary

This sets the trigger synchronization On/Off.

■ Options

On	Enables the trigger function.
Off	Disables the trigger function.

Note

If Target Channel is set to PRACH, this parameter is automatically fixed to ON.

Trigger Source

■ Summary

This sets the trigger source.

■ Options

External*1	Measurement starts with external trigger signal input.
External 2*2	Measurement starts with external trigger 2 signal input.
SG Marker	Starts measurement by the timing of internal Vector Signal Generator option.
Video	Starts measurement by using a Video trigger.

*1: External 1 is displayed only for MS2850A.

*2: External 2 is selectable only for MS2850A.

Note

If Target Channel is set to PRACH, this parameter is automatically switched to Video.

If Target Channel is not set to PRACH and option 020 is installed, External or SG Marker can be specified.

Trigger Slope

■ Summary

Sets the trigger polarity.

■ Options

Rise	Synchronizes with rising edge of the trigger.
Fall	Synchronizes with falling edge of the trigger.

Trigger Delay

■ Summary

Sets the trigger delay.

■ Setting range

–2 to +2 s	When Span is set to 31.25 MHz

–1 to +1 s	When Span is set to 62.5 MHz
–500 to +500 ms	When Span is set to 125 MHz

Trigger Level

■ Summary

Sets the trigger Level for the Video trigger.

■ Setting range

–150 dBm to 50 dBm

Note

Depending on the Configuration Index setting, more than one Preamble might be allocated to 1 frame, but the measurement target is the Preamble signal at the location to which the trigger applies.

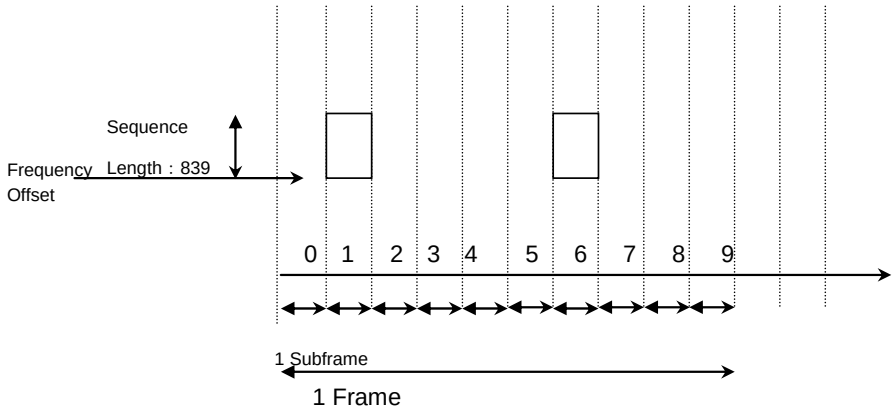


Figure 3.8-1 PRACH signal 1 frame Preamble signal allocation position

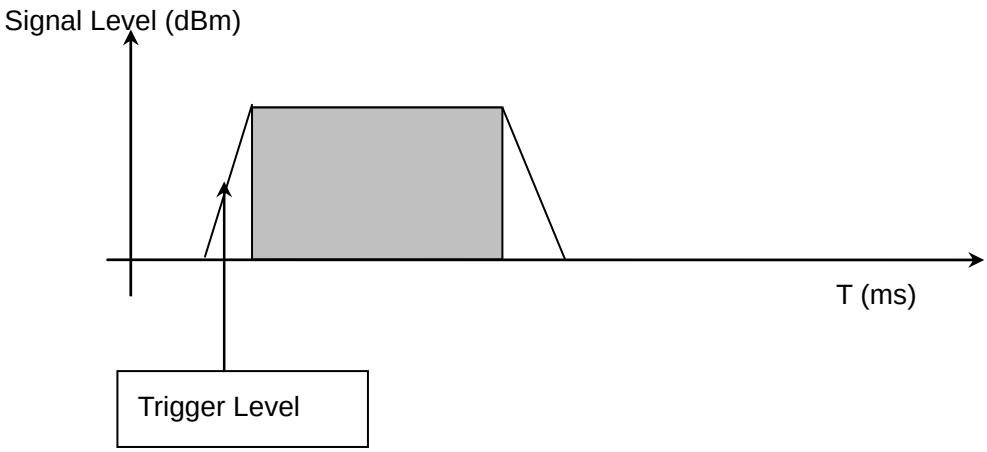


Figure 3.8-2 Video trigger example

The measurement target signal is triggered in accordance with the Trigger Level value of the Video trigger. The measurement target is the Preamble signal to which this trigger applies.

3.9 EVM Display

Displays EVM analysis results. According to the storage mode specified, the results in a single measurement are displayed for Off, the averages of the results in the specified number of measurements for Average, and the averages and the min/max (for Output Power and Mean Power only) of the results in the specified number of measurements for Average & Max, respectively.

☞ 3.6.1.2 "Trace (other than Summary)"

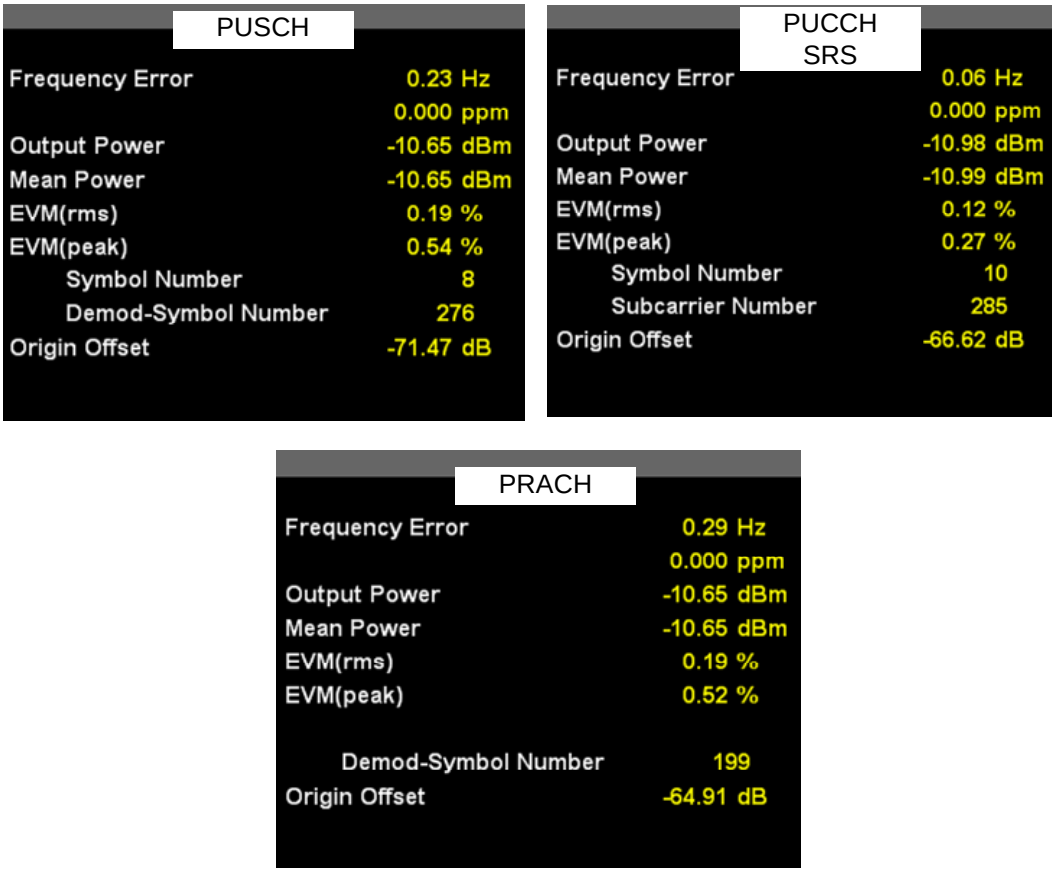


Figure 3.9-1 Result Window

Frequency Error

■ Summary

Displays the average frequency error in the range set in Starting Subframe Number and Measurement Interval.

☞ 3.6.1.2 "Trace (other than Summary)"

Output Power

■ Summary

Displays the average RF level of whole Frequency Span within the range determined by Starting Subframe Number and Measurement Interval.

Mean Power

■ Summary

Displays the average power value including Cyclic Prefix in the bandwidth set by Channel Bandwidth within the range determined by Starting Subframe Number and Measurement Interval.

EVM (rms)

■ Summary

Displays the root square average EVM of all the subcarriers (all Demod-Symbol when Target Channel is PUSCH) calculated by horizontal time axis within the range determined by Starting Subframe Number and Measurement Interval.
Switches between % and dB according to settings of EVM Unit.

☞ 3.6.1.2 “Trace (other than Summary)”

EVM (peak)

■ Summary

Displays the maximum EVM of all subcarriers (all Demod-Symbol when Target Channel is PUSCH) and all symbols calculated by horizontal time axis in the range determined by Starting Subframe Number and Measurement Interval.
Switches between % and dB according to settings of EVM Unit.

Symbol Number

■ Summary

Displays the symbol number of EVM (peak).

Demod-Symbol Number

■ Summary

Displays the Demod-Symbol number of EVM (peak).

Subcarrier Number

■ Summary

Displays the subcarrier number of EVM (peak)

Preamble Sequence Number

■ Summary

Displays the preamble sequence number of EVM (peak)

Origin Offset

■ Summary

Displays the average origin offset in the range set in Starting Subframe Number and Measurement Interval.

Time Offset

■ Summary

Displays the time offset between the trigger input and the head of the frame. This value is displayed only if the trigger function is enabled, or while the Replay function is executed and the storage mode is disabled. This value is displayed if the TriggerSource setting is External or SGMaker.

3.10 Constellation

Displays a constellation of the symbol specified in Constellation Symbol Number.

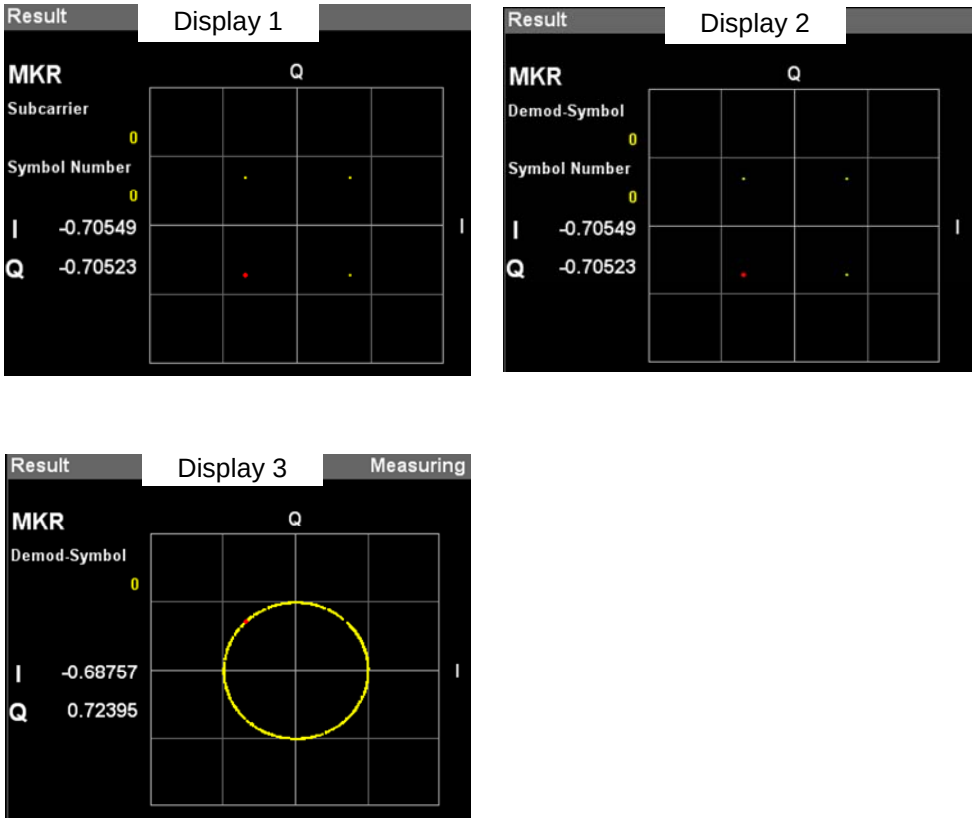


Figure 3.10-1 Constellation

Graph display

■ Summary

Displays a constellation of all subcarriers (all Demod-Symbol when Target Channel is PUSCH) in the symbol set in Constellation Symbol Number, with it overlapped when Target Channel is other than PRACH.

Displays a constellation of preamble sequence of all Demod-Symbol set in Constellation Sequence Number when Target Channel is PRACH. The marker-selected subcarrier is displayed in red.

3.6.1.2 “Trace (other than Summary)”

Table 3.10-1 Constellation display

Display	Setting		Constellation display
	Target	Trace Mode	
Display 1	PUSCH PUCCH	EVM vs Subcarrier EVM vs Symbol Spectral Flatness In-Band Emission	Displays I and Q values in all subcarriers (all Demod-Symbol when Target Channel is PUSCH).
	SRS	EVM vs Subcarrier Spectral Flatness	
Display 2	PUSCH	EVM vs Demod-Symbol Time Based EVM	Displays I and Q values in all subcarriers.
Display 3	PRACH	EVM vs Subcarrier Time Based EVM Spectral Flatness	Displays I and Q values of all Demod-Symbols for each Constellation Preamble Sequence Number.

MKR Subcarrier

■ Summary

Displays the marker-selected subcarrier number. The marker can be moved with the cursor keys or the rotary knob. This parameter is displayed when Target Channel is set to other than PRACH and Trace Mode is EVM vs Subcarrier, EVM vs Symbol, Spectral Flatness, or In-Band Emission.

MKR Demod-Symbol

■ Summary

Displays the Demod-Symbol number selected by the marker. The marker can be moved with the cursor keys or the rotary knob. This parameter is displayed when Target Channel is PRACH and Trace Mode is Time Based EVM or EVM vs Demod-Symbol.

Symbol Number

■ Summary

Displays the symbol number set in Constellation Symbol Number. Displays when Target Channel is set to other than PRACH.

Sequence Number

■ Summary

Displays the Preamble sequence number set in Constellation Sequence Number when Target Channel is set to PRACH.

MKR I/Q

■ Summary

Displays the amplitude value of I/Q of the marker-selected subcarrier (or Demod-Symbol). The marker can be moved with the cursor key or the rotary knob.

The amplitude value is normalized in the value in which that of Reference Signal is set to 1.0.

3.11 EVM vs Subcarrier

Displays EVM for each subcarrier.

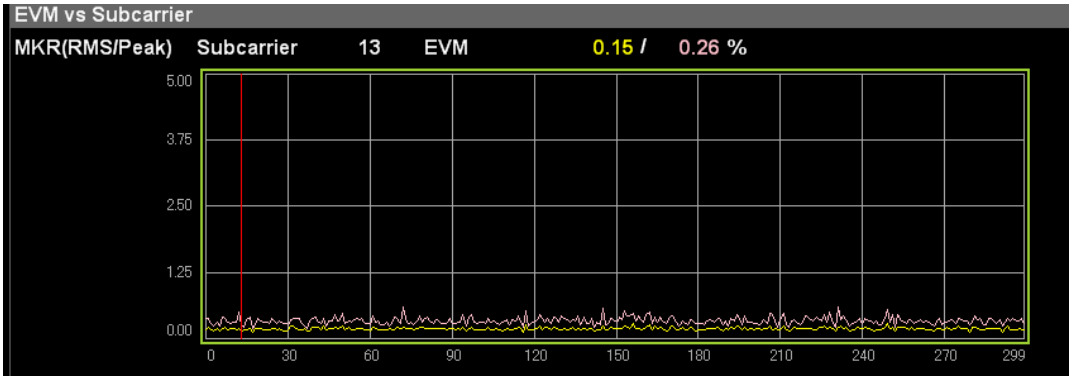


Figure 3.11-1 EVM vs Subcarrier (PUSCH)

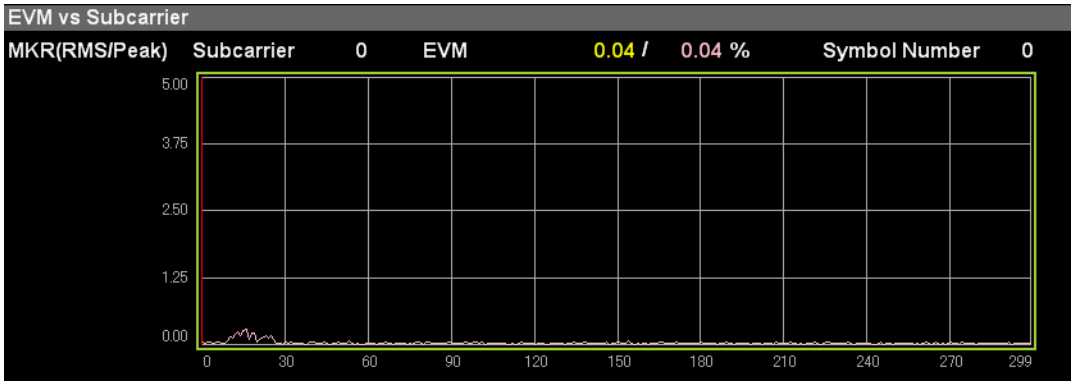


Figure 3.11-2 EVM vs Subcarrier (PUCCH)

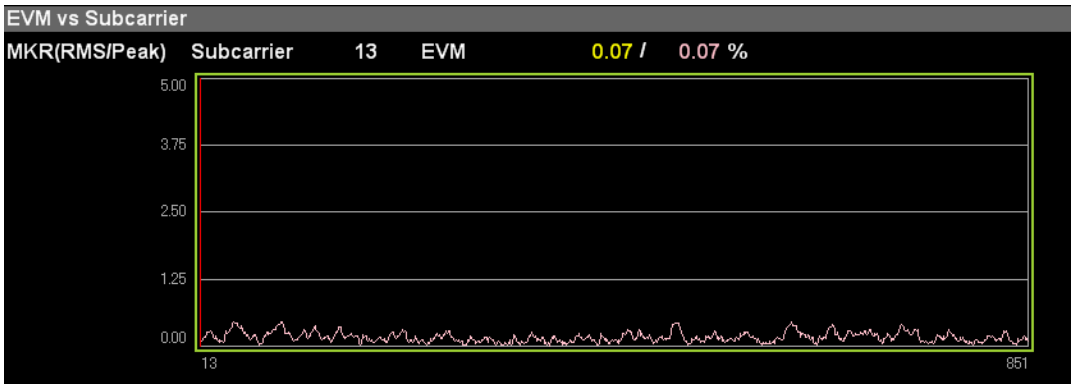


Figure 3.11-3 EVM vs Subcarrier (PRACH)

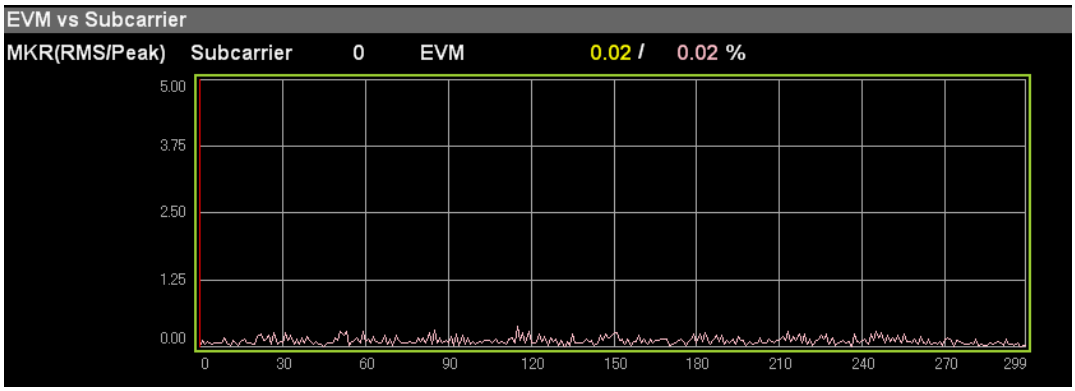


Figure 3.11-4 EVM vs Subcarrier (SRS)

Graph display

■ Summary

Displays EVM for each subcarrier. EVM for each subcarrier is based on settings of EVM vs Subcarrier View.
The marker-selected subcarrier is displayed in red.

3.6.1.2 “Trace (other than Summary)”

MKR Subcarrier

■ Summary

Displays the marker-selected subcarrier number. The marker can be moved with the cursor key or the rotary knob.

MKR EVM

■ Summary

Displays EVM of the marker-selected subcarrier. The EVM value is submitted to the settings of EVM vs Subcarrier View.

Symbol Number

■ Summary

Displays the symbol number set in EVM vs Subcarrier Symbol Number.

Note:

Displays it only when the settings of EVM vs Subcarrier View are Each Symbol.

Sequence Number

■ Summary

Displays the symbol number set in EVM vs Subcarrier Sequence Number.

Note:

Displays it only when the settings of EVM vs Subcarrier View are Each Preamble Sequence.

3.12 EVM vs Symbol

Displays EVM for each Symbol in PUSCH or PUCCH.

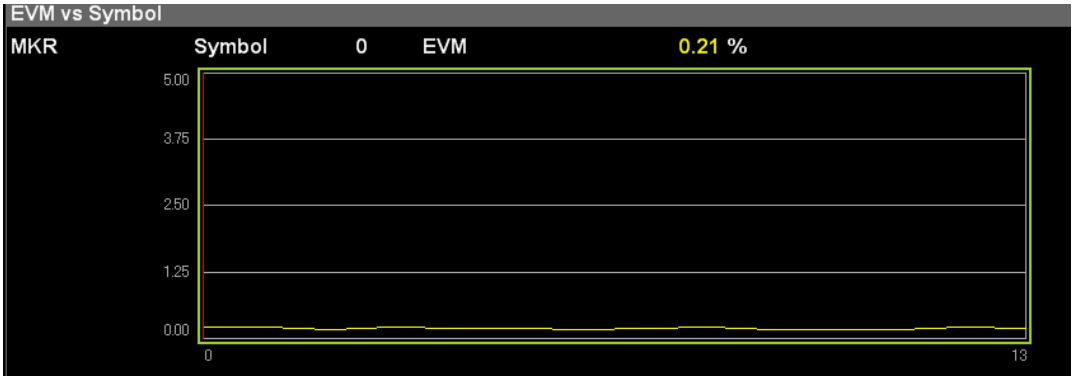


Figure 3.12-1 EVM vs Symbol (PUSCH)

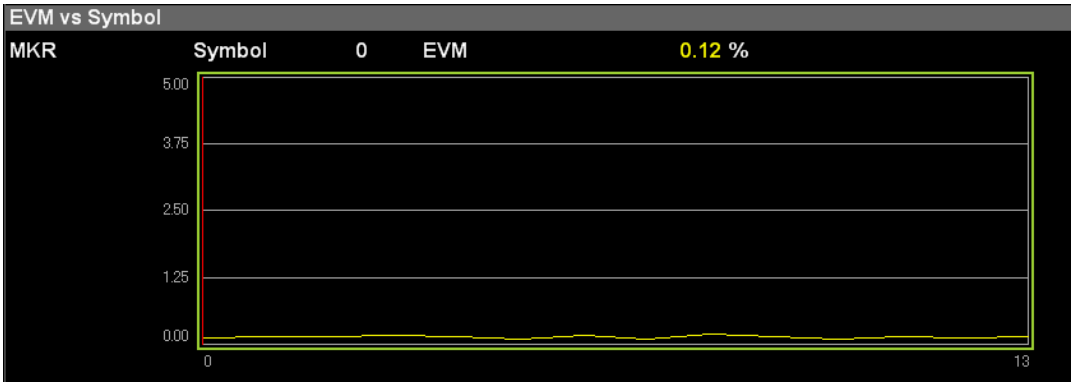


Figure 3.12-2 EVM vs Symbol (PUCCH)

Graph display

■ Summary

Displays EVM for each Symbol. EVM of each symbol is based on settings of EVM vs Symbol View.

The symbol selected by the marker is displayed in red.

☞ 3.6.1.2 “Trace (other than Summary)”

MKR Symbol

■ Summary

Displays the marker-selected symbol number. The marker can be moved with the cursor key or the rotary knob.

MKR EVM

■ Summary

Displays the average EVM of all subcarriers in the marker-selected symbol. The EVM value is submitted to the settings of EVM vs Symbol View.

Subcarrier Number

■ Summary

Displays the subcarrier number set in EVM vs Symbol Subcarrier Number.

Note:

Displays it only when the settings of EVM vs Symbol View are Each Subcarrier.

3.13 Time Based EVM

Displays the EVM for each symbol measured in the time domain. Only PUSCHs are displayed in the Time Based EVM graph. The results are not displayed for symbols that do not have a PUSCH.

Figure 3.13-1 Time Based EVM (PUSCH)

Graph display

■ Summary

Displays EVM for each Symbol. The EVM of each symbol depends on the Time Based EVM View setting.
The symbol selected by the marker is displayed in red.

3.6.1.2 “Trace (other than Summary)”

MKR Symbol

■ Summary

Displays the marker-selected symbol number. The marker can be moved with the cursor key or the rotary knob.

MKR EVM

■ Summary

Displays the average and peak EVMs of the symbol selected by the marker.

3.14 EVM vs Demod-Symbol

Displays the EVM for each Demod-symbol in PUSCH. The EVM of the symbol without PUSCH is not displayed.

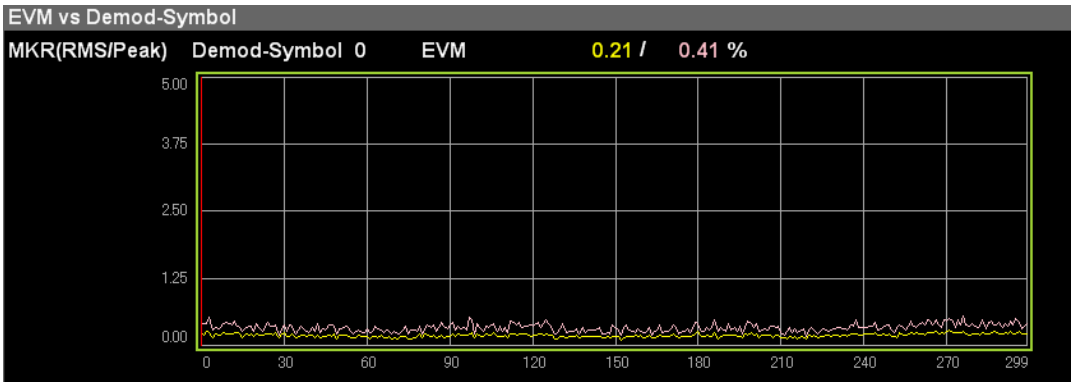


Figure 3.14-1 EVM vs Demo-Symbol (PUSCH)

Graph display

■ Summary

Displays EVM for each Symbol. EVM of each symbol is based on settings of EVM vs Demod-Symbol View.

The Demod-symbol selected by the marker is displayed in red.

3.6.1.2 “Trace (other than Summary)”

MKR Demod-Symbol

■ Summary

Displays the marker-selected symbol number. The marker can be moved with the cursor key or the rotary knob.

MKR EVM

■ Summary

Displays the average and peak EVMs of the Demod-symbol selected by the marker.

Symbol Number

■ Summary

Displays the Bottom Graph Symbol Number set in EVM vs Demod-Symbol.

Note:

Displays it only when the settings of EVM vs Demod-Symbol View are Each Symbol.

3.15 Spectral Flatness

Displays the measurement results of Spectral Flatness.

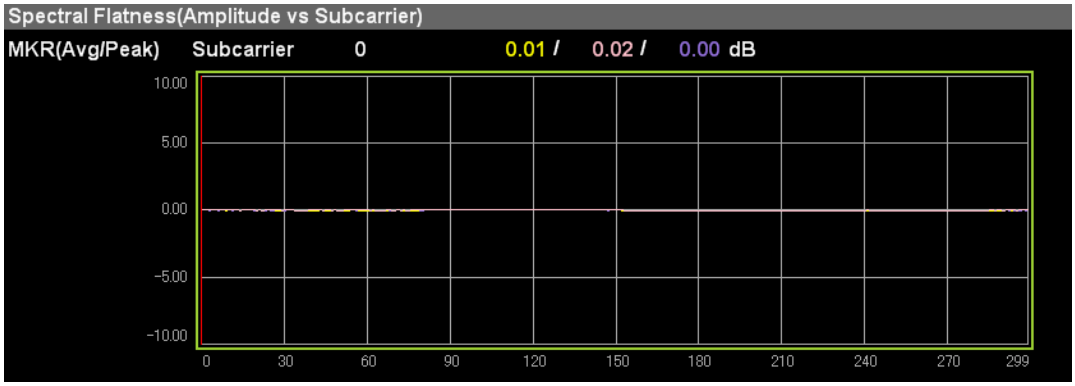


Figure 3.15-1 Amplitude of Spectral Flatness display

Graph display

■ Summary

Displays the Spectral Flatness value of an input signal. Note that the Slot setting depends on Flatness View.

☞ 3.6.1.2 “Trace (other than Summary)”

The marker-selected subcarrier is displayed in red.

MKR Subcarrier

■ Summary

Displays the marker-selected subcarrier number. The marker can be moved with the cursor key or the rotary knob.

MKR Amplitude

■ Summary

Displays the spectral flatness average of the subcarriers selected by the marker, as well as the maximum and minimum Amplitude.

MKR Difference Amplitude

■ Summary

Displays the spectral flatness average of the subcarriers selected by the marker, as well as the maximum and minimum Difference Amplitude (the level difference between adjacent subcarriers).

MKR Phase

■ Summary

Displays the spectral flatness average of the subcarriers selected by the marker, as well as the maximum and minimum Phase.

MKR Group Delay

■ Summary

Displays the spectral flatness average of the subcarriers selected by the marker, as well as the maximum and minimum Group Delay.

Slot Number

■ Summary

Displays the Bottom Graph Slot Number set in Spectral Flatness.

Note:

Displays it only when the settings of Flatness View are Each Slot.

3.16 In-Band Emission

Displays the measurement results of In-Band Emission in PUSCH or PUCCH.

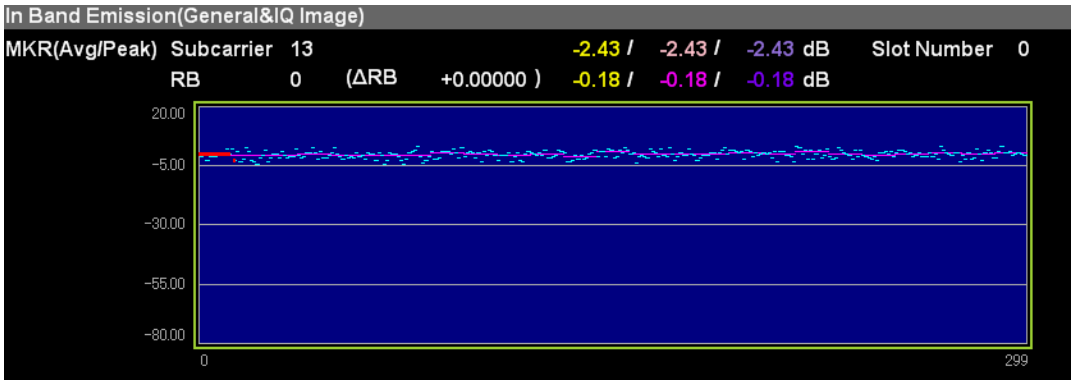


Figure 3.16-1 In-Band Emission (PUSCH)

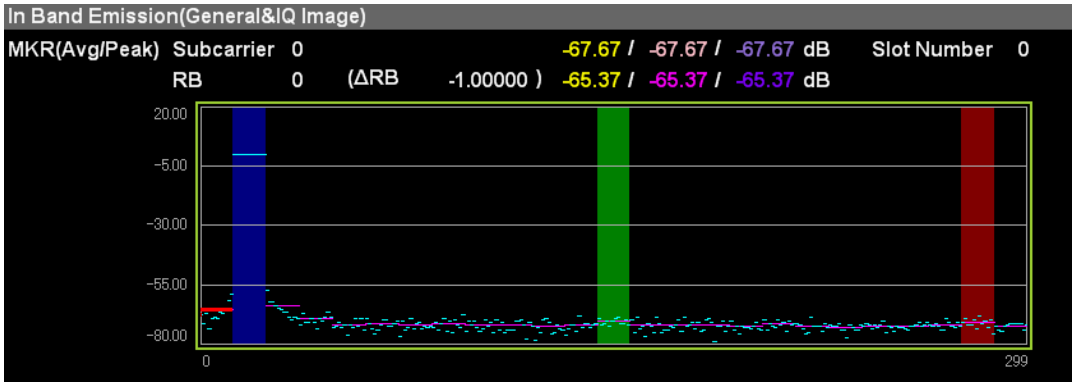


Figure 3.16-2 In-Band Emission (PUCCH)

Graph display

■ Summary

Displays the In-Band Emission value of the input signal. The In-Band Emission value of each Subcarrier or RB is displayed. The subcarrier or RB selected by the marker is indicated in red. The color bands below are displayed according to RB conditions.

Blue: Allocated RB

Green: Non-Allocated RB (Carrier Leakage)

Red: Non-Allocated RB (IQ Image)

Brown: Non-Allocated RB (Carrier Leakage + IQ Image)

☞ 3.6.1.2 “Trace (other than Summary)”

MKR Subcarrier

■ Summary

Displays the marker-selected subcarrier number. The marker can be moved with the cursor key or the rotary knob. The average, maximum, and minimum In-Band Emission values are also displayed.

MKR RB

■ Summary

Displays the number of the RB selected by the marker. The marker can be moved with the cursor key or the rotary knob. The average, maximum, and minimum In-Band Emission values are also displayed.

Slot Number

■ Summary

Displays the Bottom Graph Slot Number set in In-Band Emission.

Note:

Displays it only when the settings of In-Band Emission View are Each Slot.

ΔRB

■ Summary

Displays the distance from Allocate RB to each RB.

3.17 Summary

Displays a list of numerical results for each measurement. The power for each EVM and Slot, frequency error for each Slot, and the OriginOffset, In-Band Emission, and SpectralFlatness measurement results are displayed on multiple pages. The displayed measurement results differ according to the measurement target Channel (specified for TargetChannel).

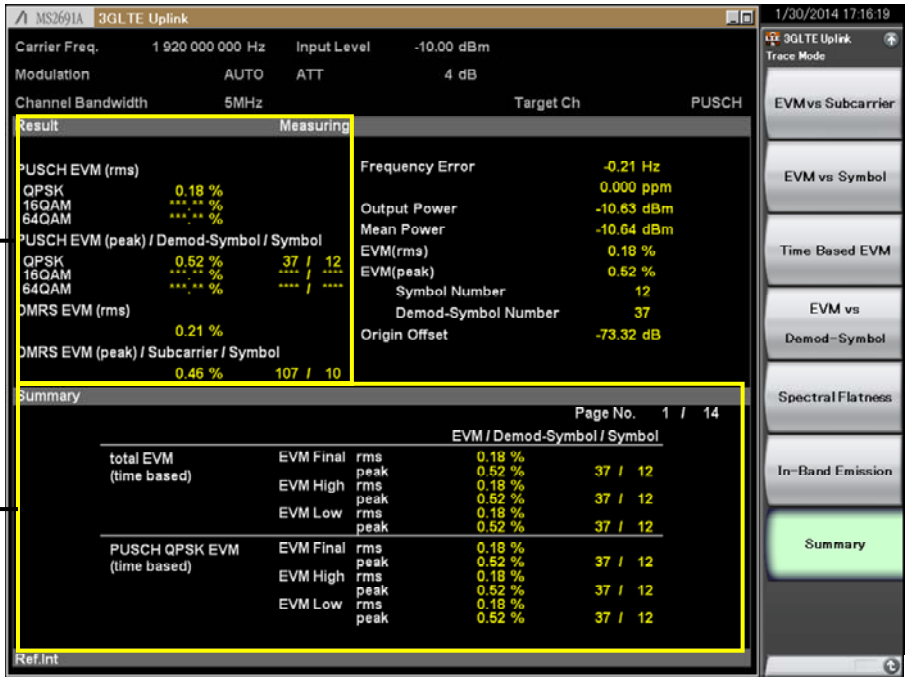


Figure 3.17-1 Summary

<Description of display area (1)>

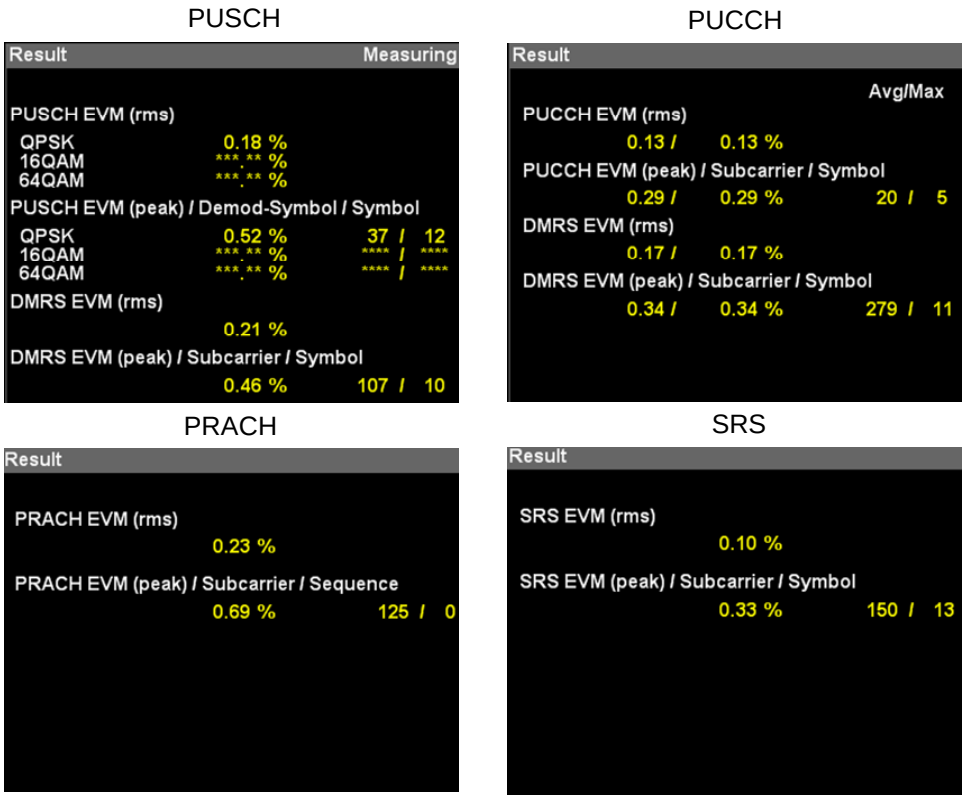


Figure 3.17-2 Description of display area (1)

When Target Channel is PUSCH

PUSCH EVM (rms) * Displays the Final result of TimeBase.
- QPSK
- 16QAM
- 64QAM

PUSCH EVM (peak)/Demod-Symbol/Symbol
* Displays the Final result of TimeBase.
- QPSK
- 16QAM
- 64QAM

DMRS EVM (rms) * Displays the Final result of RS.

DMRS EVM (peak)/Subcarrier/Symbol
* Displays the Final result of RS.

When Target Channel is PUCCH

PUCCH EVM (rms) * Displays the Final result of PUCCH.

PUCCH EVM (peak)/Subcarrier/Symbol
* Displays the Final result of PUCCH.

DMRS EVM (rms) * Displays the Final result of RS.

DMRS EVM (peak)/Subcarrier/Symbol
* Displays the Final result of RS.

When Target Channel is SRS

SRS EVM (rms) * Displays the Final result of SRS

SRS EVM (peak)/Subcarrier/Symbol
* Displays the Final result of SRS

When Target Channel is PRACH

PRACH EVM (rms) * Displays the Final result of PRACH.

PUCCH EVM (peak)/Subcarrier/Sequence
* Displays the Final result of PRACH.

<Description of display area (2)>

The displayed result items and number of displayed pages differ according to each Target Channel setting as follows. For details about measurement results, see Appendix D.

Table 3.17-1 <Description of display area (2)>

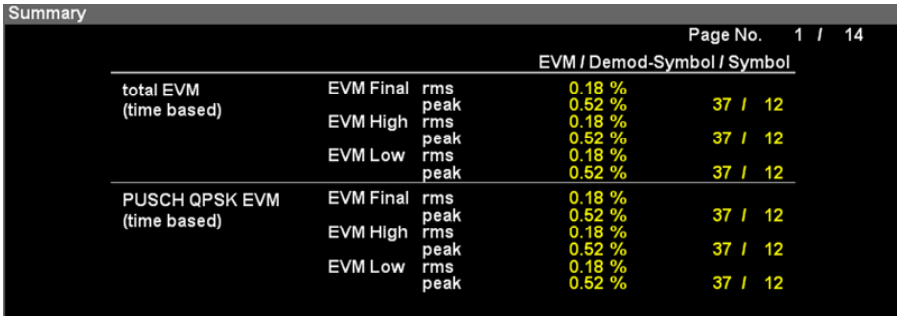
Page No	Target Ch PUSCH	Target Ch PUCCH	Target Ch SRS	Target Ch PRACH
1	total EVM (time based) PUSCH QPSK EVM (time based)	total EVM PUCCH EVM	total EVM SRS EVM	PRACH EVM
2	PUSCH 16QAM EVM (time based) PUSCH 64QAM EVM (time based)	RS EVM	Power vs Slot	Spectral Flatness
3	total EVM (Frequency Based) PUSCH All EVM	Power vs Slot	Frequency Error vs Slot[Hz]	
4	PUSCH QPSK EVM PUSCH 16QAM EVM	Frequency Error vs Slot[Hz]	Frequency Error vs Slot[ppm]	
5	PUSCH 64QAM EVM RS EVM	Frequency Error vs Slot[ppm]	Origin Offset vs Slot	
6	Power vs Slot	Origin Offset vs Slot	Spectral Flatness	
7	Frequency Error vs Slot	In- Band Emission		
8	Frequency Error vs Slot[ppm]	Spectral Flatness		
9	Origin Offset vs Slot	In-Band Flatness (Margin Peak)		
10	In- Band Emission	Spectral Flatness (peak to peak) normal condition		
11	In-Band Emission (Margin Peak)	Spectral Flatness (peak to peak) extreme condition		
12	Spectral Flatness			
13	Spectral Flatness (peak to peak) normal condition			
14	Spectral Flatness (peak to peak) extreme condition			

3.17.1 PUSCH SUMMARY

PUSCH SUMMARY

Page 1, 2

PUSCH EVM (time based)



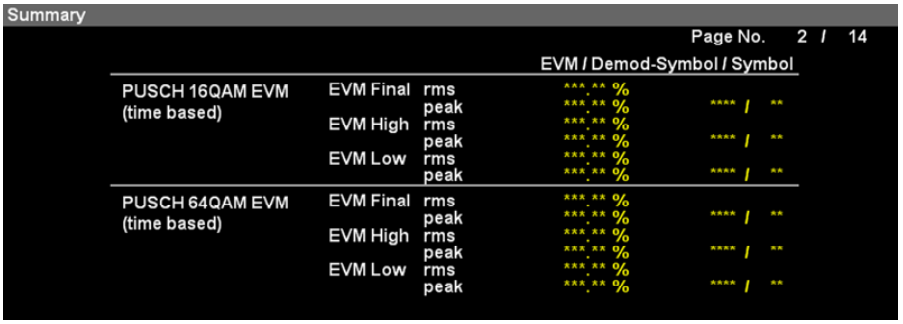


Figure 3.17.1-1 PUSCH EVM (time based)

■ Summary

Displays the EVM data for the time domain of each channel of the input signal.

EVM rms	EVM RMS value
EVM peak	EVM peak value
Demod-Symbol	The position data of EVM peak in Demod-Symbol units.
Symbol	The position data of EVM peak in Symbol units.

■ Measurement Result Types

Total EVM
PUSCH QPSK EVM
PUSCH 16QAM EVM
PUSCH 64QAM EVM

Page 3,4,5
PUSCH EVM (Frequency Based)

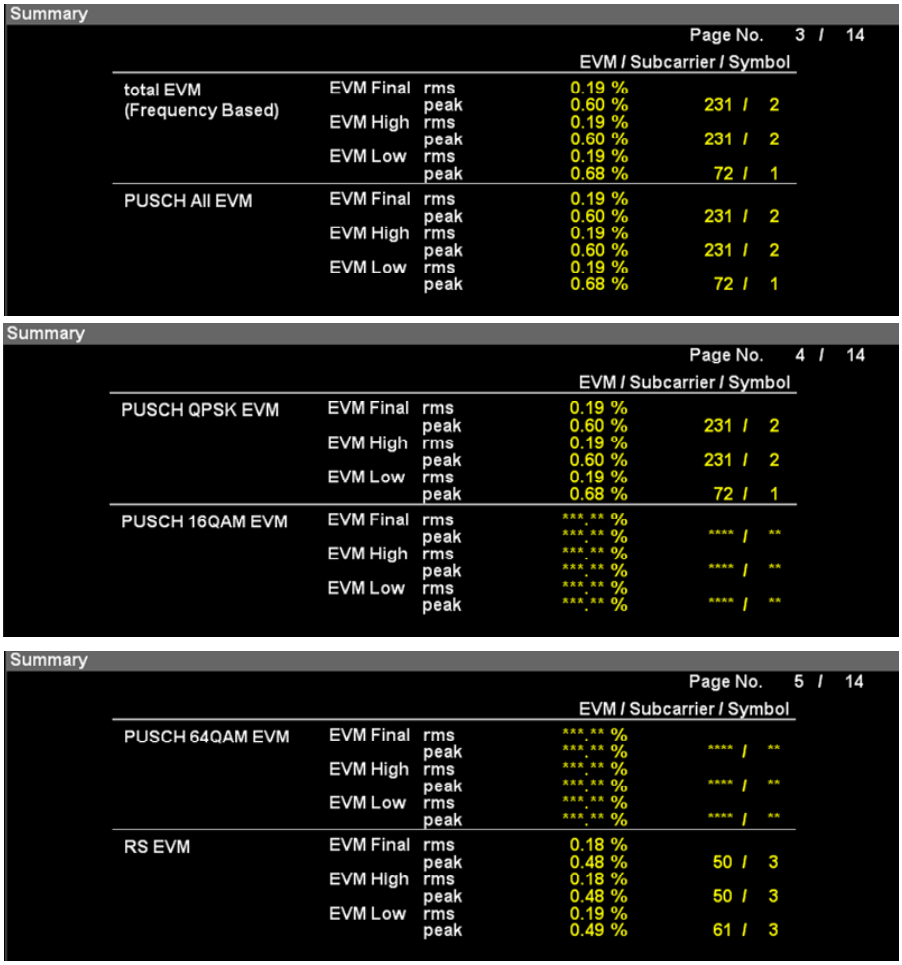


Figure 3.17.1-2 PUSCH EVM (Frequency Based)

■ Summary

Displays the EVM data of each channel of the input signal.

EVM rms	EVM RMS value
EVM peak	EVM peak value
Subcarrier	The position data of EVM peak in Subcarrier units.
Symbol	The position data of EVM peak in Symbol units.

■ Measurement Result Types

Total EVM
PUSCH All EVM
PUSCH QPSK EVM
PUSCH 16QAM EVM
PUSCH 64QAM EVM
RS EVM

Page 6

PUSCH Power vs Slot

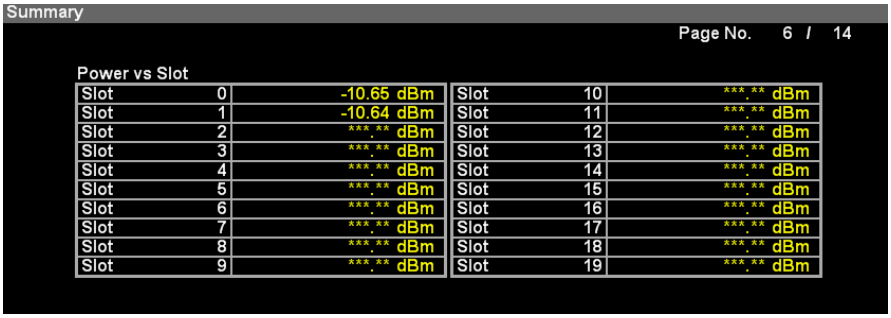


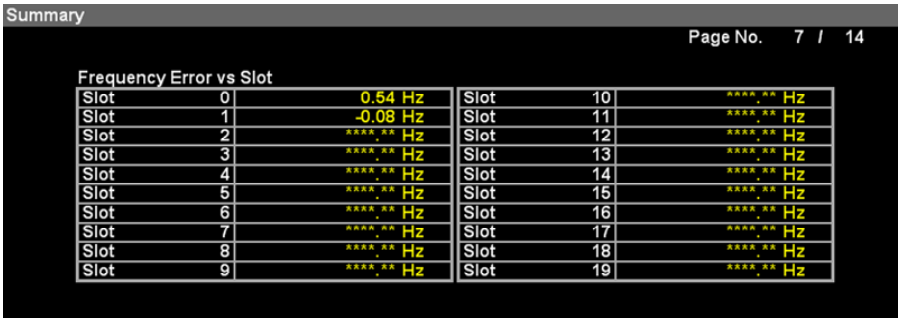
Figure 3.17.1-3 PUSCH Power vs Slot

■ **Summary**

Displays the Power data of each slot of the input signal.

Page 7, 8

PUSCH Frequency Error vs Slot



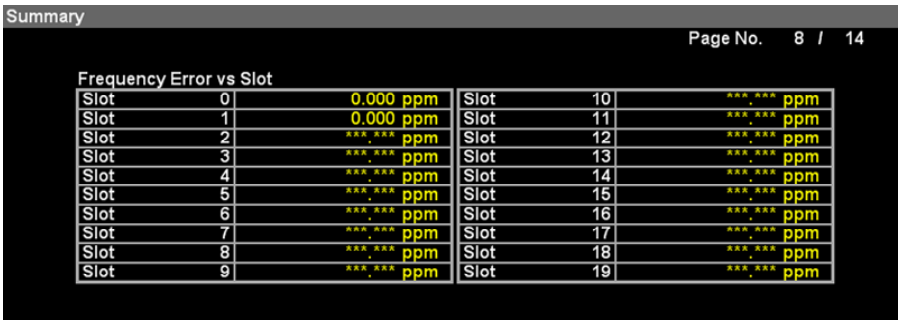


Figure 3.17.1-4 PUSCH Frequency Error vs Slot

■ Summary

Displays the Frequency Error data of each slot of the input signal.

Page 9

PUSCH Origin Offset vs Slot

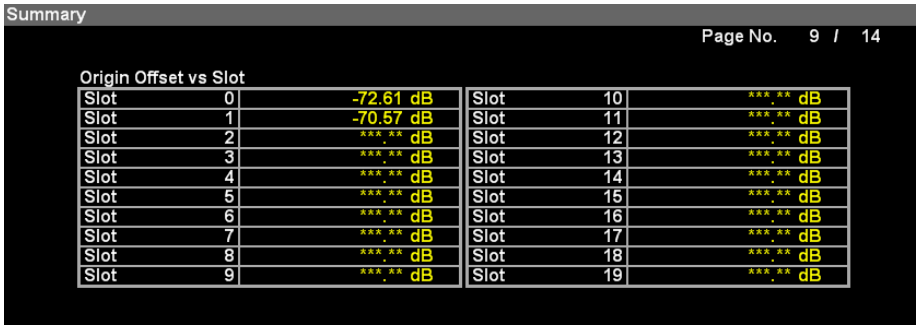


Figure 3.17.1-5 PUSCH Origin Offset vs Slot

■ Summary

Displays the Origin Offset data of each slot of the input signal.

Page 10

PUSCH In-Band Emission

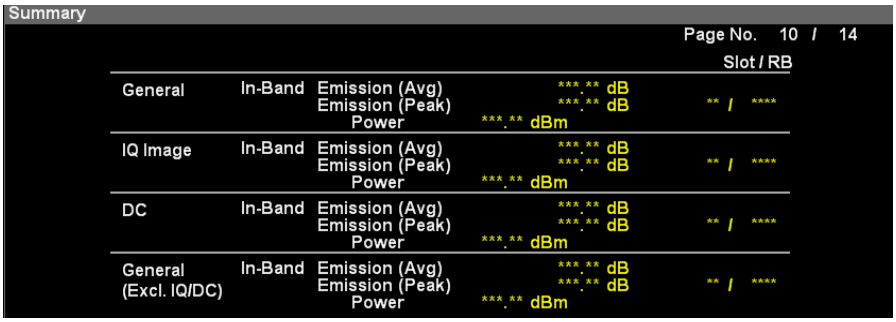


Figure 3.17.1-6 PUSCH In-Band Emission

■ Summary

Displays the numeric results for Emission measurement items.

Emission (Avg)	The Average value in Measurement Interval [dB]
Emission (Peak)	The Maximum value in Measurement Interval [dB]
Power	The absolute power of Emission (Peak) [dBm]
RB	The position data of Emission (Peak) in RB units.
Slot	The position data of Emission (Peak) in Slot units.
RB	The position data of Emission (Peak) in RB units.

■ Measurement Result Types

General

IQ Image

Carrier Leakage

General (Exclude IQ/ Carrier Leakage)

Page 11

PUSCH In-Band Emission (Margin Peak)

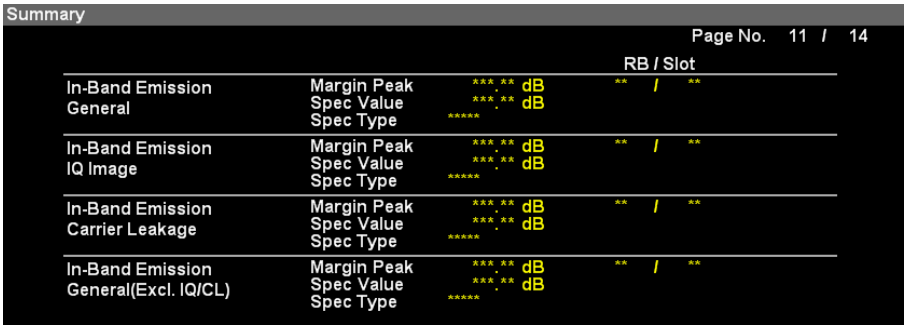


Figure 3.17.1-7 PUSCH In-Band Emission (Margin Peak)

■ Summary

Displays the results of margins relative to the limit for Emission measurement items.

Margin Peak	The minimum Emission value relative to the limit within the Measurement Interval or the maximum Emission value [dB] which exceeds the limit.
RB	Margin Peak position information in RB units
Slot	Margin Peak position information in Slot units
Spec Value	Specification limit value [dB]
Spec Type	Specification type [dB]

■ Measurement Result Types

General

IQ Image

Carrier Leakage

General (Exclude IQ/ Carrier Leakage)

Page 12

PUSCH Spectral Flatness

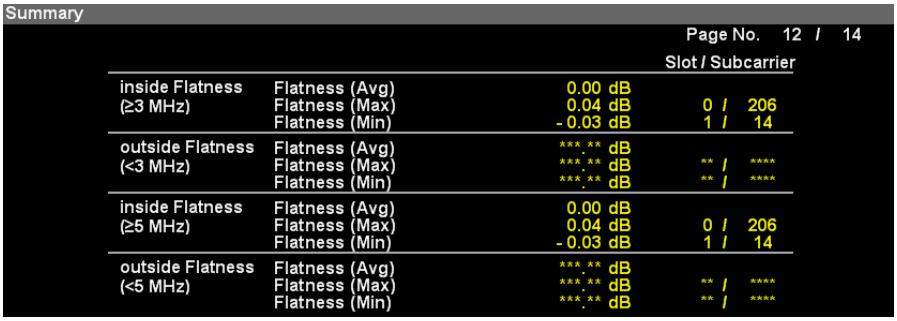


Figure 3.17.1-8 PUSCH Spectral Flatness

■ Summary

Displays the Inside Flatness (≥ 3 MHz, 5 MHz) and Outside Flatness (< 3 MHz, 5 MHz)

Flatness(Avg)	Average value [dB]
Flatness(Max)	Maximum value [dB]
Flatness(Min)	Minimum value [dB]
Subcarrier	The position data of Flatness (Max) in Subcarrier units. The position data of Flatness (Min) in Subcarrier units.
Slot	The position data of Flatness (Max) in Slot units. The position data of Flatness (Min) in Slot units.

The inside Flatness and outside Flatness measurement results are calculated according to the Carrier Frequency and Operating Band values.

☞ 3.2 “Setting Frequency”

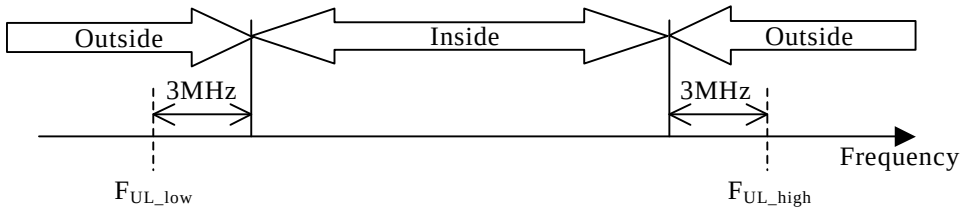


Figure 3.17.1-9 Relationship between the Inside Flatness and Outside Flatness areas (at 3 MHz)

■ Measurement Result Types

Inside Flatness (≥3 MHz)

Outside Flatness (<3 MHz)

Inside Flatness (≥5 MHz)

Outside Flatness (<5 MHz)

Page 13

PUSCH Spectral Flatness (peak to peak) normal condition

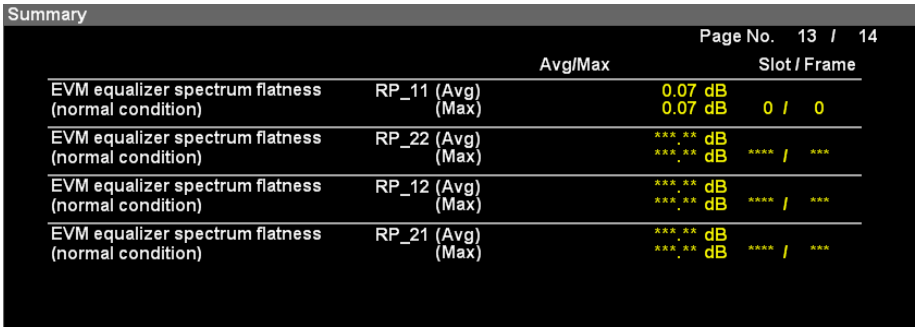


Figure 3.17.1-10 PUSCH Spectral Flatness (peak to peak) normal condition

■ Summary

Displays the Spectral Flatness (Amplitude) peak to peak results in normal condition

RP11: The maximum ripple in Range1.
RP22: The maximum ripple in Range2.
RP12: The maximum ripple between Range1 max.and Range2 min.
RP21: The maximum ripple between Range2 max.and Range1 min.

RP_11	(Avg)	The average value of RP11 [dB]
	(Max)	The maximum value of RP11 [dB]
RP_22	(Avg)	The average value of RP22 [dB]
	(Max)	The maximum value of RP22 [dB]
RP_12	(Avg)	The average value of RP12 [dB]
	(Max)	The maximum value of RP12 [dB]
RP_21	(Avg)	The average value of RP21 [dB]
	(Max)	The maximum value of RP21 [dB]
Slot		The position data of each RB (Max) in Slot units.
Frame		The position data of each RB (Max) in Frame units.

Page 14

PUSCH Spectral Flatness (peak to peak) extreme condition

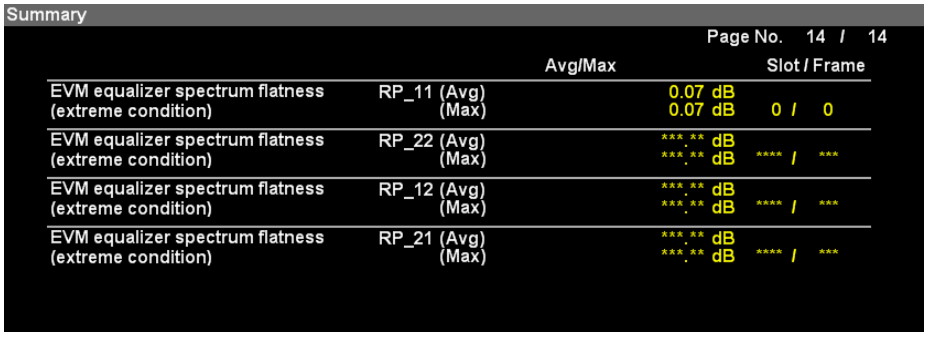


Figure 3.17.1-11 PUSCH Spectral Flatness (peak to peak) extreme condition

■ Summary

Displays the Spectral Flatness (Amplitude) peak to peak results in extreme condition

RP11: The maximum ripple in Range1.
RP22: The maximum ripple in Range2.
RP12: The maximum ripple between Range1 max.and Range2 min.
RP21: The maximum ripple between Range2 max.and Range1 min.

RP_11	(Avg)	The average value of RP11 [dB]
	(Max)	The maximum value of RP11 [dB]
RP_22	(Avg)	The average value of RP22 [dB]
	(Max)	The maximum value of RP22 [dB]
RP_12	(Avg)	The average value of RP12 [dB]
	(Max)	The maximum value of RP12 [dB]
RP_21	(Avg)	The average value of RP21 [dB]
	(Max)	The maximum value of RP21 [dB]
Slot		The position data of each RB (Max) in Slot units.
Frame		The position data of each RB (Max) in Frame units.

3.17.2 PUCCH SUMMARY

PUCCH SUMMARY

Page 1,2

PUCCH EVM

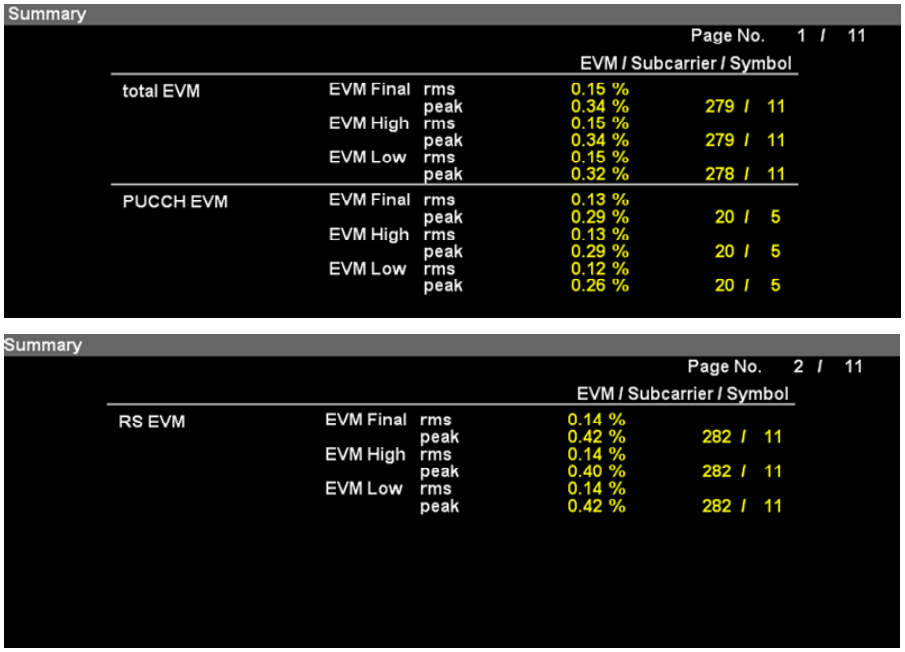


Figure 3.17.2-1 PUCCH EVM

■ Summary

Displays the EVM data of the input signal.

EVM rms	EVM RMS value
EVM peak	EVM peak value
Subcarrier	The position data of EVM peak in Subcarrier units.
Symbol	The position data of EVM peak in Symbol units.

■ Measurement Result Types

Total EVM, PUCCH EVM, RS EVM

Page 3

PUCCH Power vs Slot

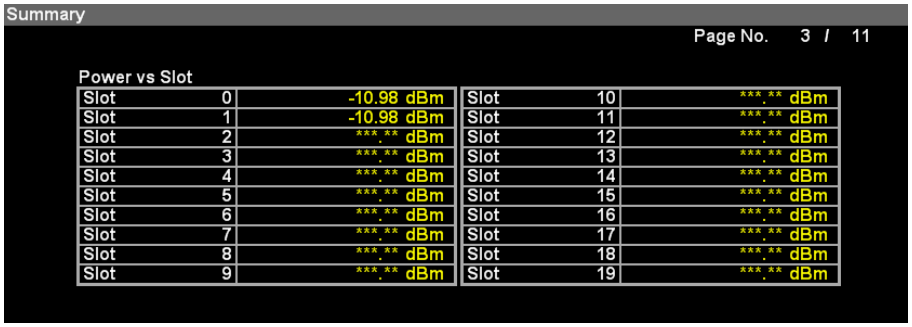


Figure 3.17.2-2 PUCCH Power vs Slot

■ Summary

Displays the Power data of each channel of the input signal.

Page 4,5

PUCCH Frequency Error vs Slot

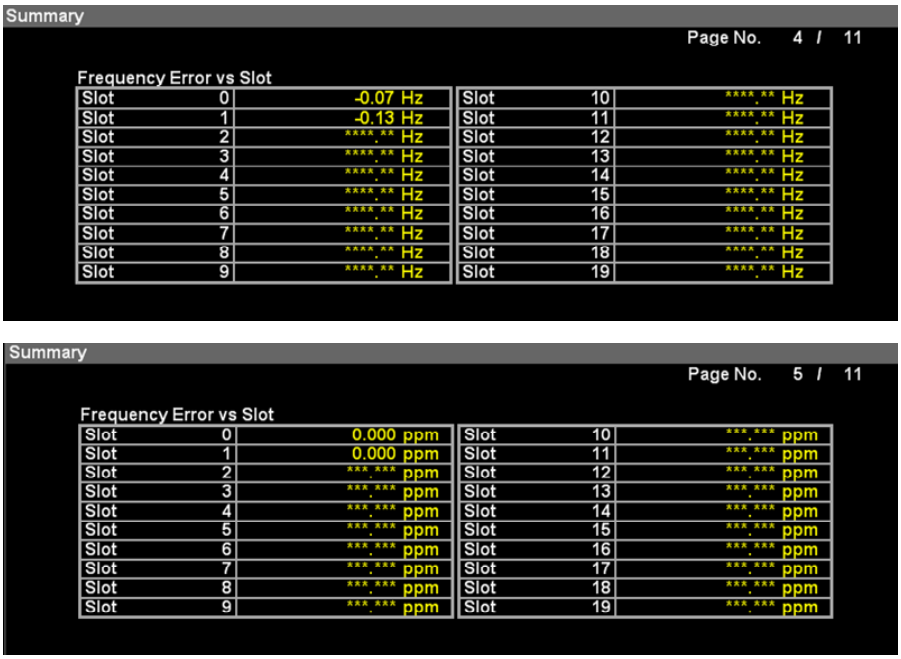


Figure 3.17.2-3 PUCCH Frequency Error vs Slot

■ Summary

Displays the Frequency Error data of each slot of the input signal.

Page 6

PUCCH Origin Offset vs Slot

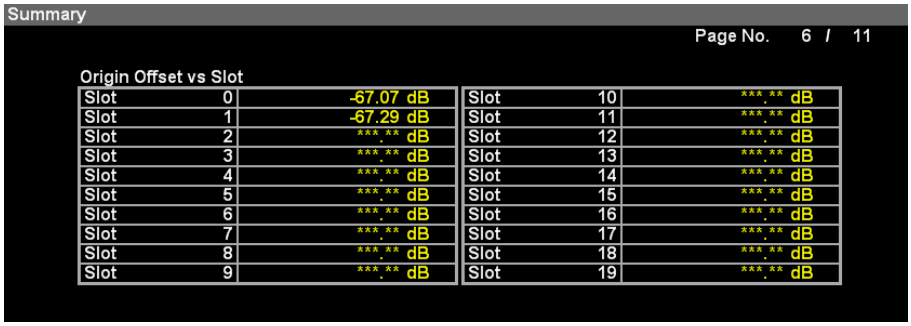


Figure 3.17.2-4 PUCCH Origin Offset vs Slot

■ Summary

Displays the Origin Offset data of each slot of the input signal.

Page 7

PUCCH In-Band Emission

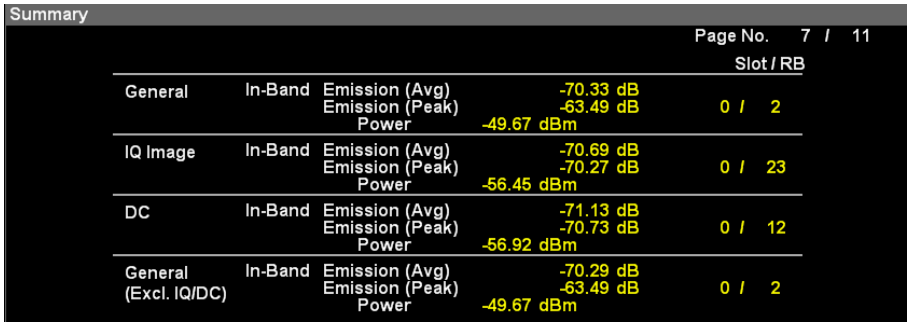


Figure 3.17.2-5 PUCCH In-Band Emission

■ Summary

Same as PUSCH Summary Page 10

Page 8

PUCCH Spectral Flatness

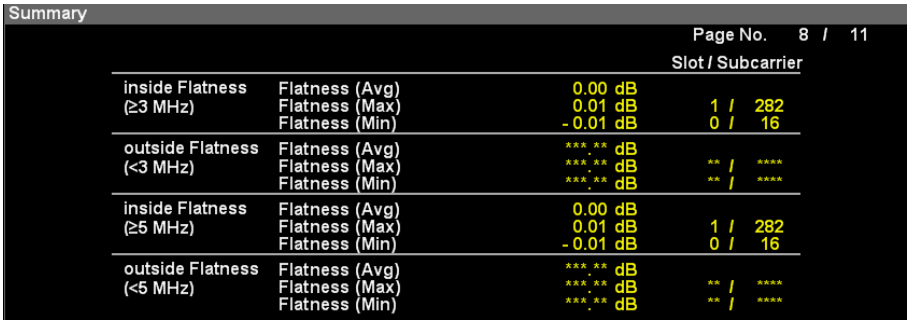


Figure 3.17.2-6 PUCCH Spectral Flatness

■ Summary

Same as PUSCH Summary Page 12

Page 9

PUCCH In-Band Emission (Margin Peak)

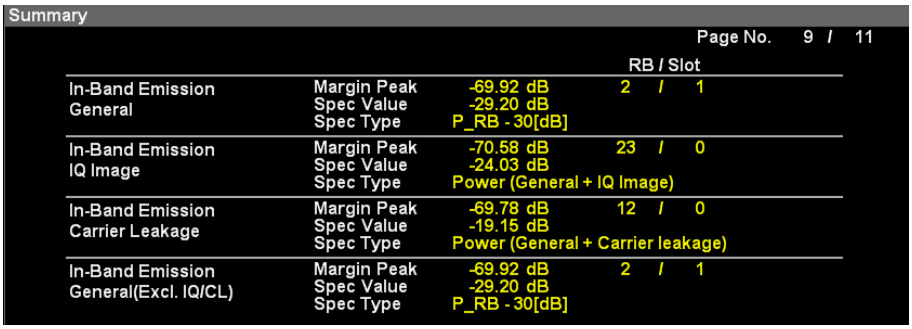


Figure 3.17.2-7 PUCCH In-Band Emission (Margin Peak)

■ Summary

Same as PUSCH Summary Page 11

Page 10

PUCCH Spectral Flatness (peak to peak) normal condition

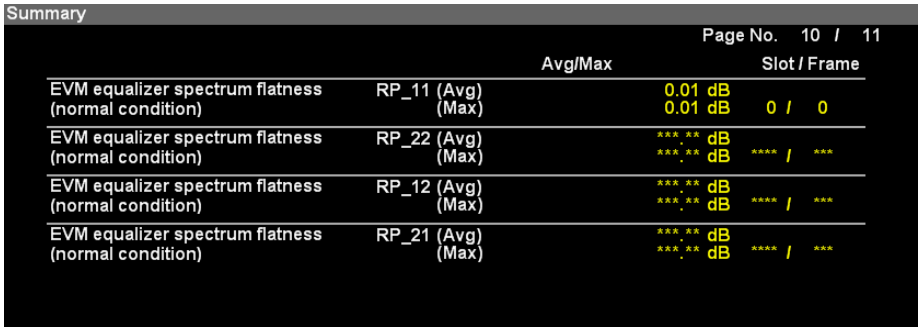


Figure 3.17.2-8 PUCCH Spectral Flatness (peak to peak) normal condition

■ Summary

Same as PUSCH Summary Page 13

Page 11

PUCCH Spectral Flatness (peak to peak) extreme condition

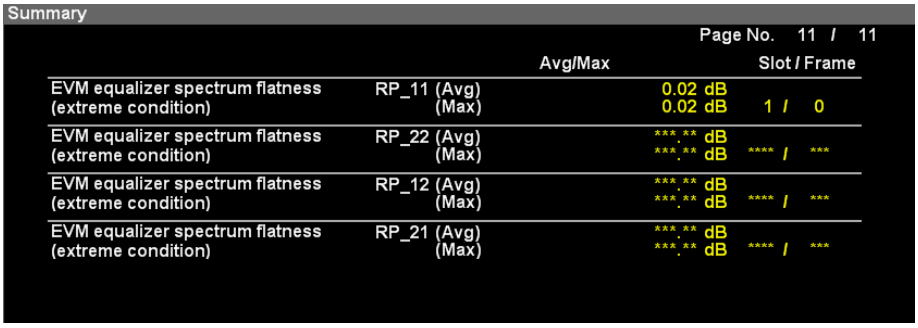


Figure 3.17.2-9 PUCCH Spectral Flatness (peak to peak)extreme condition

■ Summary

Same as PUSCH Summary Page 14

3.17.3 PRACH SUMMARY

PRACH SUMMARY

Page 1

PRACH EVM

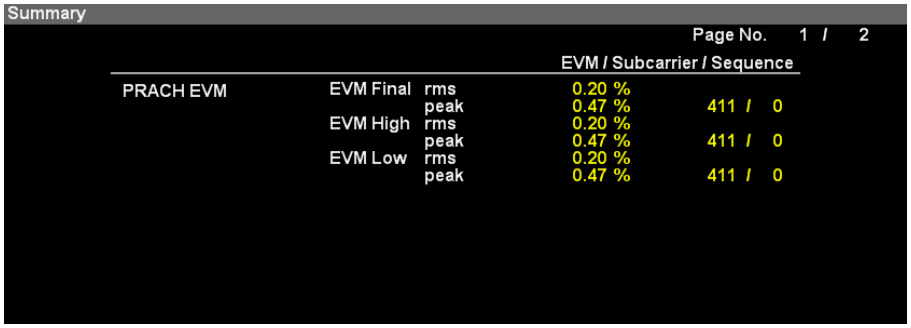


Figure 3.17.3-1 PRACH EVM

■ Summary

Displays the EVM data of the input signal.

EVM rms	EVM RMS value
EVM peak	EVM peak value
Subcarrier	The position data of EVM peak in Subcarrier units.
Symbol	The position data of EVM peak in Symbol units.

■ Measurement Result Types

PRACH EVM

Page 2

PRACH Spectral Flatness

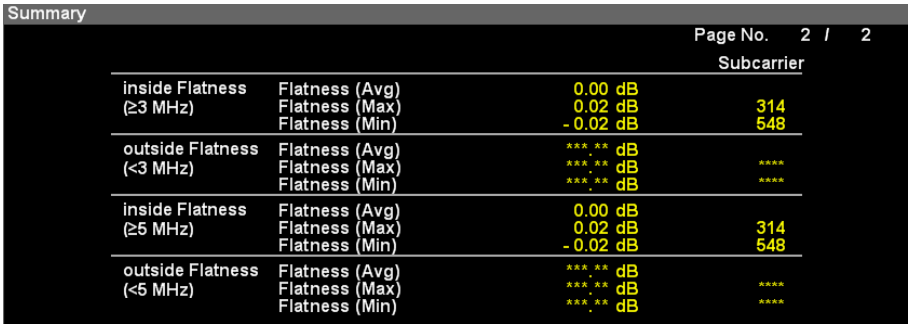


Figure 3.17.3-2 PRACH Spectral Flatness

■ Summary

Displays the Inside Flatness (≥ 3 MHz, 5 MHz) and Outside Flatness (< 3 MHz, 5 MHz)

Flatness(Avg) Average value [dB]
Flatness(Max) Maximum value [dB]
Flatness(Min) Minimum value [dB]
Subcarrier The position data of Flatness (Max) in Subcarrier units.
The position data of Flatness (Min) in Subcarrier units.

The inside Flatness and outside Flatness measurement results are calculated according to the Carrier Frequency and Operating Band values.

☞ 3.2 “Setting Frequency”

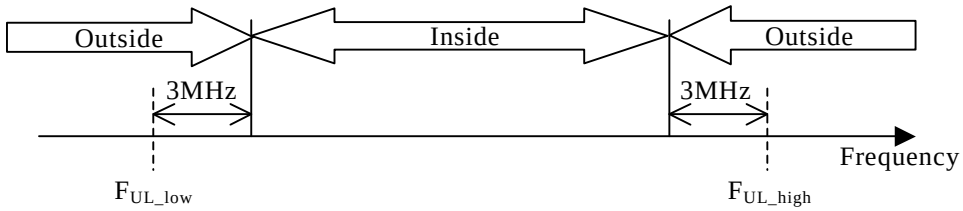


Figure 3.17.3-3 Relationship between the Inside Flatness and Outside Flatness areas (at 3 MHz)

■ Measurement Result Types

Inside Flatness (≥ 3 MHz)
Outside Flatness (< 3 MHz)
Inside Flatness (≥ 5 MHz)
Outside Flatness (< 5 MHz)

3.17.4 SRS SUMMARY

SRS SUMMARY

Page 1

SRS EVM

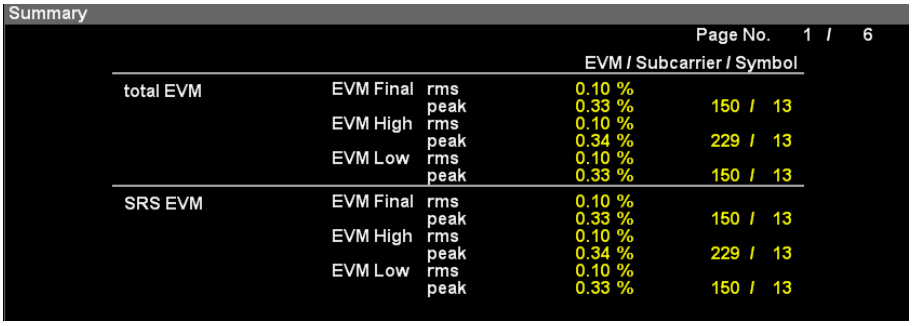


Figure 3.17.4-1 SRS EVM

■ Summary

Displays the EVM data of the input signal.

EVM rms	EVM RMS value
EVM peak	EVM peak value
Subcarrier	The position data of EVM peak in Subcarrier units.
Symbol	The position data of EVM peak in Symbol units.

■ Measurement Result Types

Total EVM, SRS EVM

Page 2

SRS Power vs Slot

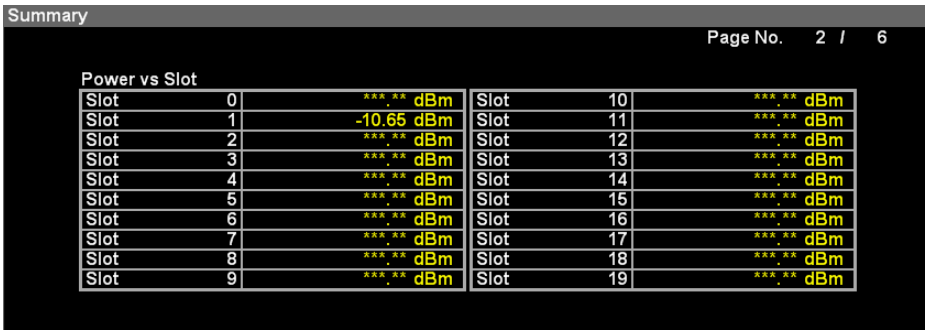


Figure 3.17.4-2 SRS Power vs Slot

■ Summary

Displays the Power data of each slot of the input signal.

Page 3, 4

SRS Frequency Error vs Slot

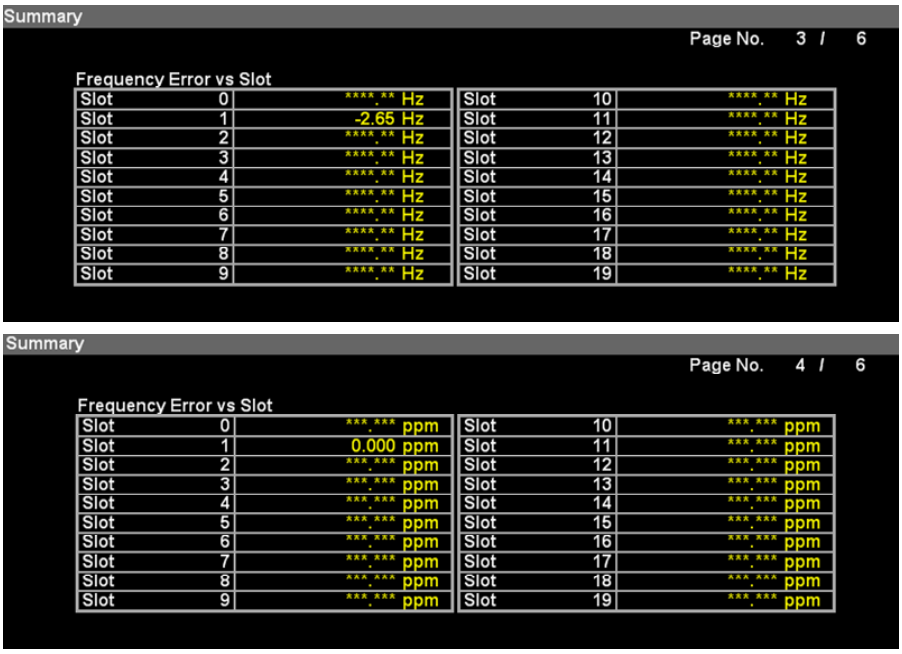


Figure 3.17.4-3 SRS Frequency Error vs Slot

■ Summary

Displays the Frequency Error data of each slot of the input signal.

Page 5

SRS Origin Offset vs Slot

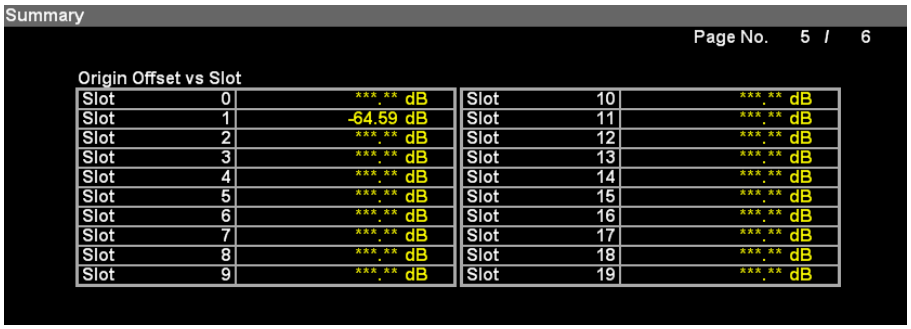


Figure 3.17.4-4 SRS Origin Offset vs Slot

■ Summary

Displays the Origin Offset data of each slot of the input signal.

Page 6

SRS Spectral Flatness

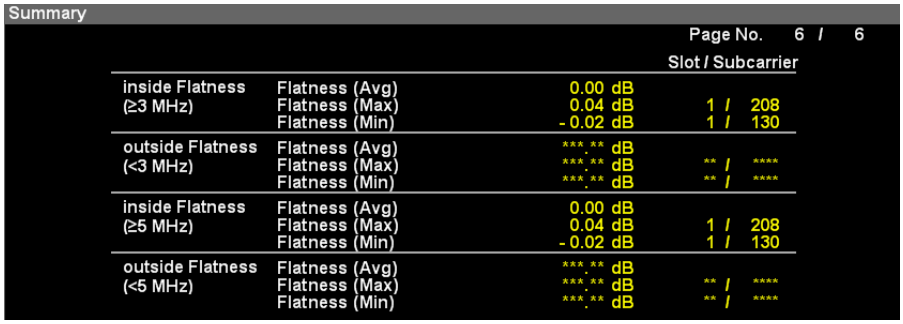


Figure 3.17.4-5 SRS Spectral Flatness

■ Summary

Same as PUSCH Summary Page 12

3.18 Power vs Time Display

Displays the measurement results of Power vs Time.

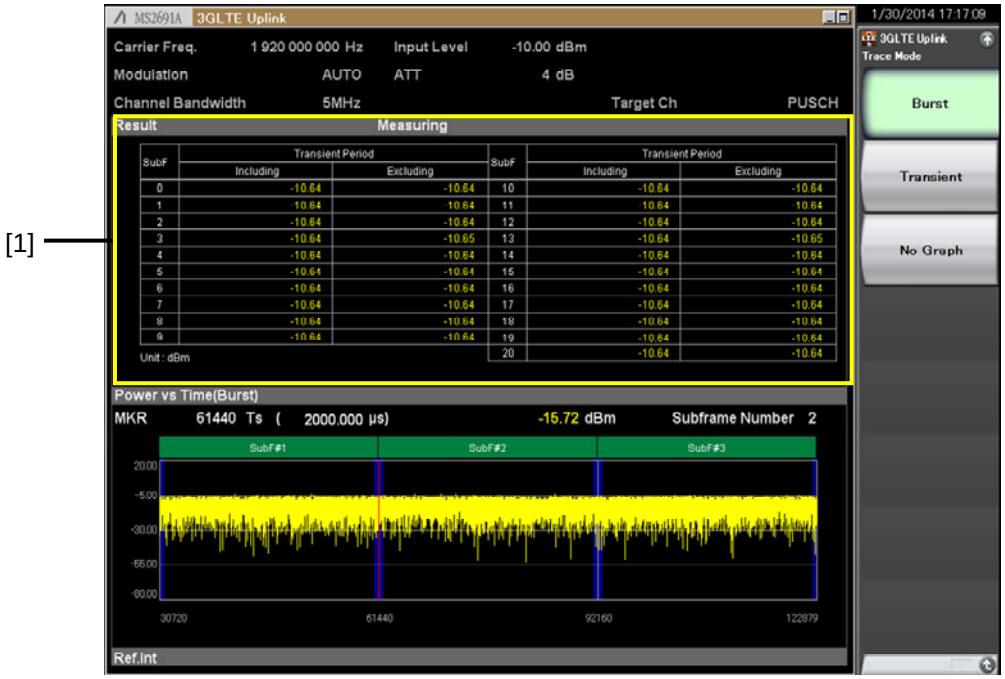
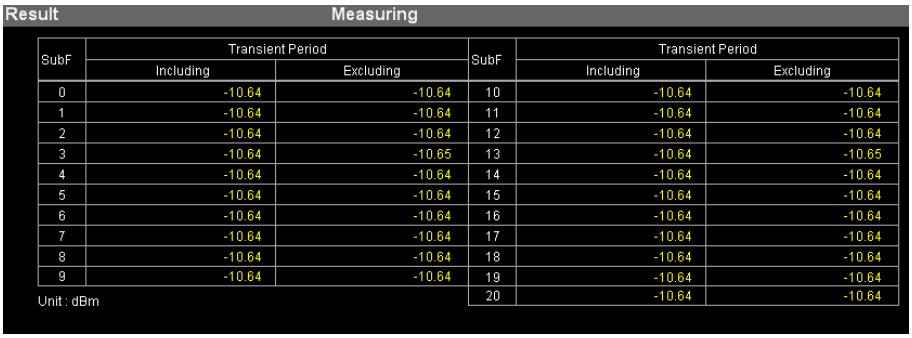


Figure 3.18-1 Power vs Time Display

Description of display area [1]



SubF	Transient Period Including	Transient Period Excluding	SubF	Transient Period Including	Transient Period Excluding
0	-10.64	-10.64	10	-10.64	-10.64
1	-10.64	-10.64	11	-10.64	-10.64
2	-10.64	-10.64	12	-10.64	-10.64
3	-10.64	-10.65	13	-10.64	-10.65
4	-10.64	-10.64	14	-10.64	-10.64
5	-10.64	-10.64	15	-10.64	-10.64
6	-10.64	-10.64	16	-10.64	-10.64
7	-10.64	-10.64	17	-10.64	-10.64
8	-10.64	-10.64	18	-10.64	-10.64
9	-10.64	-10.64	19	-10.64	-10.64
			20	-10.64	-10.64

Figure 3.18-2 Power vs Time (PUSCH / PUCCH)

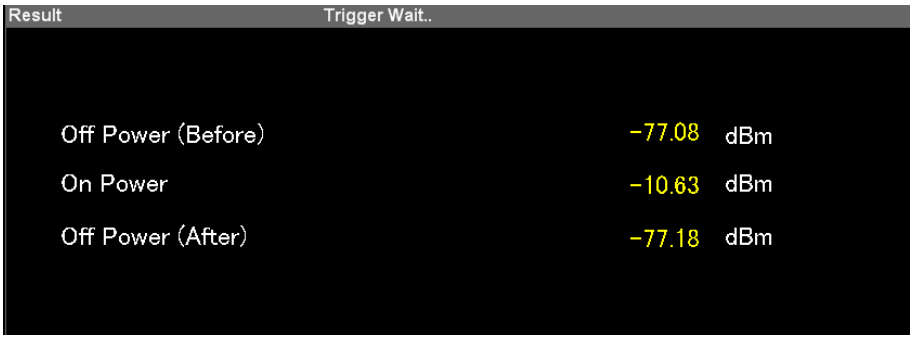


Figure 3.18-3 Power vs Time (PRACH)

Result — Measuring

SubF	On Power (SRS)	Off Power (Before SRS)	SubF	On Power (SRS)	Off Power (Before SRS)
0	-10.65	-70.81	10	-10.65	-70.86
1	-10.65	-70.73	11	-10.65	-71.03
2	-10.64	-70.85	12	-10.64	-71.12
3	-10.64	-70.69	13	-10.64	-70.91
4	-10.65	-70.74	14	-10.65	-70.64
5	-10.61	-70.67	15	-10.61	-70.69
6	-10.65	-70.75	16	-10.65	-70.57
7	-10.66	-70.83	17	-10.66	-70.24
8	-10.63	-70.59	18	-10.63	-70.48
9	-10.67	-70.86	19	-10.67	-70.42
			20	-10.65	-70.22

Unit : dBm

Figure 3.18-4 Power vs Time (SRS)

Including

■ Summary

Displays the power of each subframe including Transient Period.

Excluding

■ Summary

Displays the power of each subframe excluding Transient Period.

Off Power(Before)

■ Summary

Displays the power in the Off area before the On area starts. The transient period is excluded.

On Power

■ Summary

Displays the power in the On area. The transient period is excluded.

Off Power (After)

■ Summary

Displays the power in the Off area after the On area ends. The transient period is excluded.

On Power (SRS)

■ Summary

Displays the power of SRS in each subframe. The transient period is excluded.

Off Power (Before SRS)

■ Summary

Displays the power of the places where SRS does not exist in each subframe. The transient period is excluded.

3.19 Power vs Time - Burst

Displays the measurement results of Power vs Time - Burst. The waveform around the On area is plotted.

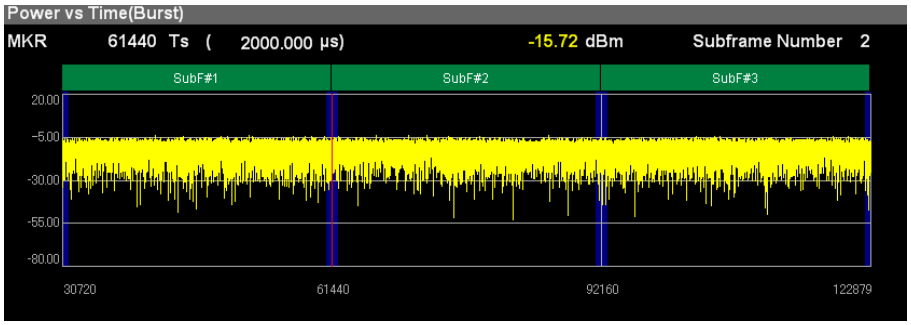


Figure 3.19-1 Power vs Time - Burst (PUSCH / PUCCH)

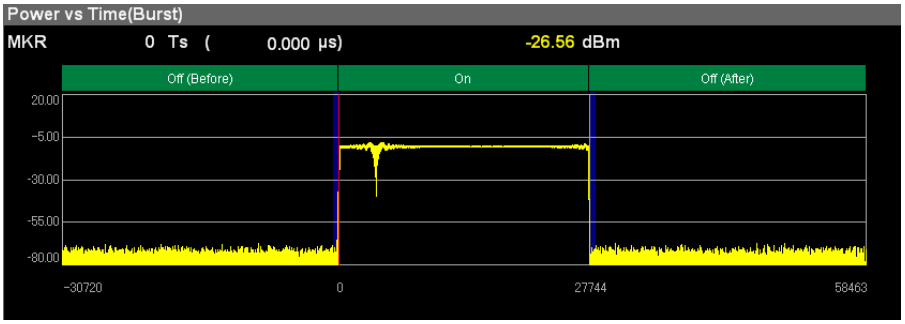


Figure 3.19-2 Power vs Time - Burst (PRACH)

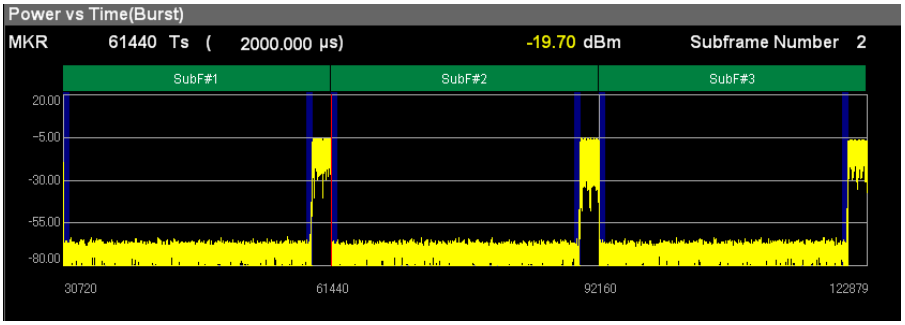


Figure 3.19-3 Power vs Time - Burst (SRS)

Graph display

■ Summary

Displays Power [dBm] (Y axis) for each sample number [Ts] (X axis).

The transient period is displayed in blue band.

MKR Ts

■ Summary

Displays the sample number selected by marker. The marker can be moved with the cursor key or the rotary knob.

MKR Result

■ Summary

Displays the sample power selected by marker.

Subframe Number

■ Summary

Displays the target subframe number.

3.20 Power vs Time - Transient

Displays the measurement results of Power vs Time - Transient. The areas around the waveform rising and falling are plotted.

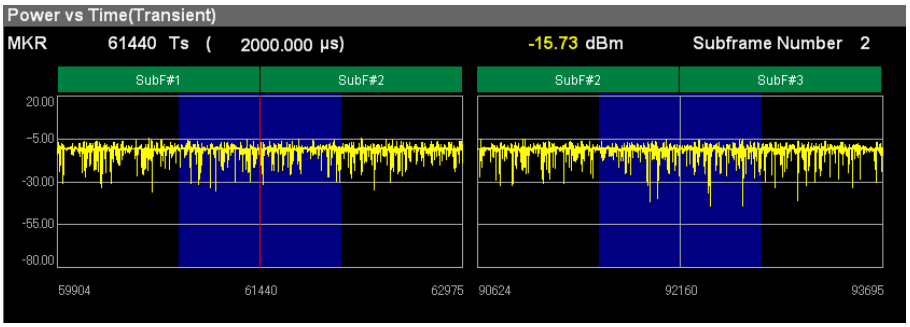


Figure 3.20-1 Power vs Time - Transient (PUSCH / PUCCH)

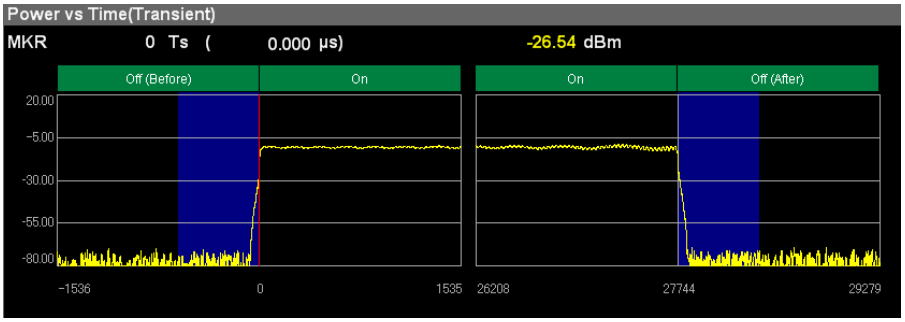


Figure 3.20-2 Power vs Time - Transient (PRACH)

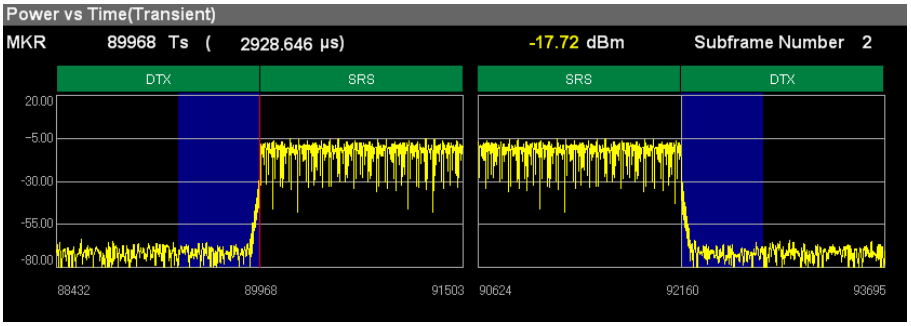


Figure 3.20-3 Power vs Time - Transient (SRS)

Graph display

■ Summary

Displays Power [dBm] (Y axis) for each sample number [Ts] (X axis).

The transient period is displayed in blue band.

MKR Ts

■ Summary

Displays the sample number selected by marker. The marker can be moved with the cursor key or the rotary knob.

MKR Result

■ Summary

Displays the sample power selected by marker.

Subframe Number

■ Summary

Displays the target subframe number.

3.21 Saving Measurement Results

Saves measurement results to the internal hard disk or USB memory. Press Save with the 3G LTE Uplink screen open to display the Save function menu.

Note:

Use the USB memory supplied. Other USB memory may malfunction due to incompatibilities.

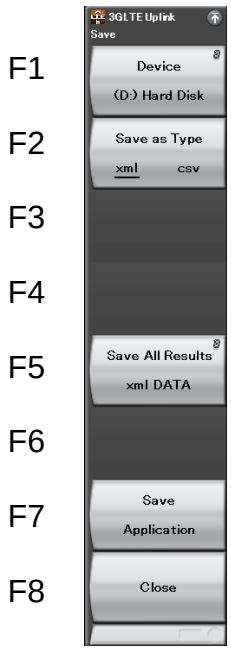


Figure 3.21-1 Save function menu

Table 3.21-1 Save function menu

Menu Display	Function
Device	Sets the save destination drive.
Save as Type	This sets the type of file to save.
Save All Results	Saves measurement results.
Save Application	Sets measurement parameters. ☞ MS2690A/MS2691A/MS2692A, MS2830A, or MS2850A Signal Analyzer operation manual (Main Frame Operation)
Close	Closes the Save function menu.

Device

■ Summary

Sets the save destination drive.

■ Options

D, E, F, …

All drives except for C

Save as Type

■ Summary

This sets the type of file to save.

■ Options

xml	Saves in xml format.
csv	Saves in csv format.

Save All Results

■ Summary

This saves the measurement results. The measurement results that can be read by the `:FETCh:EVM[n]?`, `:READ:EVM[n]?`, and `:MEASure:EVM[n]?` remote commands are saved. For details on measurement results, see Table 2.7-2 "Responses to Modulation Measurement Results" in the MX269021A LTE Uplink Measurement Software Operation Manual (Mainframe Remote Control).

The saved file is output under the name format of "LTEUL*date_sequence number*.xml". When measurement results are saved several times on the same date, the sequence number starting from "00" is suffixed to each file name, like "LTEUL*date*_00.xml," "LTEUL*date*_01.xml," "LTEUL*date*_02.xml," …, up to "LTEUL*date*_99.xml."

The sequential numbers suffixed to a file name are 0 to 99. Since the file number returns to 00 after 99, files with the same name are overwritten.

Files are saved to the following directory of the target drive specified using F1 (Device).

\Anritsu Corporation\Signal Analyzer\User Data\Measurement Results\3GLTE Uplink

There can be up to 100 XML files and 1000 CSV files among the files.

Close

■ Summary

Closes the Save function menu.

Chapter 4 Digitize Function

This chapter describes how to save IQ data to an external memory and replay the stored IQ data.

4.1 Saving IQ Data 4-2
4.1.1 Format of data information file 4-4
4.1.2 Format of data file 4-6
4.2 Replay Function 4-7
4.2.1 Starting Replay Function 4-8
4.2.2 Display during Replay Function Execution 4-8
4.2.3 Restriction during Replay Function Execution 4-9
4.2.4 Conditions for IQ Data Files That Can Be Replayed 4-9
4.2.5 Stopping Replay 4-10

4.1 Saving IQ Data

After pressing F7 (Capture) on the main function menu, press F3 (Save Captured Data) to display the Save Captured Data function menu.

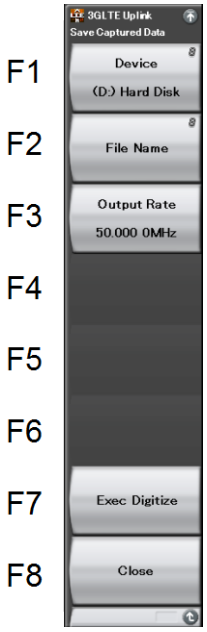


Figure 4.1-1 Save Captured Data function menu

Table 4.1-1 Save Captured Data function menu

Menu Display	Function
Device	Selects the location of the file to be saved.
File Name	Sets the name of the file to be saved.
Output Rate	Sets the rate of the output data.
Exec Digitize	Executes saving.
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) on the main function menu.
2. Press F3 (Save Captured Data).
3. Press F1 (Device) on the Save Captured Data function menu to select a data file for saving the IQ data.
4. Press F2 (File Name) to set the file name.
5. Press F7 (Exec Digitize) to save the IQ data.

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.

If a file name was not specified, the file is automatically named "Digitize *date_sequential number*". The sequential number range is from 000 to 999.

Files are saved to the following directory of the target drive specified using F1 (Device).
\Anritsu Corporation\Signal Analyzer\User Data\Digitized Data\3GLTE Uplink
Up to 1000 files can be saved in a folder.

4.1.1 Format of data information file

The information on the saved IQ data is recorded in the data information file. Table 4.1.1-1 shows the details of the recorded parameters.

Table 4.1.1-1 Format of data information file

Item	Descriptions
CaptureDate	Day/Month/Year of the captured data in the "DD/MM/YYYY" format.
CaptureTime	Data captured time in "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":No error "OverLoad":Level over
TriggerPosition	Trigger occurrence position [Sample] The 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 (fixed)
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	Gain value obtained by Option 008 [dB]
IQReverse	IQ reverse setting, fixed to "Normal"
TriggerSwitch	Trigger On/Off setting "FreeRun":Trigger is not used. "Triggered":Trigger is used.

Table 4.1.1-1 Format of data information file (Cont'd)

Item	Descriptions
TriggerSource	Trigger source "External":External trigger "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 that indicates 0 dB 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	Correction value of correction function [dB] The correction factor is added to the IQ data in a data file. 0.000 is automatically set when the Correction function is set to Off.
Terminal	Signal input terminal "RF": RF terminal
ReferencePosition	0-second reference position Indicates the 0-second reference position using the digitized data point position. During Replay function execution, the reference 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

4.1.2 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).

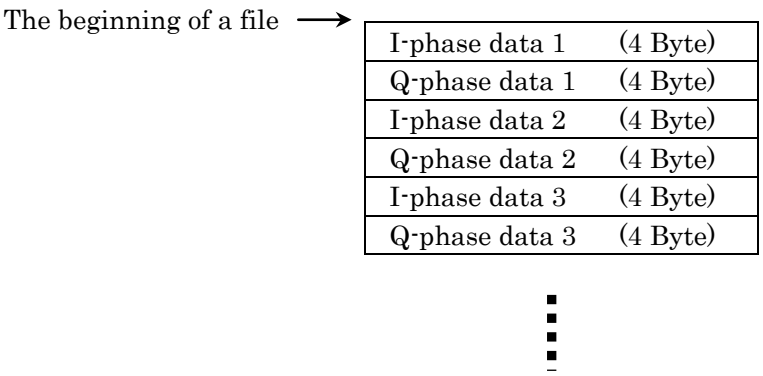


Figure 4.1.2-1 Format of data file

The IQ data can be converted to power based on the following formula:

$$P = 10Log_{10}\left(I^2 + Q^2\right)$$

P: Power [dBm]
I: I-phase data
Q: Q-phase data

4.2 Replay Function

The Replay function enables the saved IQ data to be reanalyzed . After pressing F7 (Capture) on the main function menu, press F4 (Replay) to display the Replay function menu.

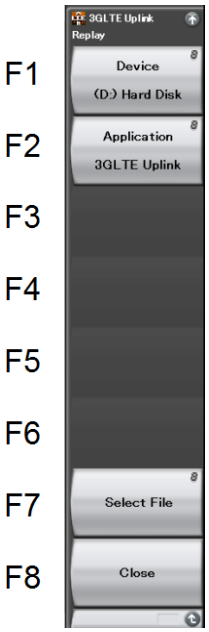


Figure 4.2-1 Replay Function Menu

Table 4.2-1 Replay Function Menu

Menu Display	Function
Device	Selects the drive in which the target file is stored.
Application	Selects the name of the application used to save the target file.
Select File	Selects the target file. After selecting the file, the Replay function is executed.
Close	Closes the Replay function menu.

4.2.1 Starting Replay Function

Start the Replay function using the following procedure:

<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 and select the drive in which the target file is stored.
4. Press F2 (Application) and select the application used to save the target file.
5. Press F7 (Select File) to display the file selection dialog box. The Replay function starts after a file is selected. Then, Replaying is displayed on the screen.

4.2.2 Display during Replay Function Execution

Replay Error Info. is displayed if the target IQ data file meets the following conditions:

- Frequency reference is Unlocked when IQ data is saved.
- Level Over occurs when IQ data is saved.

4.2.3 Restriction during Replay Function Execution

The functions shown in Table 4.2.3-1 are disabled when Replay is executed.

Table 4.2.3-1 Functions Restricted During Replay

Function
Center Frequency
Span
Input Level
Pre Amp
Trigger Switch
Trigger Source
Trigger Slope
Trigger Delay
Continuous Measurement
Single Measurement
Capture Time Auto/Manual
Capture Time Length

4.2.4 Conditions for IQ Data Files That Can Be Replayed

Table 4.2.4-1 shows the conditions for IQ data files for which replay analysis can be performed.

Table 4.2.4-1 IQ data file that can be replayed

Name	Value
Format	I, Q (32-bit Float Binary format)
Sampling rate	MS269xA, MS2830A 50 MHz Span 31.25MHz 100 MHz Span 62.5MHz 200 MHz Span 125MHz MS2850A 50 MHz Span 31.25MHz 81.25 MHz Span 62.5MHz 162.5 MHz Span 125MHz
Number of samples	Modulation Analysis time: 24 ms or more Number of samples ≥ Sampling rate ×24 ms ACP/OBW/Channel Power: 26.3 ms or more Number of samples ≥ Sampling rate × 26.3 ms

4.2.5 Stopping Replay

Stop the Replay function using the following procedure:

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F5 (Stop Replaying) to stop the Replay function.

Chapter 5 Performance Test

This chapter describes measurement devices, setup methods, and performance test procedures required for performing performance tests as preventive maintenance.

5.1 Overview of Performance Test 5-2
5.1.1 Performance test 5-2
5.2 Performance Test Items 5-3
5.2.1 Testing methods 5-3

5.1 Overview of Performance Test

5.1.1 Performance test

Performance tests are performed as part of preventive maintenance in order to prevent the performance degradation before it occurs.

Use performance tests when required for acceptance inspection, routine inspection and performance verification after repairs. Perform items deemed critical at regular intervals as preventive maintenance. Perform the following performance tests for acceptance inspection, routine inspection and performance verification after repairs.

- Carrier frequency accuracy
- Residual EVM

Perform items deemed critical at regular intervals as preventive maintenance. A recommended cycle for routine tests of once or twice a year is desirable.

If items that do not meet the required level are detected during performance testing, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the PDF version.

5.2 Performance Test Items

Warm up the subject testing device and measuring instruments for at least 30 minutes except where directed, in order to stabilize them sufficiently before running performance tests. Demonstrating maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures, little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity or other problems.

5.2.1 Testing methods

(1) Test target standards

- Carrier frequency accuracy
- Residual vector error (Target Channel is PUSCH)
- Residual vector error (Target Channel is PUCCH)

(2) Measuring instrument for tests

- Vector signal generator
- Frequency standard device — Unnecessary if signal source has sufficient frequency accuracy
- Power meter — Unnecessary if signal source has sufficient transmitter power accuracy

(3) Setup

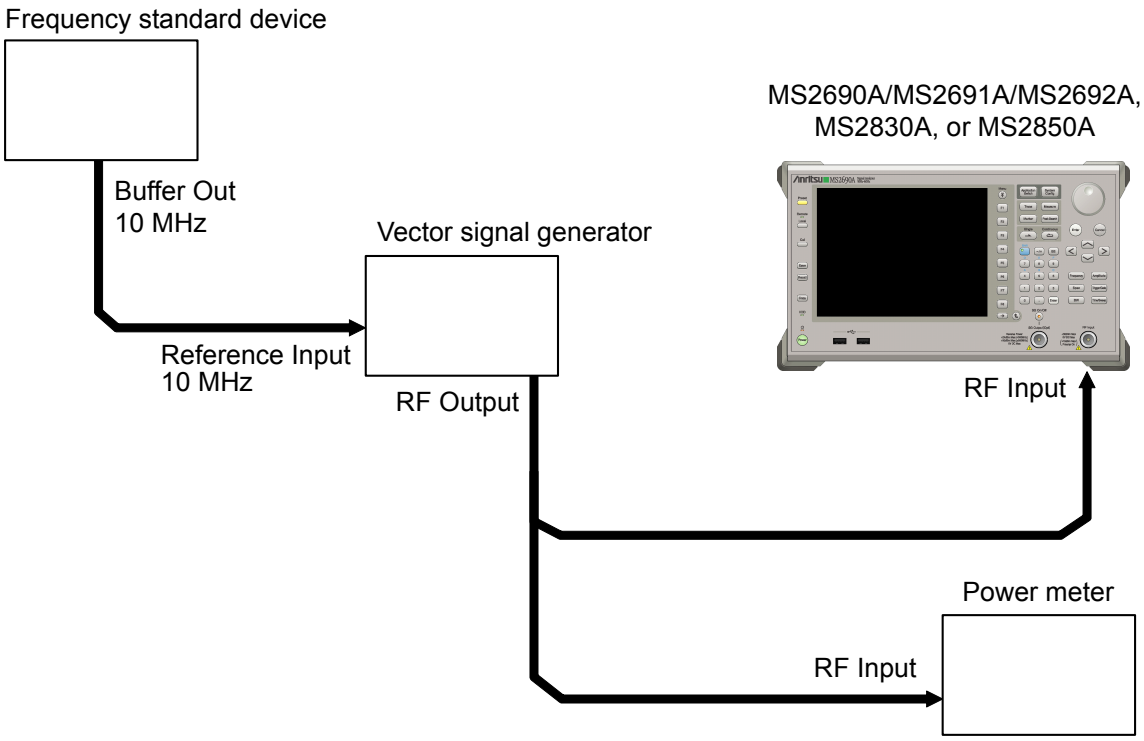


Figure 5.2.1-1 Performance test

(4) Test procedure

(a) Signal source adjustment

1. Input the 10-MHz reference signal output from the frequency standard device into the Reference Input connector of the vector signal generator.
2. Input the 10 MHz reference signal output from the signal generator to the Reference Input connector.
3. Output an LTE Uplink modulation signal from the vector signal generator.
4. Input the vector signal generator output signal into the power meter and measure the power.

(b) Settings of the main unit

1. Turn On the power switch on the front panel then wait until the internal temperature stabilizes (approx. 1.5 hours after the temperature in the thermostatic bath stabilizes).
2. Press Application Switch, then press the menu function key displaying the character string "3GLTE Uplink."
3. Press Preset.
4. Press F1 (Preset) to perform initialization.
5. Press Cal.
6. Press F1 (SIGANA All) to perform calibration.
7. Press F8 (Close).
8. Press Frequency, enter the frequency output by the vector signal generator using the numeric keypad, then press Enter.
9. Press Amplitude, enter the power meter measurement result using the numeric keypad, then press Enter.
10. Press Trace then press F4 (Storage) and press F1 (Mode) to choose Average using the cursor key or the rotary knob, then press Enter.
11. Press F2 (Count), enter the measurement count using the numeric keypad, then press Enter.
12. Press Single to perform measurement.

    When measuring the carrier frequency accuracy, select **Auto** for **Reference Signal**. When measuring the residual vector error, select **Fixed to Internal**.

    Press System Config (System Settings) after pressing F3 to display the System Settings screen. Select and set Reference Signal with cursor key, and then press F7 (Set).
13. Confirm whether the measured Frequency Error (carrier frequency accuracy) is within the specifications.
14. Confirm whether the measured EVM (rms) (residual vector error) value is within the specifications.

(5) Test Result

Table 5.2.1-1 Carrier frequency accuracy

Frequency	Min. limit	Deviation (Hz)	Max. limit	Uncertainty	Pass/Fail
400 MHz	MS269xA –8.0 Hz		MS269xA +8.0 Hz	MS269xA ±0.6 Hz	
1500 MHz	MS2830A –8.0 Hz		MS2830A +8.0 Hz	MS2830A ±0.6 Hz	
2700 MHz	MS269xA-077/177/ 078/178 –8.0 Hz		MS269xA-077/177/ 078/178 +8.0 Hz	MS269xA-077/177/ 078/178 ±0.6 Hz	
4000 MHz	MS2830A-077/078 –8.0 Hz		MS2830A-077/078 +8.0 Hz	MS2830A-077/078 ±0.6 Hz	
5000 MHz 3600 MHz (MS2830A-040)	MS2850A –8.0 Hz		MS2850A +8.0 Hz	MS2850A ±0.6 Hz	

Table 5.2.1-2 Residual vector error (Target Channel is PUSCH)

Frequency	Measured value [% (rms)]	Max. limit	Uncertainty	Pass/Fail
400 MHz		MS269xA 1.0% (rms)	MS269xA 0.1% (rms)	
1500 MHz		MS2830A 1.2% (rms)	MS2830A 0.1% (rms)	
2700 MHz		MS269xA-077/177 /078/178 1.3% (rms)	MS269xA-077/177/ 078/178 0.1% (rms)	
4000 MHz		MS2830A-077/078 1.3% (rms)	MS2830A-077/078 0.1 % (rms)	
5000 MHz 3600 MHz (MS2830A-040)		MS2850A 1.3% (rms)	MS2850A 0.1% (rms)	

Table 5.3.1-3 Residual vector error (Target Channel is PUCCH)

Frequency	Measured value [% (rms)]	Max. limit	Uncertainty	Pass/Fail
400 MHz		MS269xA 1.0% (rms)	MS269xA 0.1% (rms)	
1500 MHz		MS2830A 1.2% (rms)	MS2830A 0.1% (rms)	
2700 MHz		MS269xA-077/177 /078/178 1.3% (rms)	MS269xA-077/177/ 078/178 0.1% (rms)	
4000 MHz		MS2830A-077/078 1.3% (rms)	MS2830A-077/078 0.1% (rms)	
5000 MHz 3600 MHz (MS2830A-040)		MS2850A 1.3% (rms)	MS2850A 0.1% (rms)	

Chapter 6 Other Functions

This chapter describes other functions of this application.

6.1 Selecting Other Functions 6-2
6.2 Setting Title.....6-2
6.3 Erasing Warmup Message 6-2

6.1 Selecting Other Functions

Pressing F8 (Accessory) on the main function menu displays the Accessory function menu.

Table 6.1-1 Accessory function menu

Function Keys	Menu Display	Function
F1	Title	Sets the title character string.
F2	Title (On/Off)	Displays (On) or hides (Off) the title character string.
F4	Erase Warm Up Message	Erases the warmup message display.

6.2 Setting Title

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. The maximum number of characters to be displayed on the top of the function menu varies according to character string.)

<Procedure>

1. Press F8 (Accessory) on 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. When the title is entered, press F7 (Set).
3. Press F2 (Title) and then select "Off " to hide the title.

6.3 Erasing Warmup Message

The warmup message (Warm Up), which is displayed upon power-on and indicates that the level and frequency are not stable, can be deleted.

<Procedure>

1. Press F8 (Accessory) on the main function menu.
2. Press F4 (Erase Warm Up Message) to erase the warmup message.

Appendix A Error Messages

Table A-1 Error Messages

Message	Description
Out of range.	The settable range is exceeded.
Not available in Constellation Select.	This operation is invalid when Constellation is selected.
Not available in Bottom Graph Select.	This operation is invalid when Bottom Graph is selected.
Not available in Averaged over all Subcarriers.	This operation is invalid when Averaged over all Subcarriers is selected.
Not available in Averaged over all Symbols.	This operation is invalid when Averaged over all Symbols is selected.
Not available in EVM vs Subcarrier Trace.	This operation is invalid when Active Trace is in the EVM vs Subcarrier state.
Not available in EVM vs Symbol Trace.	This operation is invalid when Active Trace is in the EVM vs Symbol state.
Not available in Spectral Flatness Trace.	This operation is invalid when Active Trace is in the Spectral Flatness state.
Not available in Summary Trace.	This operation is invalid with Summary displayed.
Not available in 20MHz Channel Bandwidth.	This operation is invalid when Channel Bandwidth is set to 20 MHz.
Not available in 15MHz Channel Bandwidth.	This operation is invalid when Channel Bandwidth is set to 15 MHz.
Not available in 10MHz Channel Bandwidth.	This operation is invalid when Channel Bandwidth is set to 10 MHz.
Not available in Storage.	This operation is invalid in the Storage state.
Please Load Signal Analyzer.	The Signal Analyzer function is required to be loaded.
Please Load Spectrum Analyzer.	The Spectrum Analyzer function is required to be loaded.
File read error.	File reading has failed.
File format error.	The file format is invalid.
Write error.	File writing has failed.
File Open error.	File Open failed.
File Close error.	File Close failed.
Empty File Name.	No character is entered.
Save File Limit < 100	The save destination contains the maximum number of files (100).
Cannot find device.	The specified device could not be found.
Search error.	Search error
Number of the letters over.	This operation is invalid because the maximum number of characters has been exceeded.
The model of the main instrument is different.	This operation is invalid because the specified model name does not match.

Table A-1 Error Messages (Cont'd)

Message	Description
The option configuration is different.	This operation is invalid because the option configuration does not match.
Not available when Capture Time is set to Auto.	This operation is invalid when Capture Time is set to Auto.
File not found.	The specified file could not be found.
Cannot find device.	The specified device could not be found.
Selected item is empty.	The selected item (ex. file) could not be found.
Not available when Capture Time is Manual and less Capture Time Length.	This operation is invalid when Capture Time is set to Manual and when Capture Time Length is set to 1 Frame.
Only available while replaying.	This operation is invalid when the Replay function is not executed.
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.
Unsupported SpanFrequency.	The frequency span is not supported.
Unsupported SamplingClock.	The sampling rate is not supported.
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 in Time Based EVM Trace.	This operation is invalid when Time Based EVM is displayed.
Not available in Demod-Symbol.	This operation is invalid when EVM vs Demod-Symbol is displayed.
Not available during measurement.	This operation is invalid during measurement.
Set any one of the Target Channels to Include.	It is not possible to set all the Target Channels to Exclude. Be sure to set at least one of the Target Channels to Include.
Not available when PUCCH Format is 2, 2a or 2b.	The Orthogonal Sequence Index parameter cannot be set when the PUCCH Format is set to 2, 2a, or 2b.
SRS Mapping over the physical resource limit.	Mapping to the Physical Resources of SRS calculated from the SRS Bandwidth (B_SRS) and Configuration (C_SRS) settings exceeds the range of Physical Resources that can be set by using the current Channel Bandwidth.
Not available when DMRS Parameter (PUCCH) is set to Auto.	This operation cannot be performed when the Target Channel is PUCCH and DMRS Parameters is set to Auto.
Not available when DMRS Parameter (SRS) is set to Auto.	This operation cannot be performed when the Target Channel is SRS and SRS Parameters is set to Auto.

Table A-1 Error Messages (Cont'd)

Message	Description
Not available in Averaged over all Symbols.	1) When Trace Mode = EVM vs Subcarrier and EVM vs Subcarrier View = Averaged over all Symbols 2) When Trace Mode = EVM vs Demod-symbol and EVM vs Demod-symbol = Averaged over all Symbols This operation cannot be performed in cases 1) and 2) above.
Not available in Averaged over all Subcarriers.	This operation cannot be performed when Trace Mode = EVM vs Symbol and EVM vs Symbol View = Averaged over all Subcarriers.
Not available in Averaged over all Slots.	1) When Trace Mode = SpectralFlatness and SpectralFlatness View = Averaged over all Slots 2) When Trace Mode = Inband emission and Inband emission View = Averaged over all Slots This operation cannot be performed in cases 1) and 2) above.
Not available when Target Channel PUCCH is set to Include.	This operation cannot be performed when the Target Channel is a PUCCH channel and is set to Include.
Not available when Target Channel PRACH is set to Include.	This operation cannot be performed when the Target Channel is a PRACH channel and is set to Include.
This parameter can be set to 0 only.	N_cs_1 can only be set to 0. The setting is fixed.
Invalid character.	–
Not available in Averaged over all Preamble Sequences.	This operation cannot be performed when Trace Mode is EVM vs Subcarrier and EVM vs Subcarrier View is Averaged over all Preamble Sequences.
Not available when Operating Band Setting is set to Standard.	This operation cannot be performed when Operating Band Setting is set to Standard.
Not available when Operating Band Setting is set to User.	This operation cannot be performed when Operating Band Setting is set to User.
Not available when Standard is set to LTE.	This operation cannot be performed when Standard is LTE.
Not available when Standard is set to LTE-Adv.	This operation cannot be performed when Standard is LTE-Adv.
Not available if not LTE-Advanced option.	This operation cannot be performed when the MX269021A-001 LTE-Advanced FDD Uplink Measurement Software is not installed.
Not available when Contiguous Mode is set to On.	This operation cannot be performed when Contiguous Mode is On.
The channel spacing between all CCs shall be multiple of 300 kHz when Contiguous Mode is set to On.	When Contiguous Mode is On, the channel intervals of all CCs (decided by Freq. Offset) must be the multiples of 300 kHz.
Not available when Number of CCs is set to 1.	This operation cannot be performed when Number of CCs is 1.
Not available when Number of CCs is set to 2.	This operation cannot be performed when Number of CCs is 2.
Not available when both CC Statuses are set to On.	This operation cannot be performed when the both CC statuses are On.

Appendix B Default Value List

Frequency	
Carrier Frequency	1.920 GHz
E-UTRA Operating Band	None
Span	Auto
Amplitude	
Input Level	–10.00 dBm
Lowest ATT Setting	4 dB
Pre-Amp	Off
Offset	Off
Offset Value	0.00 dB
Common Setting	
Channel Bandwidth	5 MHz
Target Channel	PUSCH
DMRS Parameters	Auto
Standard	LTE
Contiguous Mode	On
Number of CCs	2
Synchronization CC#	CC#0
Setting/Result Target CC#	CC#0
In-Band Em. Carr. Leak. Freq.	At Carrier Frequency
Carrier Leak Rejection	
At Carrier Frequency	Off
At CC#0 Center	On
At CC#1 Center	On
CC Status	On
CC Frequency Offset	CC#0 : –2400000 CC#1 : 2400000
Target Channel PUSCH	
Reference Signal Manual	
Zadoff-Chu-Sequence Length	All 293
Base Sequence Number	All 0
PUSCH Subframe Assignment	All Checked
Reference Signal Auto	
Cell ID	0
N_DMRS_2	0
N_DMRS_1	0
Delta SS	0
Sequence Hopping	Off
Group Hopping	On
PUSCH Subframe Assignment	All Checked

Target Channel PUCCH
- Reference Signal Manual
  - PUCCH Subframe Assignment: All Checked
  - Scramble Code S(ns): All 0
- Reference Signal Auto
  - Cell ID: 0
  - N_cs_1: 6
  - N_RB_2: 2
  - N_PUCCH_1: All 0
  - N_PUCCH_2: 0
  - Delta Shift PUCCH: 2
  - Group Hopping: On
  - N_PUCCH_3: All 0
  - PUCCH Subframe Assignment: All Checked

Target Channel PRACH
- Configuration Index: 3
- Physical Root Sequence Number Index: 1
- Cyclic Shift Value: 806

Target Channel SRS
- Reference Signal Manual
  - Base Sequence Number: All 0
  - k_TC: 0
  - Cyclic Shift Index: 0
  - SRS Subframe Assignment: All Checked
- Reference Signal Auto
  - Cell ID: 0
  - C_SRS: 3
  - B_SRS: 0
  - Delta SS: 0
  - k_TC: 0
  - Cyclic Shift Index: 0
  - Subframe Configuration: 0
  - SRS Subframe Assignment: All Checked
  - Sequence Hopping: Off
  - Group Hopping: On

Modulation Analysis		
	Analysis Time	
		Starting Subframe Number 0
		Measurement Interval 1
		Analysis Frame Position 0 Frame
		Analysis Offset Time 0 s
	PUSCH Modulation Scheme	AUTO
	Channel Bandwidth	5 MHz
	First RB	0 RB
	Number of RBs	25 RB
	PRACH Frequency Offset	0
	EVM Window Length	W, 32
	EVM Window Length(PRACH)	W, 3072
	Detail Setting	
		Channel Estimation On
		Equalization Mode 3GPPTS36.521(2009-09)
	EVM with Exclusion Period	All Checked
	Leading Exclusion Period	All 25 µs
	Lagging Exclusion Period	All 25 µs
	BWchannel Selective Filter	Off

Trace (Modulation Analysis)	
Trace Mode	EVM vs Subcarrier
Flatness Type	Amplitude
Emission Type	General&IQ Image
Scale	
EVM Unit	%
EVM Scale	5%
Flatness Scale	±10 dB
Storage	
Mode	Off
Count	10
Constellation Symbol Number	0 Symbol
Constellation Sequence Number	0 Sequence
Bottom Graph Symbol Number	0 Symbol
Bottom Graph Sequence Number	0 Sequence
Bottom Graph Subcarrier Number	0 Subcarrier
Bottom Graph Slot Number	0 Slot
EVM vs Subcarrier View	Averaged over all Symbols
Graph View	RMS&Peak
EVM vs Symbol View	Averaged over all Subcarriers
Graph View	RMS&Peak
Time Based EVM	
Graph View	RMS&Peak
EVM vs Demod-Symbol View	Averaged over all Symbols
Graph View	RMS&Peak
Flatness View	Averaged over all Slots
Graph View	Avg&Peak
In-Band Emission View	Averaged over all Slots
Emission Graph Type	Both
Graph View	Avg&Peak
Page Number	1

Marker (Modulation Analysis)	
Graph Marker	On
Constellation Marker Number	0 Subcarrier
Constellation Marker Number	0 Demod-Symbol
Bottom Graph Marker Number	0 Subcarrier
Bottom Graph Marker Number	0 Symbol
Bottom Graph Marker Number	0 Demod-Symbol
Bottom Graph Marker Number	0 RB
Power vs Time	
Channel Bandwidth	5 MHz
First RB	0 RB
Number of RBs	25 RB
PRACH Frequency Offset	0
EVM Window Length	W, 32
EVM Window Length(PRACH)	W, 3072
Detail Setting	
Channel Estimation	On
Equalization Mode	3GPPTS36.521(2009-09)
BWchannel Selective Filter	Off
Trace(Power vs Time)	
Trace Mode	Burst
Graph Subframe Number	2
Scale	
Reference Level Upper	20 dBm
Reference Level Lower	–80 dBm
Storage	
Mode	Off
Count	10
Marker(Power vs Time)	
Graph Marker	On
Graph Marker Number	61440 Ts
Trigger	
Trigger Switch	Off
Trigger Source	External
Trigger Slope	Rise
Trigger Delay	0 s

Capture	
Capture Time	Auto
Capture Time Length	1 Frame
Save Captured Data	
Device	D:
File Name	Digitize(Date)_000
Output Rate	50 MHz
Replay	
Device	D:
Application	3GLTE Uplink
Accessory	
Title	On, “3GLTE Uplink”

Appendix C LTE Uplink Signal Configuration

This appendix describes the configuration of the LTE Uplink signal, which is to be measured by the MX269021A.

C.1 Overview of LTE Uplink Signal C-2
C.2 Details of Each Channel and Signal C-3
C.2.1 Demodulation Reference Signal C-3
C.2.2 PUSCH C-4
C.2.3 SRS C-5
C.2.4 PUCCH C-7
C.2.5 PRACH C-8

C.1 Overview of LTE Uplink Signal

The MX269021A can analyze signals based on the following parameters of the 3GPP TS36.211 V8.7.0 (2009-5) Physical channels and modulation (Release 8) (hereinafter, referred to as "3GPP specifications"). Refer to the 3GPP specifications for details on the parameters.

Table C.1-1 Parameters of signal

Parameter	Setting
Frame structure	Type 1 (FDD)
Physical channels	PUSCH, SRS, PUCCH, PRACH (simultaneous measurement not possible)
Physical signals	Demodulation Reference signal, Sounding Reference signal (simultaneous measurement not possible)
Uplink bandwidth configuration	100 Resource Block (20 MHz bandwidth) 75 Resource Block (15 MHz bandwidth) 50 Resource Block (10 MHz bandwidth) 25 Resource Block (5 MHz bandwidth) 15 Resource Block (3 MHz bandwidth) 6 Resource Block (1.4 MHz bandwidth)
Cyclic prefix	Normal cyclic prefix
Δf	15 kHz
Uplink frequency-hopping	disable
Demodulation reference signal group-hopping	enable/disable
Demodulation reference signal sequence-hopping	enable/disable

C.2 Details of Each Channel and Signal

As described above, the MX269021A can analyze signals configured by the PUSCH and Demodulation Reference Signal parameters. This section describes details of each of the channels and signals.

C.2.1 Demodulation Reference Signal

Details of the Demodulation Reference Signal are as follows. The Demodulation Reference Signal level is used as the reference value for the PUSCH channel. The MX269021A uses this signal to perform synchronization. Since the Demodulation Reference Signal is common to all slots when group-hopping and sequence-hopping are set to disable, an external trigger must be used for the MX269021A to perform synchronization with signals having cycles longer than the slots.

Table C.2.1-1 Parameters of Demodulation Reference Signal

Parameter	Setting
Modulation	Based on 3GPP specifications (Zadoff-Chu sequence when Number of RBs > 2)
Resource element mapping	The Demodulation Reference Signal is mapped to the resource block determined by the First RB Number and Number of RBs settings of the MX269021A. Fourth symbol of each slot.
Symbol sequence	3GPP-based value determined by the Sequence Group Number and Base Sequence Number settings of the MX269021A.

C.2.2 PUSCH

Details of PUSCH are as follows. The PUSCH operation depends on whether DMRS Parameters is set to Manual or Auto.

Table C.2.2-1 When DMRS Parameter is set to Manual

Parameter	Setting
Zadoff-ChuSequence Length	The maximum value is the largest prime number within the number of RBs ×12. This parameter sets N_{ZC}^{RB}, which is defined in 3GPP TS 36.211.
Sequence Group Number	A value from 0 to 29 can be set for each slot. This parameter sets the sequence group number u, which is defined in 3GPP TS 36.211 5.5.1.3.
Base Sequence Number	A value 0 or 1 can be set for each slot. This parameter is fixed to 0 if the number of RBs is less than 6. This parameter sets the base sequence number v, which is defined in 3GPP TS 36. 211 5.5.1.4.
PUSCH Subframe Assignment	Sets whether to measure each subframe individually.
Cyclic Shift Index	A value from 0 to 11 can be set for each slot. This parameter sets n_{cs}, which is defined in 3GPP TS 36. 211 5.5.2.1.1.

Table C.2.2-2 When DMRS Parameter is set to Auto

Parameter	Setting
Cell ID	A value from 0 to 503 can be set. This parameter sets N_{ID}^{cell}, which is defined in 3GPP TS 36.211.
n_DMRS_2	A value from 0 to 10 can be set. For details about the setting, refer to Table 5.5.2.1.1-1 of 3GPP TS 36. 211.
n_DMRS_1	A value from 0 to 10 can be set. For details about the setting, refer to Table 5.5.2.1.1-2 of 3GPP TS 36. 211.
Delta SS	A value from 0 to 29 can be set.
Sequence Hopping	Enable (ON) or disable (OFF) sequence hopping. For details, refer to 3GPP TS 36. 211 5.5.1.4.
Group Hopping	Enable (ON) or disable (OFF) group hopping. For details, refer to 3GPP TS 36. 211 5.5.1.3.

C.2.3 SRS

Details about SRS follow. The SRS operation depends on whether DMRS Parameters is set to Manual or Auto.

Table C.2.3-1 When DMRS Parameter is set to Manual

Parameter	Setting
Sequence Group Number	A value from 0 to 29 can be set for each slot. This parameter sets the sequence group number u, which is defined in 3GPP TS 36.211 5.5.1.3.
Base Sequence Number	A value 0 or 1 can be set for each slot. This parameter is fixed to 0 if the number of RBs is less than 6. This parameter sets the base sequence number v, which is defined in 3GPP TS 36. 211 5.5.1.4.
k_TC	Set 0 or 1 for Transmission Comb k_TC. This parameter sets k_{TC}, which is defined in 3GPP TS 36. 211 5.5.3.2.
Cyclic Shift Index	A value from 0 to 7 can be set for each slot. This parameter sets n_{SRS}^{cs}, which is defined in 3GPP TS 36. 211 5.5.3.1.
SRS Subframe Assignment	SRS transmission subframes can be set. With this parameter, SRS transmission subframes can be set without using expressions or referencing tables provided in 3GPP TS 36. 211 “SRS Subframe Configuration”.

Table C.2.3-2 When DMRS Parameter is set to Auto

Parameter	Setting
Cell ID	A value from 0 to 503 can be set. This parameter sets N_{ID}^{cell}, which is defined in 3GPP TS 36.211.
C_SRS	A value from 0 to 7 can be set. The number of RBs can be determined by setting C_SRS and B_SRS. This parameter sets C_{SRS}, which is defined in Tables 5.5.3.2-1 to 5.5.3.2-4 of 3GPP TS 36. 211.
B_SRS	A value from 0 to 3 can be set. The number of RBs can be determined by setting C_SRS and B_SRS. This parameter sets B_{SRS}, which is defined in Tables 5.5.3.2-1 to 5.5.3.2-4 of 3GPP TS 36. 211.
Delta SS	A value from 0 to 29 can be set.
k_TC	Set 0 or 1 for Transmission Comb k_TC. This parameter sets k_{TC}, which is defined in 3GPP TS 36. 211 5.5.3.2.
Cyclic Shift Index	A value from 0 to 7 can be set for each slot. This parameter sets n_{SRS}^{cs}, which is defined in 3GPP TS 36. 211 5.5.3.1.
Subframe Configuration	A value from 0 to 14 can be set. This parameter sets srsSubframeConfiguration, which is defined in 3GPP TS 36. 211 5.5.3.3.
Sequence Hopping	Enable (ON) or disable (OFF) sequence hopping. For details, refer to 3GPP TS 36. 211 5.5.1.4.
Group Hopping	Enable (ON) or disable (OFF) group hopping. For details, refer to 3GPP TS 36. 211 5.5.1.3.

C.2.4 PUCCH

Details about PUCCH follow. The PUCCH operation depends on whether DMRS Parameters is set to Manual or Auto.

Table C.2.4-1 When DMRS Parameter is set to Manual

Parameter	Setting
Sequence Group Number	A value from 0 to 29 can be set for each slot. This parameter sets the sequence group number u, which is defined in 3GPP TS 36.211 5.5.1.3.
Cyclic Shift Index	A value from 0 to 11 can be set for each slot. This parameter sets n_{cs}, which is defined in 3GPP TS 36. 211 5.5.2.2.1.
Orthogonal Sequence Index	A value from 0 to 2 can be set if PUCCH Format is set to 1, 1a or 1b. A value from 0 to 4 can be set if PUCCH Format is set to 3. This parameter cannot be set if PUCCH Format is set to 2, 2a or 2b. This parameter sets $\bar{n}_{oc}(n_s)$, which is defined in Table 5.5.2.2.1-2 of 3GPP TS 36. 211 5.5.2.2.1.
PUCCH Subframe Assignment	Sets whether to measure each subframe individually.
Cell-Specific Cyclic Shift	A value from 0 to 255 can be set only if PUCCH Format is set to 3.
Scramble Code S (ns)	A value from 0 to 1 can be set

Table C.2.4-2 When DMRS Parameter is set to Auto

Parameter	Setting
Cell ID	A value from 0 to 503 can be set. This parameter sets N_{ID}^{cell}, which is defined in 3GPP TS 36.211.
N_cs_1	A value from 0 to 7 can be set. For details, refer to 3GPP TS 36. 211 5.4.
N_RB_2	A value from 0 to 98 can be set. The setting range is varied according to the channel bandwidth.
n_PUCCH_1	A value from 0 to 7199 can be set. The setting range is varied according to the channel bandwidth. This parameter sets $n_{PUCCH}^{(1)}$, which is defined in 3GPP TS 36.211 5.4.
n_PUCCH_2	This parameter sets $n_{PUCCH}^{(2)}$, which is defined in 3GPP TS 36.211 5.4.
N_PUCCH_3	A value from 0 to 499 can be set only if PUCCH Format is set to 3. The setting range is varied according to the channel bandwidth.
Delta Shift PUCCH	A value from 1 to 3 can be set.
Group Hopping	Enable (ON) or disable (OFF) group hopping. For details, refer to 3GPP TS 36. 211 5.5.1.3.

C.2.5 PRACH

Details about PRACH follow.

Table C.2.5-1 PRACH parameters

Parameter	Setting
Configuration Index	A value from 0 to 63 can be set. This parameter sets the PRACH configuration index, which is defined in Table 5.7.1-2 of 3GPP TS 36. 211.
Physical Root Sequence Number Index	A value from 0 to 838 can be set. This parameter sets the physical root sequence number u, which is defined in Table 5.7.2-4 of 3GPP TS 36.211.
Cyclic Shift Value	A value from 0 to 838 can be set. This parameter sets C_v, which is defined in 3GPP TS 36.211 5.7.2.

Appendix D Measurement Results

Table D-1 Measurement result

Measurement Results	Details
Frequency Error	Indicates the frequency error. The measurement unit is one subframe.
Output Power	Indicates the output power measured without bandpass filtering of the channel bandwidth.
Mean Power	Indicates the output power measured with bandpass filtering of the channel bandwidth.
EVM (rms) Total EVM (Time Based) (rms)	Indicates the EVM (rms) calculated. Analysis length is one subframe unit. The resource blocks other than those determined by the First RB Number and Number of RBs settings are excluded. When storage is set to On, the Average value is the square mean value of EVM (rms).
EVM (peak) Total EVM (Time Based) (peak)	Indicates the maximum EVM (rms) of each resource element calculated. The resource blocks other than those determined by the First RB Number and Number of RBs settings are excluded.
EVM peak Symbol Number	Indicates the SC-FDMA symbol number of the resource element for which the EVM calculated is the maximum. This is displayed if Target Channel is set to a value other than PRACH.
EVM peak Demod-Symbol Number	Indicates the number of the Demod symbol for which the EVM calculated on the horizontal time axis is the maximum among all the transmitted resource elements. This is displayed if Target Channel is set to PUSCH or PRACH.
EVM peak Subcarrier Number	Indicates the subcarrier number for which the EVM calculated based on the frequency axis becomes the maximum.
Origin Offset	Indicates the origin offset.
Time Offset	Indicates the time offset between the trigger signal and the head of the frame.
Constellation graph	Indicates the amplitudes of the I and Q phases of each resource element (When it is PUSCH, each Demod Symbol), which are normalized at the reference signal level. The amplitudes are calculated on the horizontal time axis.
EVM vs Subcarrier graph	Indicates the EVM of each subcarrier calculated on the vertical frequency axis. If storage is enabled, EVM (rms) indicates the square mean value and EVM (peak) indicates the maximum value. For resource elements to which no channel is assigned, EVM is calculated using the expression 100 × sqrt (the noise power of the target resource element divided by average power per resource element).
EVM vs Symbol graph	Indicates the EVM of each SC-FDMA symbol calculated on the vertical frequency axis. The details are the same as those for EVM vs Subcarrier.
Time Based EVM graph	Indicates the EVM of each SC-FDMA symbol calculated on the horizontal time axis. The details are the same as those for EVM vs Subcarrier.
EVM vs Demod-Symbol graph	Indicates the EVM of each demodulation symbol. The details are the same as those for EVM vs Subcarrier.

Table D-1 Measurement result (Cont'd)

Measurement Results	Details
Spectral Flatness Amplitude	Indicates the spectral flatness of amplitudes based on the average amplitude error of each subcarrier.
Spectral Flatness Differential Amplitude	Indicates the spectral flatness of the amplitude difference based on the average amplitude error between adjacent subcarriers.
Spectral Flatness Phase	Indicates the spectral flatness of the phase value based on the average phase error of each subcarrier.
Spectral Flatness Group Delay	Indicates the spectral flatness of the phase difference based on the difference between the average phase errors of adjacent subcarriers.
In-Band Emission General & IQ Image	Displays the General, IQ Image, and Image Emission Average and Peak values, as well as the Power, RB Position, and Slot Position values for each Peak position.
In-Band Emission DC	Displays the DC Emission Average and Peak values, as well as the Power, RB Position, and Slot Position values for each Peak position.
PUSCH/SRS/PUCCH/PRACH EVM (Time Based)	Indicates the EVM calculated on the horizontal time axis.
PUSCH/SRS/PUCCH/PRACH EVM	Indicates the EVM calculated on the vertical frequency axis.
EVM High	Indicates the EVM calculated at the High side of FFT Window. For details about FFT Window, refer to E.3.2 Timing of the FFT window in 3GPP TS 36. 521-1. The details of each item are the same as those for Total EVM.
EVM Low	Indicates the EVM calculated at the Low side of FFT Window. For details about FFT Window, refer to E.3.2 Timing of the FFT window in 3GPP TS 36. 521-1. The details of each item are the same as those for Total EVM.
EVM Final	Indicates whichever worse of Total EVM High and Total EVM Low as EVM Final.
Power vs Slot	Displays the power of each slot within the range that is determined by the Starting Subframe Number and Measurement Interval settings.
Total EVM High ***	Indicates the EVM calculated at the High side of FFT Window. For details about FFT Window, refer to E.3.2 Timing of the FFT window in 3GPP TS 36. 521-1. The details of each item are the same as those for Total EVM.
Total EVM Low ***	Indicates the EVM calculated at the Low side of FFT Window. For details about FFT Window, refer to E.3.2 Timing of the FFT window in 3GPP TS 36. 521-1. The details of each item are the same as those for Total EVM.

Table D-1 Measurement result (Cont'd)

Measurement Results	Details
PUSCH ALL EVM ***	Indicates the EVM of all the transmitted PUSCHs. The details of each item are the same as those for Total EVM.
PUSCH QPSK EVM ***	Of the PUSCHs that are transmitted, indicates the EVM of the resource block whose modulation scheme is QPSK. The details of item are the same as for Total EVM. When all the resource blocks are judged to have modulation modes other than QPSK, result valid returns 0 (invalid).
PUSCH 16QAM EVM ***	Indicates the EVM of resource blocks among the transmitted PUSCHs whose modulation method is 16QAM. The details of each item are the same as those for Total EVM. If the modulation methods of all the resource blocks are not 16QAM, result valid returns 0 (invalid).
PUSCH 64QAM EVM ***	Indicates the EVM of resource elements among the transmitted PUSCHs whose modulation method is 64QAM. The details of each item are the same as those for Total EVM. If the modulation methods of all the resource blocks are not 64QAM, result valid returns 0 (invalid).
RS EVM ***	Indicates the EVM of the transmitted demodulation reference signal. The details of each item are the same as those for Total EVM.
Power vs Slot	Indicates the power of each slot in dBm units.
Power vs Time(Burst)	Displays the Power vs Time measurement result. The waveform around the On area is plotted.
Power vs Time(Transient)	Displays the Power vs Time measurement result. The areas around the waveform rising and falling are plotted.
Including	Displays the power of each subframe including Transient Period.
Excluding	Displays the power of each subframe excluding Transient Period.
Off Power(Before)	Displays the power in the Off area before the On area starts. The transient period is excluded.
On Power	Displays the power in the On area. The transient period is excluded.
Off Power(After)	Displays the power in the Off area after the On area ends. The transient period is excluded.
On Power(SRS)	Displays the power of SRS in each subframe. The transient period is excluded.
Off Power(Before SRS)	Displays the power of the places where SRS does not exist in each subframe. The transient period is excluded.

References are to page numbers.

Symbol and Numbers

1

1st Local Output connector....2-8

A

AC inlet....2-11
Accessory....6-2
ACP
  FFT....3-77
  Swept....3-77
Adjacent Channel Power Measurement (ACP)....3-77
Amplitude....3-11
Analysis Frame Position....3-54
Analysis Time....3-53
Anritsu Warranty....iii
Applicable parts....1-3
Application key....2-7
Application Switch....2-15
AUX connector....2-10

B

B_SRS....3-41
Base Sequence Number
  when DMRS Parameter is set to Manual (PUSCH)....3-25
  when SRS Parameter is set to Manual....3-39
Bottom Graph Marker Number....3-81
Bottom Graph Select....3-80
Bottom Graph Sequence Number....3-62
Bottom Graph Slot Number....3-62
Bottom Graph Symbol Number....3-61
Buffer Out Connector....2-10
BWchannel Selective Filter....3-51

C

C_SRS....3-41
Cal key....2-3
CAL Port....2-12
Calibration....2-3
Cancel key....2-6
Capture....3-13
Capture Time....3-14
Capture Time Length....3-14
Carrier Frequency....3-6
Carrier Leak Rejection....3-20
Cautions against computer virus infection..vii
CC Frequency Offset....3-21
CC Status....3-21
Cell ID
  when DMRS Parameter is set to Auto (PUCCH)....3-32
  when DMRS Parameter is set to Auto (PUSCH)....3-26
  when SRS Parameter is set to Auto....3-41
Cell-specific Cyclic Shift
  when DMRS Parameter is set to Manual....3-31
Channel Bandwidth....3-22
Channel Estimation....3-52, 3-73
Channel Power
  FFT....3-78
  Swept....3-78
Channel Power Measurement (Channel Power)....3-78
Common Setting....3-17
Composition of Operation Manuals....I
Configuration Index....3-36
configuration of the LTE Uplink signal....0-1
Constellation....3-3, 3-92
Constellation Marker Number....3-81
Constellation Select....3-80
Constellation Sequence Number....3-61
Constellation Symbol Number....3-61
Contiguous Mode....3-17
Continuous Measurement....3-5
continuous measurement mode....3-5
Copy key....2-3
Count....3-60, 3-67, 3-76

Cursor key....2-6
Cyclic Shift Index
when DMRS Parameter is set to Manual....3-31
when DMRS Parameter is set to Manual (PUSCH)....3-25
when SRS Parameter is set to Auto....3-42
when SRS Parameter is set to Manual.3-40
Cyclic Shift Value....3-37

D

Delta Shift PUCCH....3-33
Delta SS
when DMRS Parameter is set to Auto (PUSCH)....3-27
when SRS Parameter is set to Auto....3-42
Demodulation Reference Signal....3-22
Demodulation Reference Signal (PUCCH)3-29
Demodulation Reference Signal (PUSCH)3-23
Detail Settings....3-52, 3-73
Device....3-137
Dip Search....3-84
DMRS Parameter Manual....3-34, 3-35
when DMRS Parameter is set to Auto (PUSCH)....3-28
DMRS Parameters....3-22

E

Enter key....2-6
Equipment Certificate....iii
Erase Warm Up Message....6-2
Error Messages....A-1
Ethernet connector....2-11
Ethernet:....2-4
E-UTRA Operating Band....3-6
E-UTRA Operating Band
Operating Band Lowest Frequency....3-9
E-UTRA Operating Band:
Operating Band Highest Frequency....3-9
E-UTRA Operating Band:
Operating Band Number....3-7
E-UTRA Operating Band:
Operating Band Setting....3-7
EVM (peak)....3-90
EVM (rms)....3-90
EVM Display....3-89
EVM Threshold....3-51
EVM vs Demod-Symbol....3-101
EVM vs Demod-Symbol View....3-64
EVM vs Subcarrier....3-95
EVM vs Subcarrier View....3-63
EVM vs Symbol....3-98
EVM vs Symbol Subcarrier Number....3-99
EVM vs Symbol View....3-63
EVM Window Length
(Target Channel=PRACH)....3-52
EVM Window Length
(When Target Channel is other than PRACH.)....3-50, 3-72
EVM with Exclusion Period....3-50
Excluding....3-130

F

First RB Number....3-70
Flatness View....3-59
Frequency....3-6
Frequency Error....3-89
Front panel....2-2
Function keys....2-4
Function menu....3-3

G

GPIB....2-4, 2-10
GPIB connector....2-10
Graph Marker Number (Power vs Time)..3-83
Graph Subframe Number....3-75
Graph window....3-3
Group Hopping
when DMRS Parameter is set to Auto (PUCCH)....3-34
when DMRS Parameter is set to Auto (PUSCH)....3-27
when SRS Parameter is set to Auto....3-44

H

Hard disk access lamp 2-3
HDD slot 2-11

I

IF Out connector 2-10
IF output connector 2-12
In-Band Em. Carr. Leak Freq. 3-19
In-Band Emission 3-104
In-Band Emission Type 3-59
In-Band Emission View 3-65
Including 3-130
Input Level 3-11

K

k_TC 3-40

L

Lagging Exclusion Period 3-51
Leading Exclusion Period 3-51
Load Application Select 2-15
Local key 2-4
Lowest ATT Setting 3-11

M

Main function keys 2-5
Marker 3-80
Measure 3-45
Measurement Interval 3-54
Measurement parameter 3-3
Measurement result D-1
MKR Amplitude 3-102
MKR Demod-Symbol 3-93, 3-101
MKR Difference Amplitude 3-102
MKR EVM 3-96, 3-99, 3-100, 3-101
MKR Group Delay 3-103
MKR I/Q 3-94
MKR Phase 3-102
MKR RB 3-105
MKR Result 3-133, 3-135
MKR Subcarrier 3-93, 3-96, 3-102, 3-105
MKR Symbol 3-98, 3-100
MKR Ts 3-133, 3-135
Modulation Analysis 3-45
Modulation control key 2-7
Monitor Out connector 2-11

N

N_cs_1 3-32
n_DMRS_1
when DMRS Parameter is set to Auto (PUSCH) 3-26
n_DMRS_2
when DMRS Parameter is set to Auto (PUSCH) 3-26
n_PUCCH_1 3-33
n_PUCCH_2 3-33
n_PUCCH_3 3-33
N_RB_2 3-32
Next Dip 3-84
Next Peak 3-84
Noise Source 2-12
Notes On Export Management iv
Number of CCs 3-18
Number of RBs 3-49
Number Of RBs 3-71
Numeric keypad 2-6

O

OBW
FFT 3-79
Swept 3-79
Occupied Bandwidth Measurement (OBW) 3-79
Off Power (After) 3-131
Off Power (Before SRS)) 3-131
Off Power(Before) 3-130
Offset 3-12
Offset Value 3-12
On Power 3-130
On Power (SRS) 3-131
Option 1-3
Origin Offset 3-91

Orthogonal Sequence Index
when DMRS Parameter is set to Manual 3-30
Output Power 3-90

P

Page Number 3-68
PCIe X8 2-13
Peak Search 3-83
Performance test 5-2
Physical Root Sequence Number Index 3-37
Power Switch 2-3
Power vs Time 3-69
Power vs Time Display 3-129
Power vsTime - Burst 3-132
Power vsTime - Transient 3-134
PRACH (PRACH) 3-36
PRACH Frequency Offset 3-49, 3-71
Preamble Sequence Number 3-90
Preset key 2-4
Product Configuration 1-3
PUCCH Format 3-48, 3-70
PUCCH Subframe Assignment 3-34
PUSCH Modulation Scheme 3-47
PUSCH Subframe Assignment
when DMRS Parameter is set to Manual 3-25
PUSCH Subframe Assignment 3-27
PUSCH Subframe Assignment 3-30

R

Rear panel 2-9
Recall key 2-3
Ref Input connector 2-10
reference frequency signal 2-10
Remote lamp 2-4
Replay Function 4-7
Result window 3-3
Result Window 3-89
RF Input connector 2-6
RF Output connector 2-7
RF Output Control key 2-6
Rotary knob 2-6

S

SA Trigger Input connector 2-11
Save 3-136
Save All Results 3-137
Save as Type 3-137
Save key 2-3
Saving IQ Data 4-2
Saving Measurement Results 3-136
Scale 3-59, 3-67, 3-75
Scramble Code S (ns)
when DMRS Parameter is set to manual 3-31
Sequence Group Number
when DMRS Parameter is set to Manual (PUSCH) 3-24
when DMRS Parameter is set to Manual (PUUCH) 3-30
when SRS Parameter is set to Manual 3-39
Sequence Hopping
when DMRS Parameter is set to Auto (PUSCH) 3-27
when SRS Parameter is set to Auto 3-43
Sequence Number 3-93, 3-97
Setting Marker 3-80
Setting Trigger 3-86
Setting/Result Target CC# 3-19
SG Trigger Input connector 2-11
Shift key 2-6
Single Measurement 3-5
single measurement mode 3-5
Slot Number 3-103, 3-105
Software End-User License Agreement (EULA) v
Sounding Reference Signal (SRS) 3-38
Span 3-9
Specifications 1-4
Spectral Flatness 3-102
Spectral Flatness View 3-64
Spectrum Emission Mask
Swept 3-79

Spectrum Emission Mask Measurement (SEM) 3-79
SRS 3-38
SRS Parameter Manual 3-42, 3-44
SRS Subframe Assignment 3-40, 3-43
SSD access lamp 2-3
SSD slot 2-11
Standard 3-17
Standard configuration 1-3
Starting Subframe Number 3-53
Status message 3-3
Storage 3-60, 3-67, 3-76
Subcarrier Number 3-62, 3-90, 3-99
Subframe Configuration 3-42
Subframe Number 3-133, 3-135
Summary 3-106
Sweep Status Out connector 2-10
Symbol Number 3-93, 3-96, 3-101
Synchronization CC# 3-18

T

Target Channel 3-18
Time Based EVM 3-100
Time Based EVM View 3-64
Time Offset 3-91
Title 6-2
Title (On/Off) 6-2
Trace 3-56, 3-66, 3-74
Trace (other than Summary) 3-56
Trace Mode 3-58, 3-67, 3-75
Trigger 3-86
Trigger Input 2-12
Trigger Input connector 2-10
Trigger Level 3-87
Trigger Output 2-12
trigger signal 2-10, 2-14
Trigger Slope 3-86
Trigger Source 3-86
Trigger Switch 3-86

U

USB 3.0 2-12
USB connector 2-7
  Type A 2-11
  Type B 2-11

Z

Zadoff-chu Sequence Length when DMRS Parameter is set to Manual (PUSCH) 3-24

Δ

ΔRB 3-105