MX269017A
Vector Modulation Analysis Software
Operation Manual
Operation

32nd 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), MS2840A 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-W3305AE-32.0

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

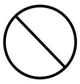
DANGER This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

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

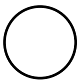
CAUTION This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

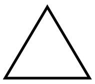
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



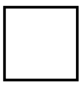
This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



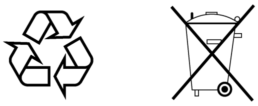
This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



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.

MX269017A
Vector Modulation Analysis Software
Operation Manual Operation

16 September 2009 (First Edition)
14 March 2019 (32nd Edition)

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 one year from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 6 months 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 injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Anritsu Corporation Contact

In the event of this equipment malfunctions, 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.

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Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.
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   - i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
   - ii) If this Software is used in conjunction with other non-Anritsu-approved software.
   - iii) Recovery of lost or damaged data.
   - iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
   - v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.

b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.

c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.

4. Export Restrictions

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

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Anritsu shall deem this EULA terminated if you violate any conditions described herein. This EULA shall also be terminated if the conditions herein cannot be continued for any good reason, such as violation of copyrights, patents, or other laws and ordinances.

6. Reparations

If Anritsu suffers any 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.

7. Responsibility after Termination

Upon termination of this EULA in accordance with item 5, you shall cease all use 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.

8. Dispute Resolution

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

9. Court of Jurisdiction

This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

Cautions against computer virus infection

- Copying files and data

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

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

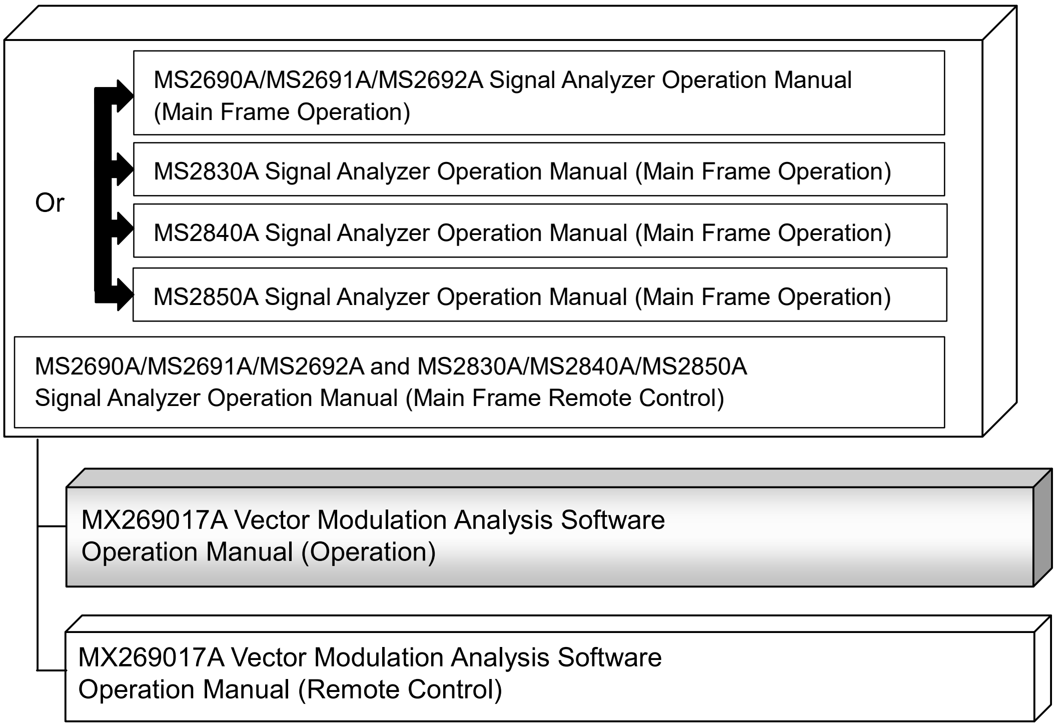
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections

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

About This Manual

■ Composition of Operation Manuals

The operation manuals for the MX269017A Vector Modulation Analysis 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.

- Vector Modulation Analysis Software Operation Manual (Operation) <This document>

This manual describes basic operating methods, and functions of the Vector Modulation Analysis Software.

As for signal analyzer hardware and its basic functions and operation outline, refer to "MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)", "MS2830A Signal Analyzer Operation Manual (Mainframe Operation)", "MS2840A Signal Analyzer Operation Manual (Mainframe Operation)" or "MS2850A Signal Analyzer Operation Manual (Mainframe Operation)" for details.

- Vector Modulation Analysis Software Operation Manual (Remote Control)

This manual describes remote control of the Vector Modulation Analysis Software.

As for signal analyzer application's basic remote control functions and its definitions of common commands, refer to "MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control)".

Convention Used in This Manual

Throughout this document, the use of MS269x Series is assumed unless otherwise specified. If using MS2830A, MS2840A, or MS2850A, change MS269xA to read MS2830A, MS2840A, or MS2850A.

Table of Contents

1
2
3
4
5
6
Appendix
Index

Chapter 1 Overview

This chapter provides an overview of the MX269017A Vector Modulation Analysis Software and describes the product configuration.

1.1 Product Overview

The MS269xA, MS2830A, MS2840A, 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 MS269xA, MS2830A, MS2840A, 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 MX269017A Vector Modulation Analysis software is a software option for performing modulation analysis of modulated signals.

The MX269017A provides the following measurement features.

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

“MS2830A-005/105/006/106/007/009/109” is required to use the MX269017A on MS2830A.

“MS2840A-005/105/006/106/009/109” is required to use the MX269017A on MS2840A.

1.2 Product Configuration

1.2.1 Standard configuration

Table 1.2.1-1 lists the standard configuration of the MX269017A.

Table 1.2.1-1 Standard configuration

Item	Model Name/Symbol	Product Name	Q'ty	Remarks
Application	MX269017A	Vector Modulation Analysis Software	1	
Accessory	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Options

Table 1.2.2-1 lists the options. They are sold separately.

Table 1.2.2-1 Options

Option Number	Product Name	MS2840A/ MS2850A	MS269xA/ MS2830A	Remarks
MX269017A-001	APSK Analysis	✓	–	
MX269017A-011	Higher-Order QAM Analysis	✓	–	
MX269017A-071	Single Carrier Block Transmission Analysis	✓ (MS2840A only)	✓ (MS2830A only)	
MX269017A-072	Single Carrier Block Transmission Carrier Select Filter	✓ (MS2840A only)	✓ (MS2830A only)	MX269017A-071 is required.

✓: Installable. –: Not installable.

1.2.3 Applicable parts

Table 1.2.3-1 lists the applicable parts for the MX269017A.

Table 1.2.3-1 Applicable parts

Model Name/Symbol	Product Name	Remarks
W3305AE	MX269017A Vector Modulation Analysis Software Operation Manual (Operation)	English, printed version
W3306AE	MX269017A Vector Modulation Analysis Software Operation Manual (Remote Control)	English, printed version

1.3 Specifications

Table 1.3.1-1 and Table 1.3.2-1 show the specifications for the MX269017A.

When MS269xA, MS2830A, MS2840A, or MS2850A is used, this software's specification is specified by the condition below, unless otherwise noted.

Attenuator Mode: Mechanical Atten Only

1.3.1 MX269017A-001/011/071 (Common item)

Table 1.3.1-1 Specifications

Item	Specification
Common Specifications	
Modulation method	BPSK, DBPSK, π/2DBPSK, QPSK, O-QPSK, DQPSK, π/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, H-CPM, MSK, 2ASK, 4ASK, MSK For MS2840A and MS2850A, the following modulation methods are available when the option is installed: 16APSK, 32APSK: With MX269017A-001 512QAM, 1024QAM, 2048QAM: With MX269017A-011 For MS2830A and MS2840A, the following modulation methods are available when the option is installed: Single Carrier Block Transmission (Refer to Table 1.3.2-1): With MX269017A-071

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th colspan="5">Specification</th></tr>
<tr><td rowspan="15">Frequency setting range</td><td colspan="5">MX269xA:</td></tr>
<tr><th colspan="4">Condition</th><th rowspan="2">Frequency setting range</th></tr>
<tr><th>Options</th><th>Modulation method</th><th>Measuring Object</th><th>Symbol Rate [symbol/s]</th></tr>
<tr><td rowspan="5">With 067/167</td><td rowspan="3">BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>Frame Format</td><td>>12.5 M</td><td rowspan="5">100 MHz to the upper limit of the main unit</td></tr>
<tr><td>Non-Formatted (Span Up=On)</td><td>>12.5 M</td></tr>
<tr><td>Non-Formatted (Span Up=Off)</td><td>>35 M</td></tr>
<tr><td>2FSK
4FSK</td><td>-</td><td>>6.25 M</td></tr>
<tr><td>O-QPSK</td><td>-</td><td>>3.125 M</td></tr>
<tr><td rowspan="5">Without 067/167</td><td rowspan="3">BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>Frame Format</td><td>>12.5 M</td><td rowspan="5">100 MHz to 6 GHz</td></tr>
<tr><td>Non-Formatted (Span Up=On)</td><td>>12.5 M</td></tr>
<tr><td>Non-Formatted (Span Up=Off)</td><td>>35 M</td></tr>
<tr><td>2FSK
4FSK</td><td>-</td><td>>6.25 M</td></tr>
<tr><td>O-QPSK</td><td>-</td><td>>3.125 M</td></tr>
<tr><td colspan="4">Other than above</td><td>100 kHz to the upper limit of the main unit</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th colspan="5">Specification</th></tr>
<tr><td rowspan="14">Frequency setting range</td><td colspan="5">MS2830A, MS2840A:</td></tr>
<tr><th colspan="4">Condition</th><th rowspan="2">Frequency setting range</th></tr>
<tr><th>Options</th><th>Modulation method</th><th>Measuring Object</th><th>Symbol Rate [symbol/s]</th></tr>
<tr><td rowspan="5">With 067/167</td><td rowspan="3">BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>Frame Format</td><td>>12.5 M</td><td rowspan="5">300 MHz to
the upper limit of the main unit</td></tr>
<tr><td>Non-Formatted (Span Up=On)</td><td>>12.5 M</td></tr>
<tr><td>Non-Formatted (Span Up=Off)</td><td>>35 M</td></tr>
<tr><td>2FSK
4FSK</td><td>-</td><td>>6.25 M</td></tr>
<tr><td>O-QPSK</td><td>-</td><td>>3.125 M</td></tr>
<tr><td rowspan="5">Without 067/167</td><td rowspan="3">BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>Frame Format</td><td>>12.5 M</td><td rowspan="5">300 MHz to
6 GHz or the upper limit of the main unit, whichever is lower.</td></tr>
<tr><td>Non-Formatted (Span Up=On)</td><td>>12.5 M</td></tr>
<tr><td>Non-Formatted (Span Up=Off)</td><td>>35 M</td></tr>
<tr><td>2FSK
4FSK</td><td>-</td><td>>6.25 M</td></tr>
<tr><td>O-QPSK</td><td>-</td><td>>3.125 M</td></tr>
<tr><td colspan="4">Other than above</td><td>100 kHz to
the upper limit of the main unit</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Frequency setting range</td><td>MS2850A:
<table>
<tr><th colspan="4">Condition</th><th rowspan="2">Frequency setting range</th></tr>
<tr><th>Options</th><th>Modulation method</th><th>Measuring Object</th><th>Symbol Rate [symbol/s]</th></tr>
<tr><td rowspan="5">With 067/167</td><td rowspan="3">BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>Frame Format</td><td>>12.5 M</td><td rowspan="5">300 MHz to the upper limit of the main unit</td></tr>
<tr><td>Non-Formatted (Capture OSR* = 4)</td><td>>12.5 M</td></tr>
<tr><td>Non-Formatted (Capture OSR* = 4)</td><td>>35 M</td></tr>
<tr><td>2FSK
4FSK</td><td>-</td><td>>6.25 M</td></tr>
<tr><td>O-QPSK</td><td>-</td><td>>3.125 M</td></tr>
<tr><td colspan="4">Other than above</td><td>100 kHz to the upper limit of the main unit</td></tr>
</table>
</td></tr>
</table>

*: Capture OSR: Capture Over Sampling Rate

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Measurement symbol rate range</td><td>
MS269xA:
<table>
<tr><th>Modulation method</th><th>Measurement symbol rate range [symbol/s]</th></tr>
<tr><td>BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>0.1 k to 12.5 M</td></tr>
<tr><td>2FSK
4FSK</td><td>0.1 k to 6.25 M</td></tr>
</table>
MS2830A, MS2840A, MS2850A:
<table>
<tr><th>Model</th><th colspan="2">Options</th></tr>
<tr><th>MS2830A, MS2840A</th><th>With 006/106</th><th>With 005/105 /007/009</th></tr>
<tr><th>MS2850A</th><th>Not required</th><th>Not required</th></tr>
<tr><th>Modulation method</th><th colspan="2">Measurement symbol rate range [symbol/s]</th></tr>
<tr><td>BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK
MSK</td><td>0.1 k to 5 M</td><td>0.1 k to 12.5 M</td></tr>
<tr><td>2FSK
4FSK</td><td>0.1 k to 2.5 M</td><td>0.1 k to 6.25 M</td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Symbol rate setting range</td><td>Earlier than Package V12.00.00:
<table>
<tr><th>Model</th><th colspan="4">Options</th></tr>
<tr><th>MS2830A</th><th>006/106</th><th>005/105
/007/009</th><th>007</th><th>078</th></tr>
<tr><th>MS2840A</th><th>006/106</th><th>005/105
009/109</th><th>077/177</th><th>078/178</th></tr>
<tr><th>MS269xA</th><th></th><th>Other than right</th><th>077/177</th><th>004/078
/178</th></tr>
<tr><th>Modulation method</th><th colspan="4">Symbol rate setting range [symbol/s]</th></tr>
<tr><td>BPSK
QPSK
π/4DQPSK
8PSK
16QAM
32QAM
64QAM
128QAM
256QAM
2ASK
4ASK</td><td>0.1 k to 5 M</td><td>0.1 k to 35 M
(Non-Formatted)

0.1 k to 12.5 M
(Frame Formatted)</td><td>0.1 k to 70 M
(Non-Formatted)

0.1 k to 25M
(Frame Formatted)</td><td>0.1 k to 140 M
(Non-Formatted)

0.1 k to 50 M
(Frame Formatted)</td></tr>
<tr><td>2FSK
4FSK</td><td>0.1 k to 2.5 M</td><td>0.1 k to 6.25 M</td><td>0.1 k to 12.5 M</td><td>0.1 k to 25 M</td></tr>
<tr><td>MSK</td><td>0.1 k to 5 M</td><td>0.1 k to 35 M
(Span Up=Off)

0.1 k to 12.5 M
(Span Up=On)</td><td>0.1 k to 70 M
(Span Up=Off)

0.1 k to 25 M
(Span Up=On)</td><td>0.1 k to 140 M
(Span Up=Off)

0.1 k to 50 M
(Span Up=On)</td></tr>
<tr><td>O-QPSK</td><td>0.1 k to 1.25 M</td><td>0.1 k to 3.125 M</td><td>0.1 k to 6.25 M</td><td>0.1 k to 12.5 M</td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Symbol rate setting range</td><td>
Package V12.00.00 and later:
<table>
<tr><th>Model</th><th colspan="4">Options</th></tr>
<tr><th>MS2830A</th><th>006/106</th><th>005/105
/007/009</th><th>007</th><th>078</th></tr>
<tr><th>MS2840A</th><th>006/106</th><th>005/105
009/109</th><th>077/177</th><th>078/178</th></tr>
<tr><th>MS269xA</th><th></th><th>Other than right</th><th>077/177</th><th>004/078
/178</th></tr>
<tr><td>Max. Sampling Rate (max. SP)</td><td>20 MHz</td><td>50 MHz</td><td>100 MHz</td><td>200 MHz</td></tr>
<tr><td>Max. Analysis Bandwidth (Span)</td><td>10 MHz</td><td>31.25 MHz</td><td>62.5 MHz</td><td>125 MHz</td></tr>
<tr><th>Capture OSR</th><th colspan="4">Max. Setting Symbol Rate [symbol/s]
(0.1 k to max. SP / Capture OSR)</th></tr>
<tr><td>32</td><td>0.625 M</td><td>1.5625 M</td><td>3.125 M</td><td>6.25 M</td></tr>
<tr><td>16</td><td>1.25 M</td><td>3.125 M</td><td>6.25 M</td><td>12.5 M</td></tr>
<tr><td>8</td><td>2.5 M</td><td>6.25 M</td><td>12.5 M</td><td>25 M</td></tr>
<tr><td>4</td><td>5 M</td><td>12.5 M</td><td>25 M</td><td>50 M</td></tr>
<tr><td>2</td><td>10 M</td><td>25 M</td><td>50 M</td><td>100 M</td></tr>
<tr><td>1</td><td>20 M</td><td>50 M</td><td>100 M</td><td>200 M</td></tr>
</table>
<table>
<tr><th>Model</th><th colspan="4">Options</th></tr>
<tr><th>MS2850A</th><th>032</th><th>033</th><th>034</th><th></th></tr>
<tr><td>Max. Sampling Rate (max. SP)</td><td>325 MHz</td><td>650 MHz</td><td>1300 MHz</td><td></td></tr>
<tr><td>Max. Analysis Bandwidth (Span)</td><td>255 MHz</td><td>510 MHz</td><td>1000 MHz</td><td></td></tr>
<tr><th>Capture OSR</th><th colspan="4">Max. Setting Symbol Rate [symbol/s]
(0.1 k to max. SP / Capture OSR)</th></tr>
<tr><td>32</td><td>10.15625 M</td><td>20.3125 M</td><td>40.625 M</td><td></td></tr>
<tr><td>16</td><td>20.3125 M</td><td>40.625 M</td><td>81.25 M</td><td></td></tr>
<tr><td>8</td><td>40.625 M</td><td>81.25 M</td><td>162.5 M</td><td></td></tr>
<tr><td>4</td><td>81.25 M</td><td>162.5 M</td><td>325 M</td><td></td></tr>
<tr><td>2</td><td>162.5 M</td><td>325 M</td><td>650 M</td><td></td></tr>
<tr><td>1</td><td>325 M</td><td>650 M</td><td>1300 M</td><td></td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Symbol rate setting range</td><td>
<table>
<tr><th>Capture OSR</th><th>Modulation method applied as default value</th></tr>
<tr><td>16</td><td>O-QPSK</td></tr>
<tr><td>8</td><td>2FSK, 4FSK, H-CPM</td></tr>
<tr><td>4</td><td>Other than above
(BPSK, DBPSK, π/2DBPSK, QPSK, DQPSK, π/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 512QAM, 1024QAM, 2048QAM, 2ASK, 4ASK, MSK, 16APSK, 32APSK)</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Modulation/Frequency Measurement</td></tr>
<tr><td>Measurement level range</td><td>–15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)
–25 to +10 dBm (at Pre-Amp On)</td></tr>
<tr><td>Carrier frequency accuracy
(BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, MSK)</td><td>After CAL execution at 18 to 28°C, For a signal of EVM = 1%
For Package V12.00.00 and later, Capture OSR = 4
(Without MS269xA-001, With MS2830A/MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Carrier frequency accuracy</th></tr>
<tr><td>MS269xA</td><td>Carrier Frequency:
30 MHz to 6.0 GHz
(Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.)</td><td>± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td>MS2830A, MS2840A</td><td>Carrier Frequency:
30 MHz to 3.5 GHz</td><td>± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td rowspan="2">MS2850A</td><td>Carrier Frequency:
30 MHz to 3.5 GHz
(Symbol rate:
4 ksps to 5 Msps)</td><td rowspan="2">± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td>Carrier Frequency:
800 MHz to 3.5 GHz
(Symbol rate:
5 to 50 Msps)</td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Carrier frequency accuracy
(π/4DQPSK, 2ASK, 4ASK)</td><td>After CAL execution at 18 to 28°C, For a signal of EVM = 1%
For Package V12.00.00 and later, Capture OSR = 4
(Without MS269xA-001, With MS2830A/MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Carrier frequency accuracy</th></tr>
<tr><td>MS269xA</td><td>Carrier Frequency:
30 MHz to 6.0 GHz
(Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.)</td><td>± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td rowspan="2">MS2830A,
MS2840A,</td><td>Carrier Frequency:
30 MHz to 3.5 GHz</td><td>± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td>Carrier Frequency:
5.7 to 5.9 GHz</td><td>± (accuracy of reference frequency × carrier frequency + 10 Hz)
(Nominal)</td></tr>
<tr><td rowspan="2">MS2850A</td><td>Carrier Frequency:
30 MHz to 3.5 GHz
(Symbol rate:
4 ksps to 5 Msps)</td><td rowspan="2">± (accuracy of reference frequency × carrier frequency + 10 Hz)</td></tr>
<tr><td>Carrier Frequency:
800 MHz to 3.5 GHz
(Symbol rate:
5 to 50 Msps)</td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

Item	Specification		
Carrier frequency accuracy (512QAM, 1024QAM, 2048QAM)	After CAL execution at 18 to 28°C, For a signal of EVM = 1% For Package V12.00.00 and later, Capture OSR = 4 (With MS2840A-002)		
	Model	**Condition**	**Carrier frequency accuracy**
	MS2840A (with MX269017A -011)	Carrier Frequency: 30 MHz to 3.5 GHz	± (accuracy of reference frequency × carrier frequency + 10 Hz)
	MS2850A (with MX269017A -011)	Carrier Frequency: 30 MHz to 3.5 GHz (symbol rate 500 ksps to 5 Msps)	± (accuracy of reference frequency × carrier frequency + 10 Hz)
		Carrier Frequency: 800 MHz to 3.5 GHz (symbol rate 5 to 50 Msps, and Equalizer = On)	± (accuracy of reference frequency × carrier frequency + 10 Hz)
Carrier frequency accuracy (16APSK, 32APSK)	After CAL execution at 18 to 28°C, For a signal of EVM = 1% For Package V12.00.00 and later, Capture OSR = 4 (With MS2840A-002)		
	Model	**Condition**	**Carrier frequency accuracy**
	MS2840A (with MX269017A -001)	Carrier Frequency: 30 MHz to 3.5 GHz	± (accuracy of reference frequency × carrier frequency + 10 Hz)
	MS2850A (with MX269017A -001)	Carrier Frequency: 30 MHz to 3.5 GHz (symbol rate 500 ksps to 5 Msps)	± (accuracy of reference frequency × carrier frequency + 10 Hz)
		Carrier Frequency: 800 MHz to 3.5 GHz (symbol rate 5 to 50 Msps	± (accuracy of reference frequency × carrier frequency + 10 Hz)

Table 1.3.1-1 Specifications (Cont’d)

<table>
<tr><th>Item</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="9">Residual EVM
(BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM)</td><td colspan="3">After CAL execution, input at 18 to 28°C, when:
Filter Type: Root Nyquist or Nyquist,
The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times
For Package V12.00.00 and later, Capture OSR = 4
(Without MS269xA-001, With MS2830A/MS2840A-002)</td></tr>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td rowspan="2">MS269xA</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 6 GHz
(Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.)</td><td><1.0% (rms)</td></tr>
<tr><td rowspan="2">MS2830A,
MS2840A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.5% (rms)</td></tr>
<tr><td rowspan="3">MS2850A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 5 to 50 Msps,
Carrier Frequency: 800 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Residual EVM
(π/4DQPSK)</td><td>After CAL execution, input at 18 to 28°C,
when: Filter Type: Root Nyquist or Nyquist,
The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times
For Package V12.00.00 and later, Capture OSR = 4
(Without MS269xA-001, With MS2830A/MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td rowspan="2">MS269xA</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 6 GHz
(Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.)</td><td><1.0% (rms)</td></tr>
<tr><td rowspan="3">MS2830A,
MS2840A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 5.7 to 5.9 GHz</td><td><1.5% (rms)
(Nominal)</td></tr>
<tr><td rowspan="3">MS2850A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 5 to 50 Msps,
Carrier Frequency: 800 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
</table>
</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="9">Residual EVM
(MSK)</td><td colspan="3">After CAL execution, input at 18 to 28°C,
when: Filter Type: Gaussian BT=0.5,
The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times
For Package V12.00.00 and later, Capture OSR = 4
(Without MS269xA-001, With MS2830A/MS2840A-002)</td></tr>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td rowspan="2">MS269xA</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 6 GHz
(Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.)</td><td><1.0% (rms)</td></tr>
<tr><td rowspan="2">MS2830A,
MS2840A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.5% (rms)</td></tr>
<tr><td rowspan="3">MS2850A</td><td>Symbol rate: 4 to 500 ksps,
Measurement time length: 50 ms or lower,
Carrier Frequency: 50 to 500 MHz</td><td><0.5% (rms)</td></tr>
<tr><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 5 to 50 Msps,
Carrier Frequency: 800 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Residual EVM
(512QAM, 1024QAM, 2048QAM,)</td><td>After CAL execution, input at 18 to 28°C, when: Measurement Filter Type: Root Nyquist, Reference Filter Type: Nyquist
The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times
For Package V12.00.00 and later, Capture OSR = 4
(With MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td>MS2840A (with MX269017A -011)</td><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td rowspan="2">MS2850A (with MX269017A -011)</td><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 5 to 50 Msps,
Carrier Frequency: 800 MHz to 3.5 GHz
(In the condition "Equalizer = On")</td><td><1.0% (rms)</td></tr>
</table></td></tr>
<tr><td>Residual EVM
(16APSK, 32APSK)</td><td>After CAL execution, input at 18 to 28°C, when: Measurement Filter Type: Root Nyquist, Reference Filter Type: Nyquist
The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times
For Package V12.00.00 and later, Capture OSR = 4
(With MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td>MS2840A (with MX269017A -001)</td><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td rowspan="2">MS2850A (with MX269017A -001)</td><td>Symbol rate: 500 ksps to 5 Msps,
Carrier Frequency: 50 MHz to 3.5 GHz</td><td><1.0% (rms)</td></tr>
<tr><td>Symbol rate: 5 to 50 Msps,
Carrier Frequency: 800 MHz to 3.5 GHz</td><td><1.5% (rms)</td></tr>
</table></td></tr>
</table>

Table 1.3.1-1 Specifications (Cont'd)

Item	Specification
Modulation/Frequency Measurement (Cont'd)	
Symbol rate error	After CAL execution at 18 to 28°C, according to the 10 MHz common reference*, when: Modulation Type: 2FSK, Filter Type: Gaussian, BT=0.5, Symbol Rate 100 ksps, slot length 160 symbol, The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 10 times For Package V12.00.00 and later, Capture OSR = 4 MS269xA: 30 MHz to 6 GHz, (Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.) MS2830A, MS2840A, MS2850A: 30 MHz to 3.5 GHz, Symbol rate error: <±1.0 ppm
Amplitude Measurement	
Measurement level range	MS269xA: –15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) –25 to +10 dBm (at Pre-Amp On) MS2830A, MS2840A, MS2850A: –15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)
Transmitter power accuracy	After CAL execution at 18 to 28°C, input attenuator ≥ 10 dB, SPAN ≤ 31.25 MHz, The signal measured is within the measurement level range and less than or equal to Input Level. MS269xA: 30 MHz to 6 GHz, (Note that a range of 3 GHz or above is not available when MS269xA-003 is installed and with Frequency Band Mode set to Spurious.) ± 0.6 dB (at Pre-Amp Off, or Pre-Amp not installed.) ± 1.1 dB (at Pre-Amp On) MS2830A, MS2840A, MS2850A: 30 MHz to 3.5 GHz, ± 0.6 dB (at Pre-Amp Off, or Pre-Amp not installed.) Transmitter power accuracy is calculated from an RSS (root summed square) error of the absolute amplitude accuracy and the in-band frequency characteristics.
Power meter measurement	Performs the power meter function of the standard function.

*: Connect 10 MHz Reference between signal source and signal analyzer.

1.3.2 MX269017A-071 Single Carrier Block Transmission Analysis

Table 1.3.2-1 Single Carrier Block Transmission Analysis Specifications

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Supported signals</td><td>The conditions for supported signals are as below.
• 1/4 or more symbols in one frame include pilots.
• Among the symbols including pilots, the pilots are mapped evenly onto 1/2 or more of all subcarriers and onto the subcarriers located at both ends of the symbols.</td></tr>
<tr><td>Subcarrier Spacing</td><td>10.0 kHz ≤ Subcarrier Spacing ≤ 18.0 kHz
Resolution: 0.5 kHz</td></tr>
<tr><td>FFT Size</td><td>64, 128</td></tr>
<tr><td>GI Size</td><td>6 ≤ GI Size ≤ 32
Resolution: 1</td></tr>
<tr><td>Primary modulation method</td><td>QPSK, 16QAM, 64QAM, 256QAM</td></tr>
<tr><td>Measurement level range</td><td>–15 to +30 dBm (Pre-amp Off, or Pre-amp not installed.)
–25 to +10 dBm (Pre-amp On)</td></tr>
<tr><td>Carrier frequency accuracy
(QPSK, 16QAM, 64QAM, 256QAM)</td><td>After CAL execution, at 18 to 28°C, and for a signal of EVM = 1%.
Capture OSR setting is excluded.
Without MX269017A-072,
or with MX269017A-072 and Multicarrier Filter is None.
(With MS2830A/MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Carrier frequency accuracy</th></tr>
<tr><td>MS2830A,
MS2840A</td><td>Carrier Frequency:
30 MHz to 3.5 GHz</td><td>±(Reference Frequency Accuracy
× Carrier Frequency + 10) Hz</td></tr>
</table></td></tr>
<tr><td>Modulation accuracy
(QPSK, 16QAM, 64QAM, 256QAM)</td><td>After CAL execution, at 18 to 28°C, Filter Type: None, The signal measured is within the measurement level range and less than or equal to Input Level, and Average = 20 times.
Capture OSR setting is excluded.
Without MX269017A-072,
or with MX269017A-072 and Multicarrier Filter is None.
(With MS2830A/MS2840A-002)
<table>
<tr><th>Model</th><th>Condition</th><th>Residual EVM</th></tr>
<tr><td>MS2830A,
MS2840A</td><td>Symbol rate: 500 ksps to 5 Msps
Carrier Frequency: 50 MHz to 3.5 GHz</td><td>< 1.5% (rms)</td></tr>
</table></td></tr>
</table>

1.3.3 MX269017A-072 Single Carrier Block Transmission Carrier Select Filter

Table 1.3.3-1 Single Carrier Block Transmission Carrier Select Filter Specifications

Item	Specification
Function	Performs filtering that removes the adjacent waves in the transmission characteristic evaluation of modulation signal in Single Carrier Block Transmission mode.
Remarks	Installing MX269017A-071 is required. If the adjacent waves are continuous signals or burst signals that do not synchronize with measurement target signals at the On/Off timings, the external triggers synchronized with the measurement target signals need to be used to measure the target signals.

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)*, *MS2840A 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

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), MS2840A 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.

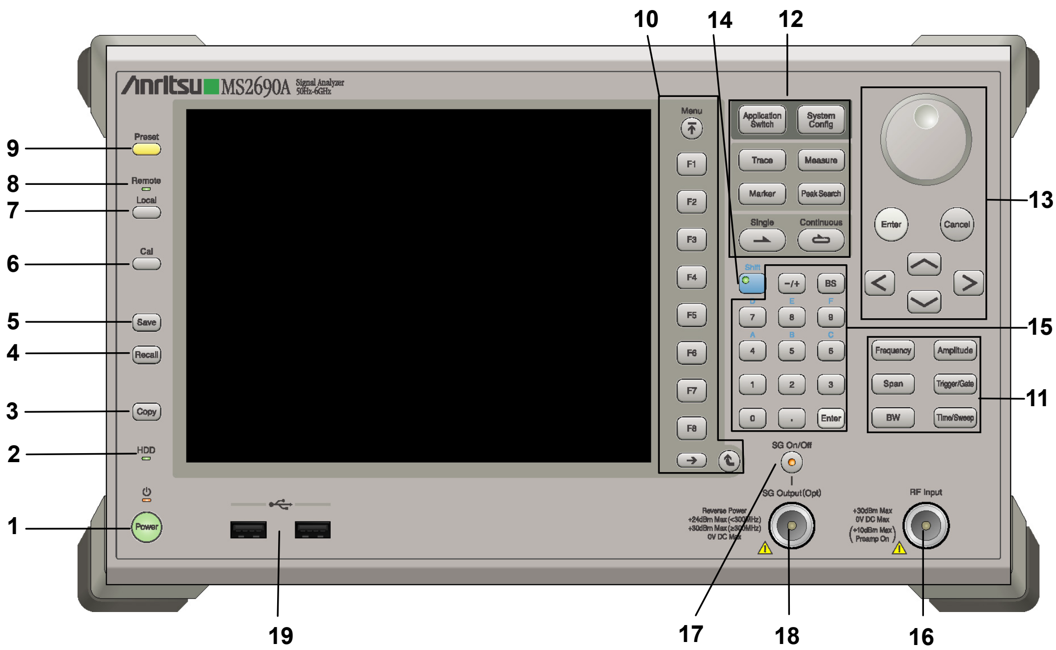


Figure 2.1.1-1 MS269x series front panel

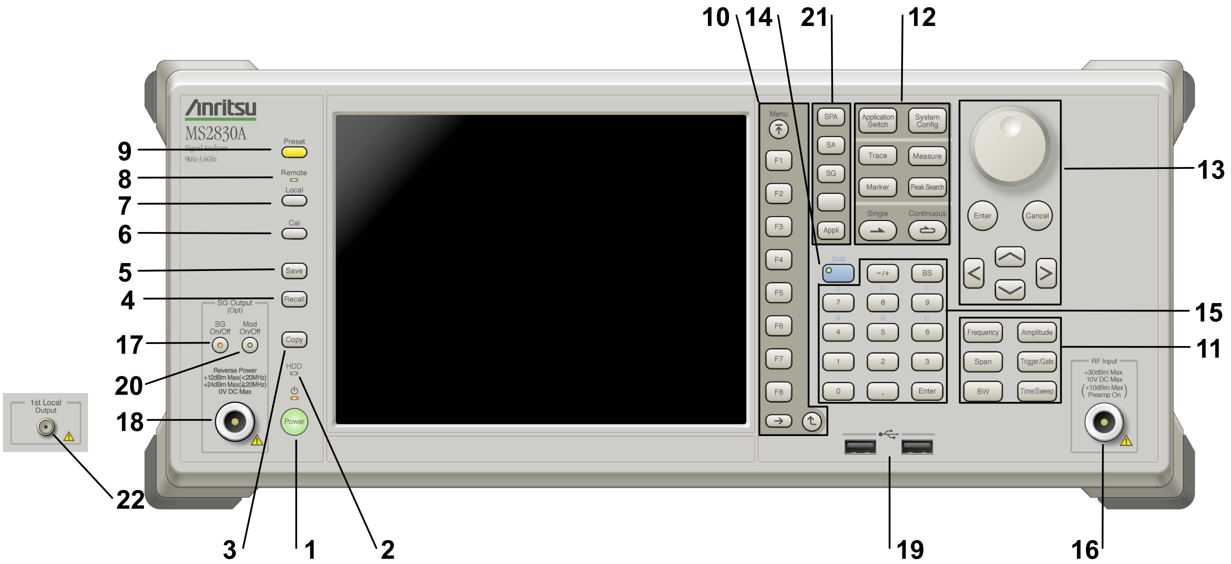
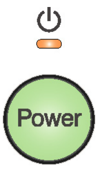


Figure 2.1.1-2 MS2830A/MS2840A/MS2850A front panel (MS2830A Example)

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 accessing the internal hard disk.

SSD access lamp (MS2840A, MS2850A)

Lights up when accessing the internal SSD.

3 

Copy key

Press to capture display screen and save to file.

4 

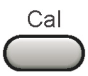
Recall key

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

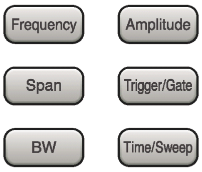
Function keys

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  to go back to the top menu.

11



Main function keys 1

Press to set or execute main functions.

<u>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.</u>

Frequency Press to set frequency parameters.

Amplitude Press to set level parameters.

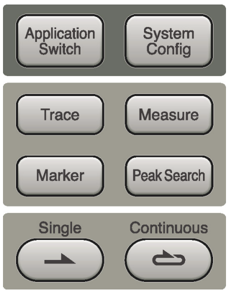
Span No function is assigned to this key.

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.

<u>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.</u>

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.

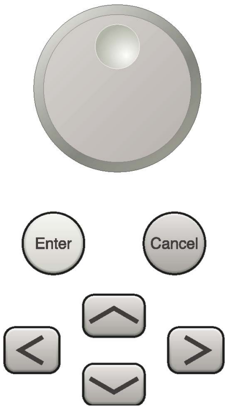
Marker Use when switching graph marker operation.

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



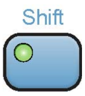
Rotary knob/Cursor key/Enter key/Cancel key

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

Press  to set the entered or selected data.

Press  to cancel input or selected data.

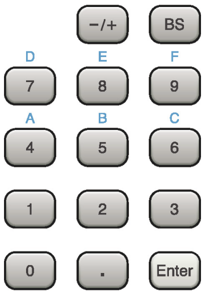
14



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.

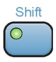
15



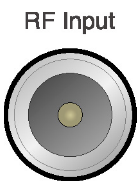
Numeric keypad

Enters numbers on parameter setup screens.

Press  to delete the last entered digit or character.

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

16



RF Input connector

Inputs RF signal. This is an N type input connector.
This is a K type input connector when MS2830A-045, MS2840A-046 is installed or MS2850A.

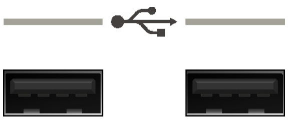
17

RF Output Control key (when MS269xA-020/120, MS2830A-020/120/021/121, MS2840A-020/120/021/121 is installed)

Press  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 any of these models: the MS2830A with MS2830A-044/045, the MS2840A with MS2840A-044/046, or the MS2850A.

18 

RF Output connector (when MS269xA-020/120, MS2830A-020/120/021/121, MS2840A-020/120/021/121 is installed)
Outputs RF signal, when the Vector Signal Generator option is installed.
This is an N type output connector.
This cannot be installed on any of these models: the MS2830A with MS2830A-044/045, the MS2840A with MS2840A-044/046, or 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, MS2840A-020/120/021/121 is 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 any of these models: the MS2830A with MS2830A-044/045, the MS2840A with MS2840A-044/046, or the MS2850A.

21

Application key (MS2830A, MS2840A, 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 MS2840A-005/105/006/106/009/109/077/177/078/178 is installed or MS2850A.

Press to display the Signal Generator main screen, when Vector Signal Generator option is installed. (MS2830A, MS2840A)

This is a blank key. Not used. (MS2830A, MS2840A)

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), MS2840A Signal Analyzer Operation Manual (Mainframe Operation),* or *MS2850A Signal Analyzer Operation Manual (Mainframe Operation).*

22

1st Local Output connector (MS2830A, MS2840A, MS2850A)

This is available when MS2830A-044/045, MS2840A-044/046 is installed, 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.

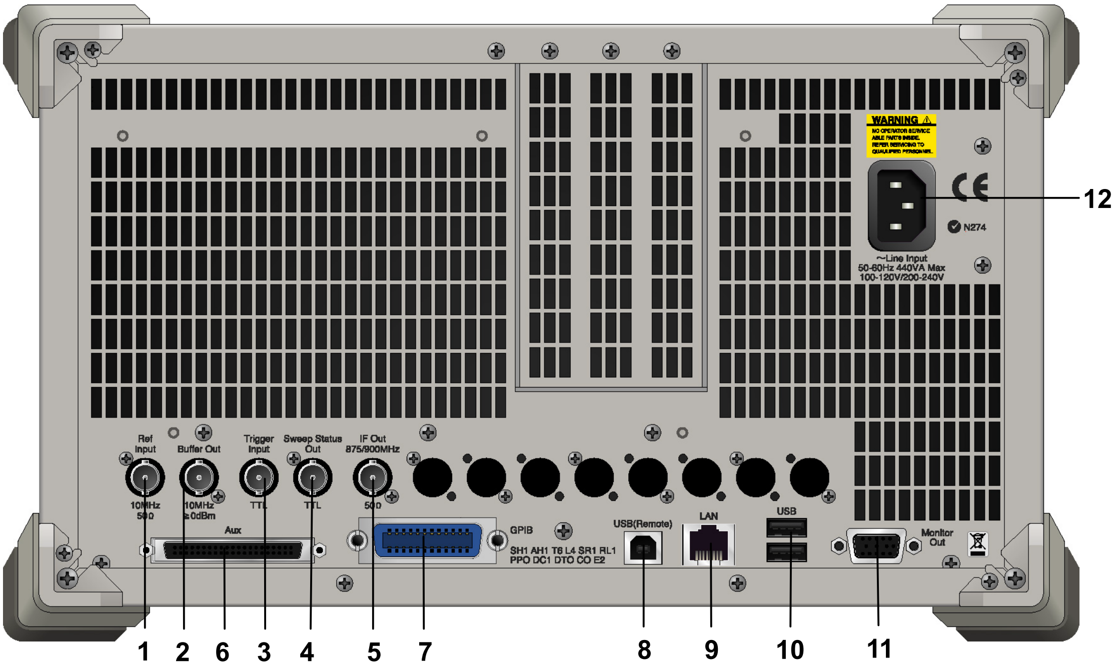


Figure 2.1.2-1 MS269x series rear panel

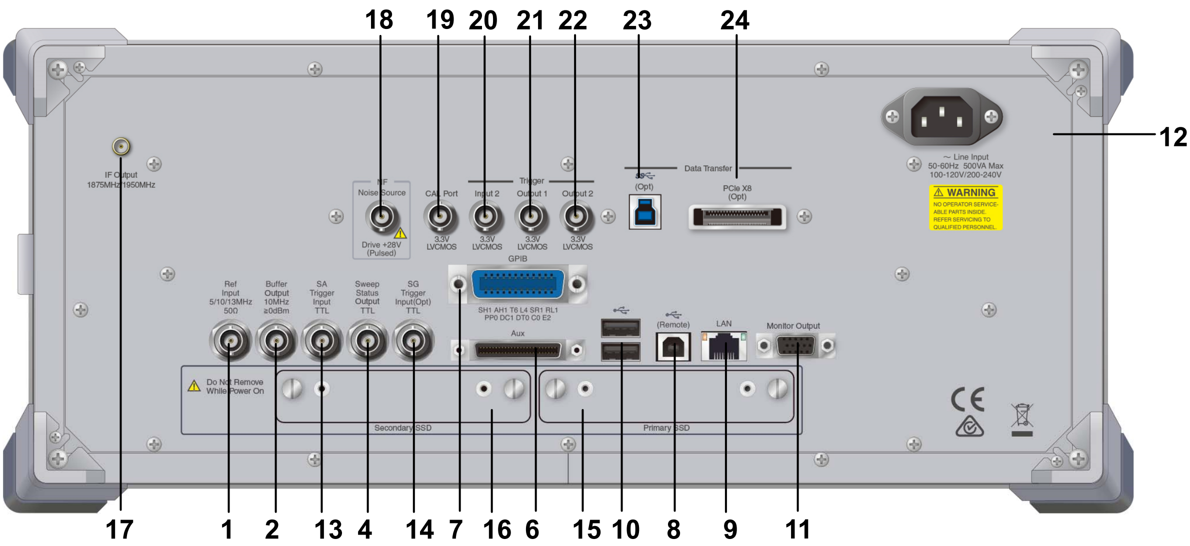


Figure 2.1.2-2 MS2830A/MS2840A/MS2850A rear panel (MS2850A Example)

1 Ref Input

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, MS2830A, MS2840A, or MS2850A to that of other equipment. The following frequencies are supported:

MS269x series:	10 MHz/13 MHz
MS2830A, MS2840A, MS2850A:	5 MHz/10 MHz/13 MHz

2 Buffer Out

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, MS2830A, MS2840A, or MS2850A.

3 Trigger Input

Trigger Input connector (MS269x series only)

Inputs trigger signal from external device.

4 Sweep Status Out

Sweep Status Out connector

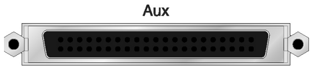
Outputs signal when internal measurement is performed or measurement data is obtained.

5 IF Out 875/900MHz

IF Out connector (MS269x series only)

Not used.

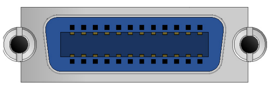
6 Aux



AUX connector

Not used.

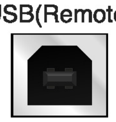
7 GP-IB



GPIB connector

For external control via GPIB.

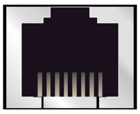
8 USB(Remote)



USB connector (type B)

For external control via USB.

9 LAN



Ethernet connector

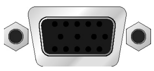
Connects PC or Ethernet network.

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, MS2840A, MS2850A)

This is a BNC connector for inputting external trigger signal (TTL) for SPA and SA applications.

14

SG Trigger Input connector (MS2830A, MS2840A)

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 (MS2840A, MS2850A)	This is a standard HDD This is a standard SSD slot.
16	**HDD(Opt)** or **Secondary HDD/SSD**	HDD slot for Option (MS2830A) SSD slot (MS2840A, MS2850A)	This is a HDD slot for the options. This is a SSD slot for the options.

17

IF output connector (MS2830A, MS2840A, MS2850A)

Monitor output of the internal IF signal.

This is installed when MS2830A-044/045, MS2840A-044/046 is installed or MS2850A.

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

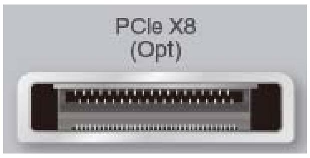
Trigger Output 2 connector (MS2850A)

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.

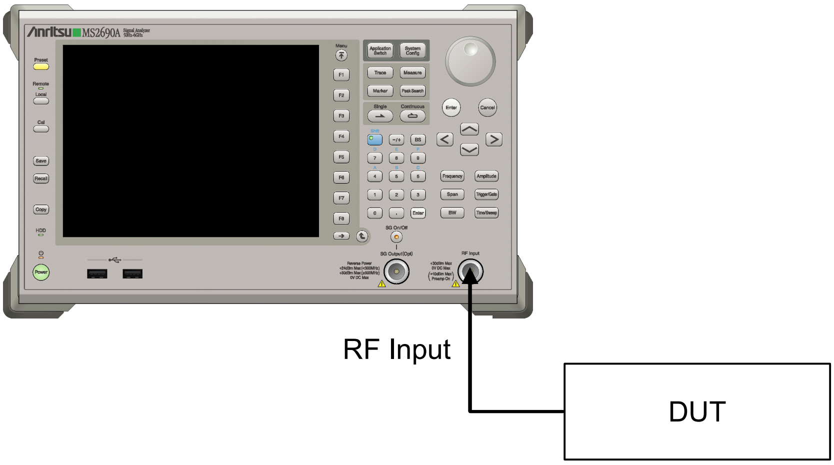


Figure 2.2-1 Signal path setup example

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

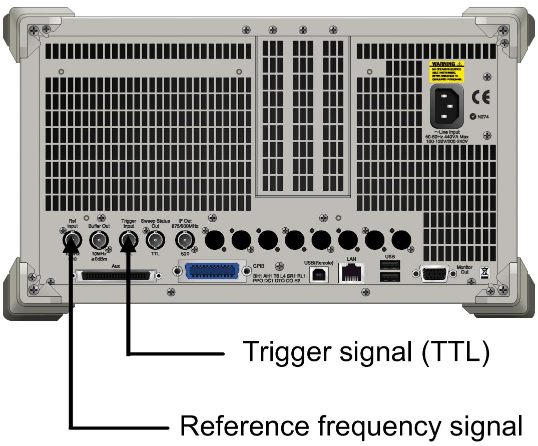


Figure 2.2-2 External signal input

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), MS2840A Signal Analyzer Operation Manual (Mainframe Operation), or MS2850A Signal Analyzer Operation Manual (Mainframe Operation).*

Chapter 3 Measurement

This chapter describes the measurement function, the parameter contents and the setting methods for the MX269017A.

3.1 Basic Operation

Note:

This application includes operations that are done using a mouse.

3.1.1 Screen layout

This section describes the screen layout of the MX269017A.

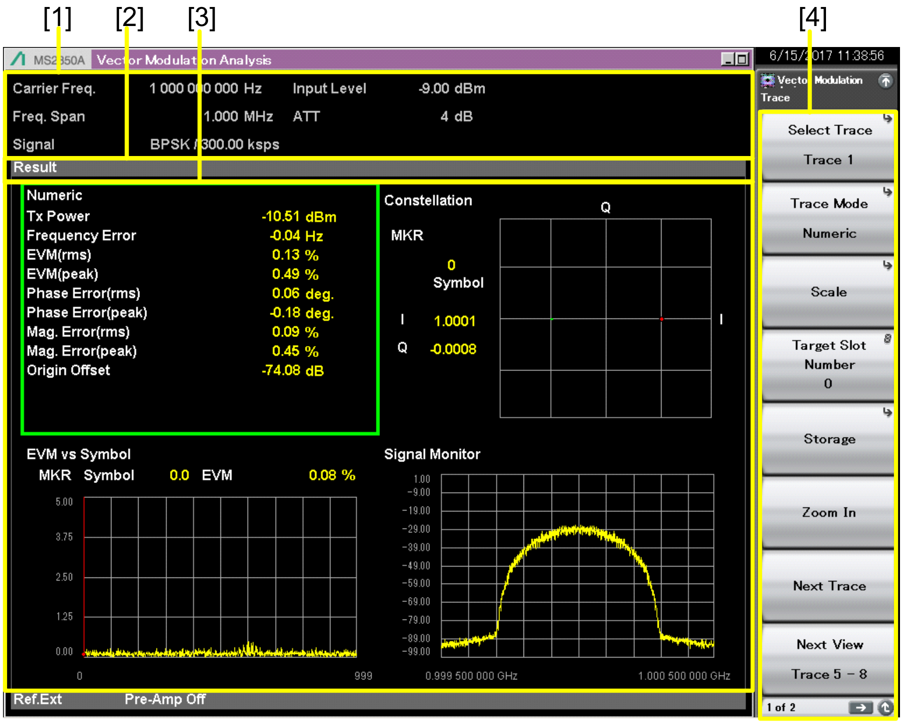


Figure 3.1.1-1 Screen Layout

[1] Measurement parameter
Displays the specified parameter.

[2] Status message
Displays signal status.

[3] Trace window
Displays the measurement results in the form of a four-trace split screen or one-trace screen. For a four-trace split screen, Trace 1 to 4 and Trace 5 to 8 are simultaneously displayed.

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

Figure 3.1.1-2 Trace Window (4-Split Screen)

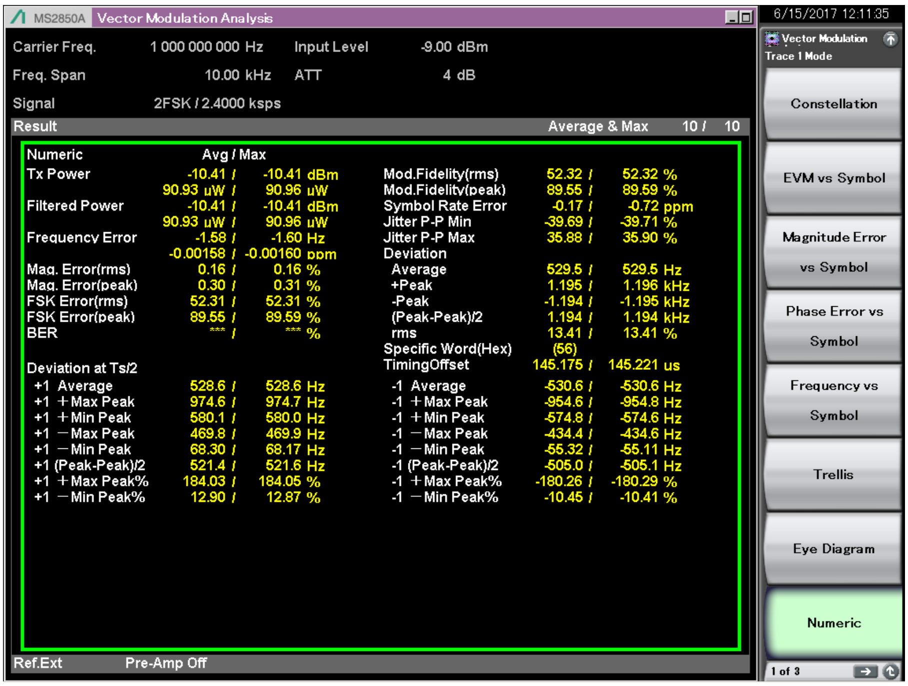


Figure 3.1.1-3 Trace Window (one-trace screen)

3.1.2 Main function menu

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

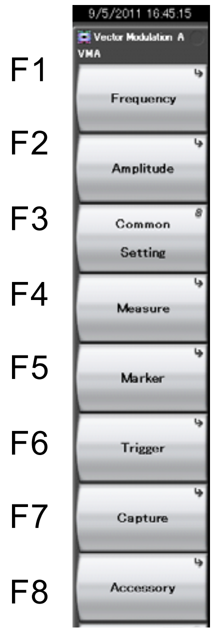


Figure 3.1.2-1 Main Function Menu

Table 3.1.2-1 Main Function Menu

Menu	Function
Frequency	Sets frequency 3.2 Setting Frequency
Amplitude	Sets level. 3.3 Setting Level
Common Setting	This sets common items. 3.4 Setting Common Items
Measure	Sets measurement items. 3.5 Setting Measurement Items
Marker	Sets a marker. 3.6 Setting markers
Trigger	Sets a trigger. 3.7 Setting Trigger
Capture	Recalls Capture function menu. 3.9 Setting Capture
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

The selected measurement items are measured only for the measurement count (Storage Count) before measurement is stopped.

<Procedure>

1. Press 

.

Continuous Measurement

The selected measurement items are continuously measured for the measurement count (Storage Count). Measurement will continue even if parameters are changed or the window display is changed. Measurement will be stopped if another application is selected.

<Procedure>

1. Press 

.

3.2 Setting Frequency

Press F1 (Frequency) in the main function menu to display the Frequency function menu. Pressing Frequency displays the Frequency function menu and opens the Carrier Frequency dialog box.

3.2.1 Carrier Frequency dialog box

Carrier Frequency

■ Summary

Sets a carrier frequency.

■ Setting range

100 kHz to upper limit depending on main unit
Note that this may be limited according to parameters that are dependent on each other.

3.4.6 Modulation

RF Spectrum

■ Summary

Sets whether to reverse the input signal IQ spectrum.

■ Setting options

Off: Measures without reversal
On: Measures with reversal

Preselector Auto Tune

■ Summary

Tunes the preselector peaking bias value automatically, and performs the preselector auto tuning.
Only available for MS2691A/MS2692A, MS2830A-044/045, MS2840A-044/046, or MS2850A-047/046.
This is not available when Span is 50 MHz or more.

3.2.2 Preselector function menu

Frequency Band Mode

■ Summary

Selects frequency band mode (Spurious or Normal). Only available for MS2691A/MS2692A-003, MS2830A-041/043/044/045, MS2840A-041/044/046, or MS2850A-047/046. Table 3.2-1 shows the preselector passthrough frequency when the frequency band mode is changed.

Table 3.2-1 Preselector Passthrough Low Frequency

Model	Frequency Band Mode	Preselector Passthrough Frequency
MS2691A/MS2692A	Normal	> 6.0 GHz
	Spurious	≥ 3.0 GHz
MS2830A	Normal	> 4.0 GHz
	Spurious	≥ 3.5 GHz
MS2840A	Normal	> 4.0 GHz
	Spurious	≥ 3.5 GHz
MS2850A	Normal	> 4.0 GHz
	Spurious	≥ 3.5 GHz

This cannot be selected when Span is 50 MHz or more. (Normal is internally selected.)

Micro Wave Preselector Bypass

■ Summary

Disables/enables the preselector bypass. This function is available with MS2692A-067/167, MS2830A-007/067/167, MS2840A-067/167, or MS2850A-047/046.

Note that the preselector is bypassed regardless of On/Off status, when Span is set to 50 MHz or more.

■ Setting options

Off: Does not bypass preselector.

On: Bypasses preselector

3.2.2 Preselector function menu

In addition, pressing F7 (Accessory) at the Main function menu displays the Accessory function menu for setting the following preselector items.

☞ 6.1 Selecting Other Functions

Preselector Auto Tune

■ Summary

Tunes the preselector peaking bias value automatically, and performs the preselector auto tuning.
Only available for MS2691A/MS2692A, MS2830A-044/045, MS2840A-044/046, or MS2850A-047/046.
Preselector auto tuning is not available in the following conditions.

- Option 007/067/167 is installed and Preselector Bypass is ON.
- Frequency Span is ≥ 50 MHz.
- When Frequency Band Mode is Normal and Center Frequency is ≤ 6.0 GHz
- When Frequency Band Mode is Spurious and Center Frequency is ≤ 4.0 GHz

Manual

■ Summary

Set the preselector peaking bias value to tune the preselector manually. Only available for MS2691A/MS2692A, MS2830A-044/045, MS2840A-044/046, or MS2850A-047/046.

■ Setting range

–128 to 127 MHz

■ Resolution

1 MHz

Preselector Tune Preset

■ Summary

Sets the preselector peaking bias value to factory shipment defaults.

3.3 Setting Level

Press F2 (Amplitude) in the main function menu to display the Amplitude function menu. Pressing Amplitude displays the Amplitude function menu and opens the Input Level dialog box.

Input Level

■ Summary

Sets the input level from the target DUT.

■ Setting range

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

Pre-Amp

■ Summary

Turns the Pre-Amp function On/Off. Pre-Amp can be set when MS269xA-008/108, MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 is installed.

■ Setting options

On, Off

Offset

■ Summary

Turns the Offset function On/Off.

■ Setting options

On, Off

Offset Value

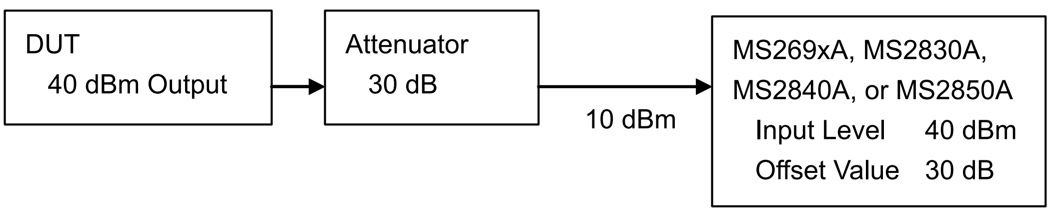
■ Summary

Sets the level offset coefficient.

■ Setting range

–99.99 to 99.99 dB

■ Setting example



3.4 Setting Common Items

Press F3 (Common Setting) on the main function menu to display the Common Setting dialog box.

For the common item settings, set the parameters required for modulation wave measurement.

For details about the settings while Replay function is being executed, refer to the following:

☞ 4.2.5 “Characteristics of Replayable IQ Data Files”

Note:

The common item settings require use of a mouse or keyboard.

3.4.1 Common Setting dialog box

This section describes the screen layout of the Common Setting dialog box:

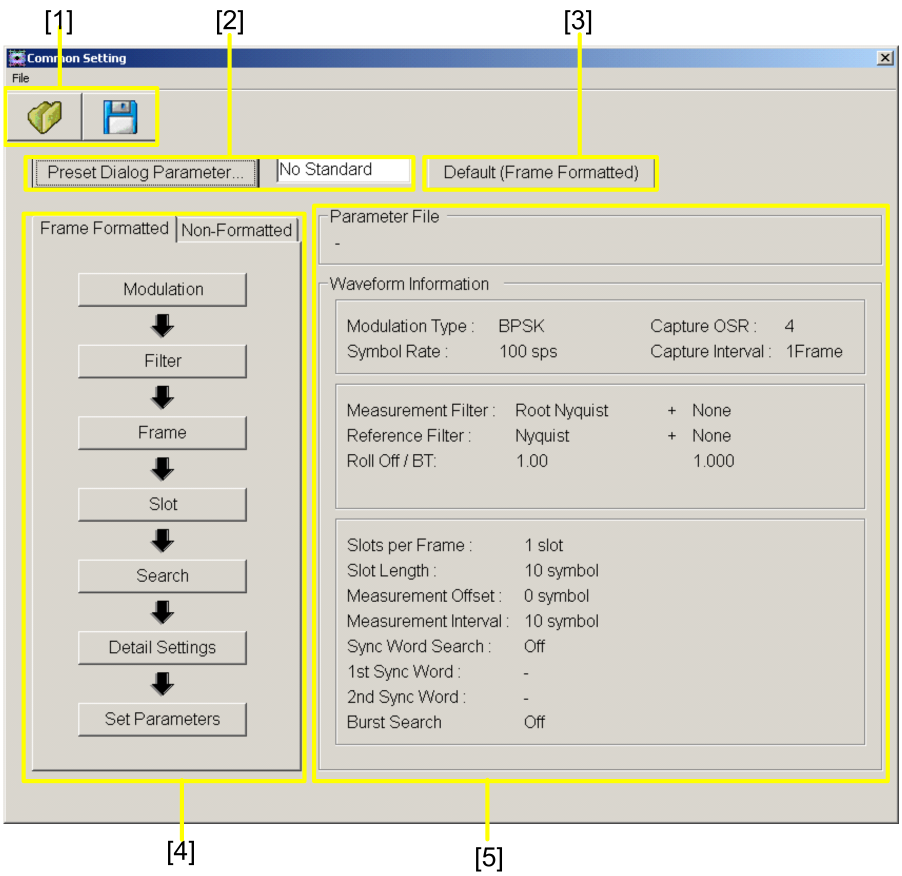


Figure 3.4.1-1 Common Setting Dialog Box

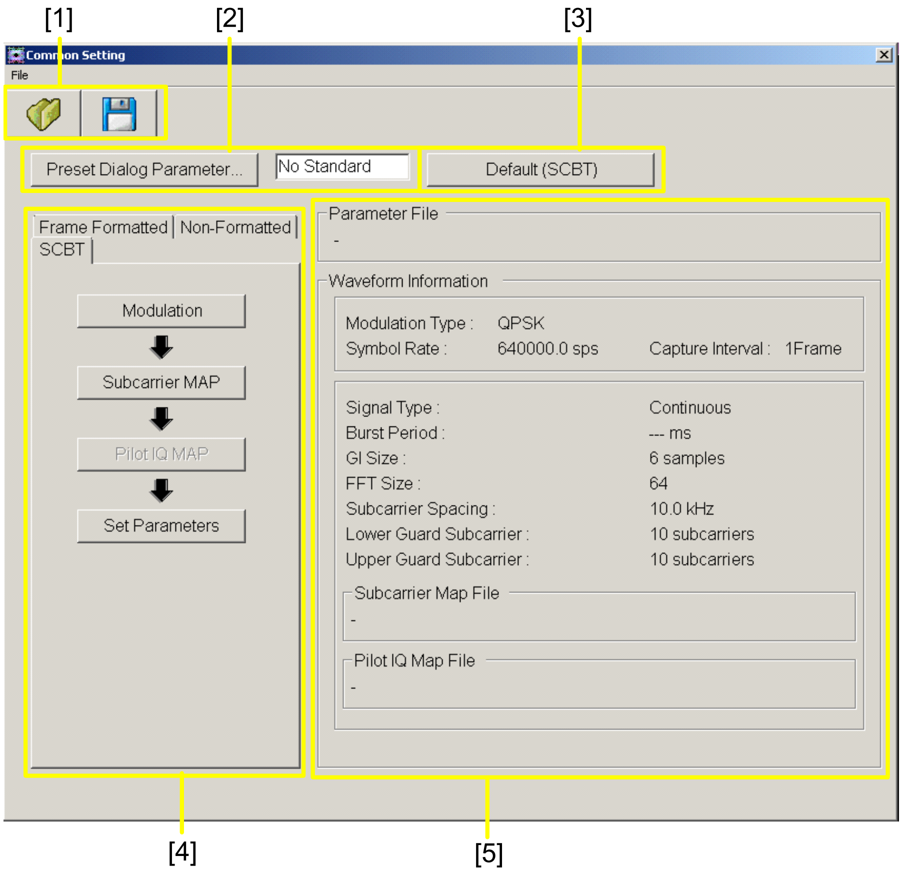


Figure 3.4.1-2 Common Setting Dialog Box (SCBT)

[1] Save/Recall button

Saves/recalls the common setting parameters.

☞ 3.4.2 Parameter Save/Recall

[2] Preset Dialog Parameter button

Recalls the preset parameters.

☞ 3.4.3 Preset Dialog Parameter

[3] Default button

Changes the values specified for the common setting parameters to the defaults.

☞ 3.4.4 Default

[4] Parameter setting buttons

Displays the dialog boxes for setting up the parameters.

☞ 3.4.5 Measuring Object
☞ 3.4.6 Modulation
☞ 3.4.7 Filter
☞ 3.4.8 Data
☞ 3.4.9 Frame
☞ 3.4.10 Slot
☞ 3.4.11 Search
☞ 3.4.12 Detail Settings
☞ 3.4.13 Set Parameters

Displays the dialog boxes for setting up the parameters (SCBT).

☞ 3.4.5 Measuring Object
☞ 3.4.6 Modulation
☞ 3.4.7 Filter
☞ 3.4.14 Subcarrier MAP
☞ 3.4.15 Pilot IQ MAP

[5] Displays the value specified for each parameter.

If a parameter is not specified, the value for that parameter is displayed as a hyphen.

Table 3.4.1-1 Description of Parameters

Parameter Name	General Information
Parameter File	Displays the name of the parameter file whose parameters have been recalled.
Modulation Type	Displays the modulation scheme.
Symbol Rate	Displays the symbol rate.
Capture OSR	Displays the over sampling rate when capturing the reception signal.
Capture Interval	Sets the capture interval for one measurement.
Measurement Filter	Shows the filter setting of the reception signal.
Reference Filter	Shows the filter setting of the reference signal.
Roll Off / BT	Displays the Roll Off rate and/or BT of the measurement filter and reference filter.
Slots per Frame	Displays the number of slots per frame.
Slot Length	Displays the number of symbols per slot.
Measurement Offset	Displays the measurement start position in symbols.
Measurement Interval	Displays the measurement interval.
Sync Word Search	Displays whether sync word search can be executed.
1st Sync Word	Displays the 1st sync word pattern.
2nd Sync Word	Displays the 2nd sync word pattern.
Burst Search	Displays whether burst search can be executed.

Table 3.4.1-2 Description of Parameters (SCBT)

Parameter Name	General Information
Parameter File	Displays the name of the parameter file whose parameters have been recalled.
Modulation Type	Displays the modulation scheme.
Symbol Rate	Displays the symbol rate.
Capture Interval	Sets the capture interval for one measurement.
Measurement Filter	Displays the Multicarrier Filter settings.
Signal Type	Displays if the measurement signal is a continuous or burst signal.
Burst Period	Displays the burst period.
GI Size	Displays the GI size.
FFT Size	Displays the FFT size.
Subcarrier Spacing	Displays the subcarrier spacing.
Lower Guard Subcarrier	Displays the lower guard subcarrier.
Upper Guard Subcarrier	Displays the upper guard subcarrier.
Subcarrier Map File	Displays the name of the selected subcarrier map file.
Pilot IQ Map File	Displays the name of the selected Pilot IQ Map file.

3.4.2 Parameter Save/Recall

How to save parameters to or recall parameters from a file is described below.

Parameter Save

To display Save Parameter File dialog box, do one of the followings:

- Press the **Save** button  in the Common Setting dialog box.
- Select **Save Parameter File** from the **File** menu.

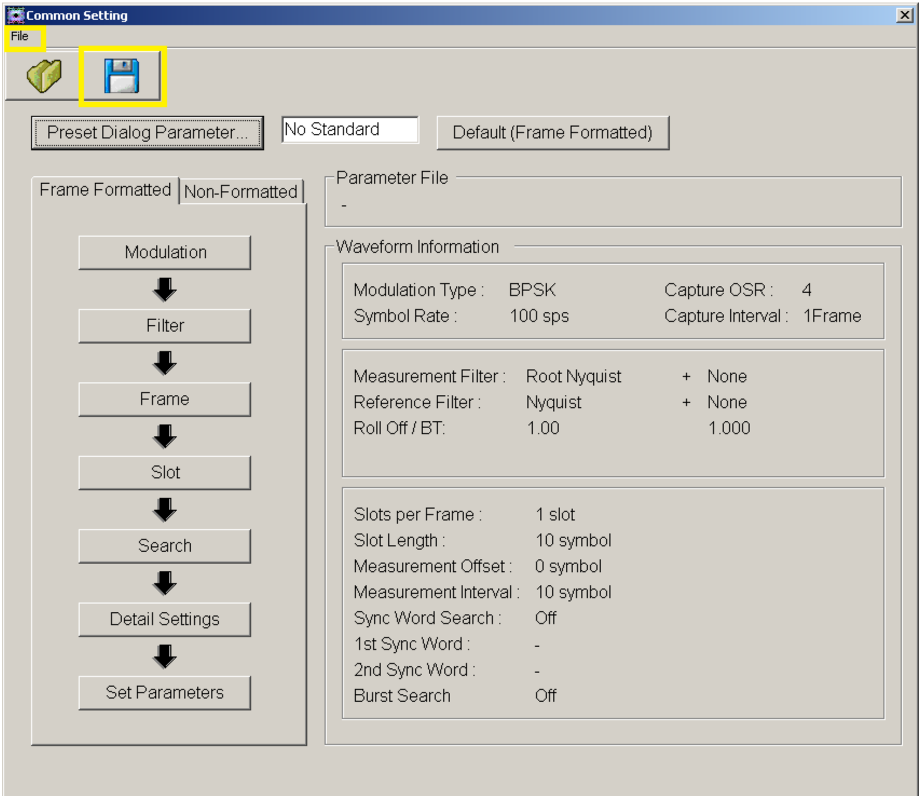


Figure 3.4.2-1 Common Setting Dialog Box (Save Parameter)

Specify any file name and then press **Save** to save the common setting parameters. The file can be saved at any location.

Recalling Parameter

To display Recall Parameter File dialog box, do one of the followings:

- Press the Recall button  in the Common Setting dialog box.
- Select **Recall Parameter File** from the **File** menu.

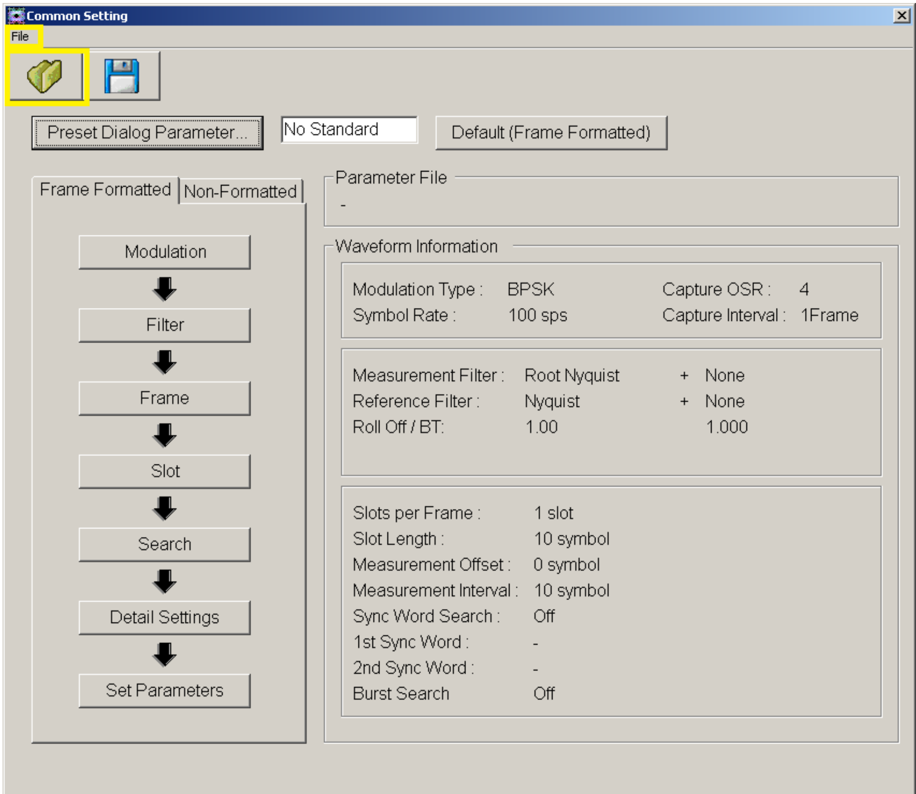


Figure 3.4.2-2 Common Setting Dialog Box (Recall Parameter)

Specify the file to be recalled and then press **Open** to recall the common setting parameters from the file.

3.4.3 Preset Dialog Parameter

Recall the parameters corresponding to the various standards. Click the **Preset Dialog Parameter** button and select from the parameter sets (Predefined setting values) displayed.

For the standards and parameter values, refer to Appendix C.

☞ Appendix C List of Predefined Setting Values

3.4.4 Default

Change the values of the common setting parameters to the defaults.

If **Frame Formatted** is selected for the signal to be measured, change the **Frame Formatted** values to the defaults.
If **Non-Formatted** is selected, change the **Non-Formatted** values to the defaults.
If **SCBT** is selected, change the **SCBT** values to the defaults.

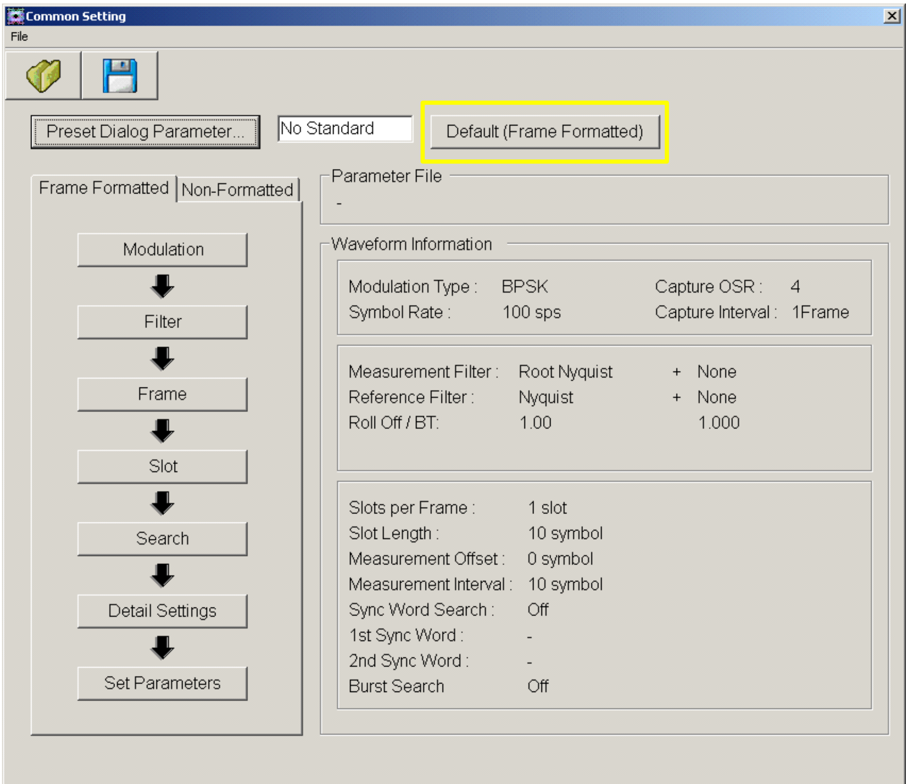


Figure 3.4.4-1 Common Setting Dialog Box (Default button)

3.4.5 Measuring Object

Select the format of the signal to be measured. If the signal to be measured has a frame structure, which part of the signal to analyze can be specified by setting the frame structure parameters.

■ Setting options

Frame Formatted	Select this tab if the measured signal has a frame structure.
Non-Formatted	Select this tab if the measured signal does not have a frame structure.
SCBT	Select this tab if the measured signal is in SCBT (Single Carrier Block Transmission) mode. SCBT can be selected when the MX269017A-071 is installed.

To specify the settings, click the relevant tab in the Common Setting dialog box.

If **Non-Formatted** is selected, the **Frame**, **Slot**, and **Search** parameters are not set. When **SCBT** is selected, only **Modulation** parameters, **Subcarrier Map** parameters, **Pilot IQ Map** parameters, and **Set Parameters** are displayed.

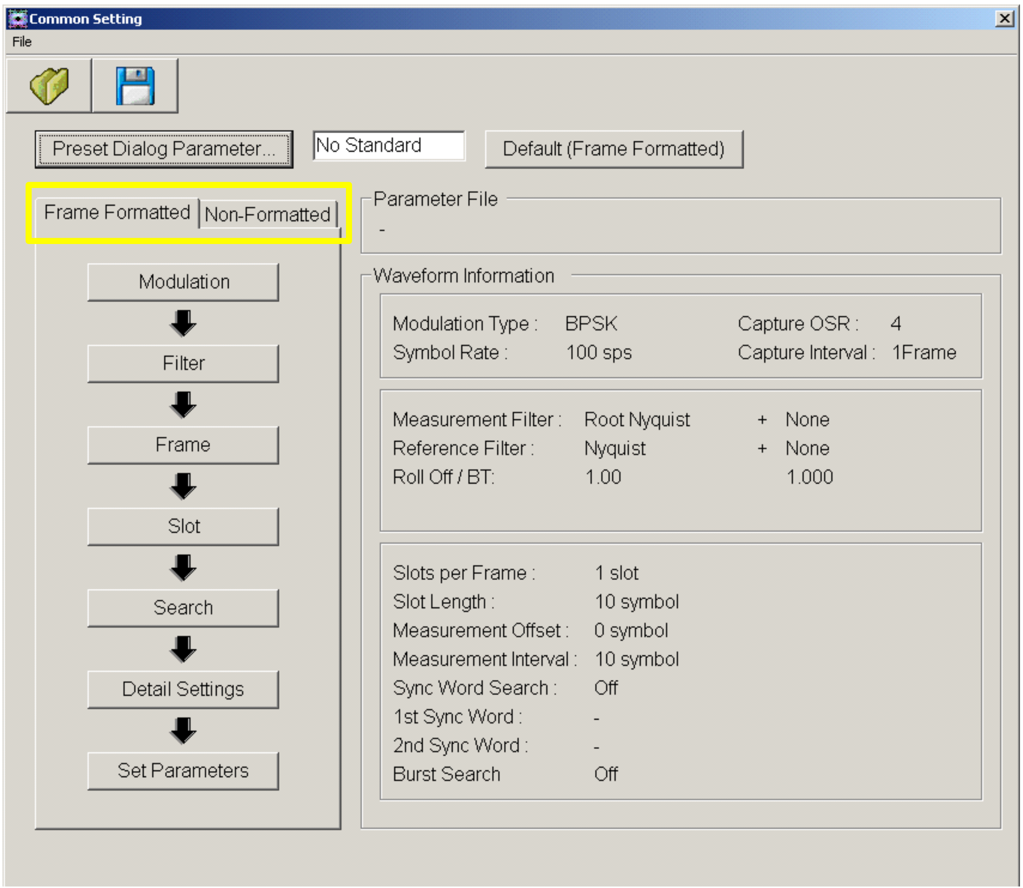


Figure 3.4.5-1 Common Setting Dialog Box, when MX269017A-071 is not installed

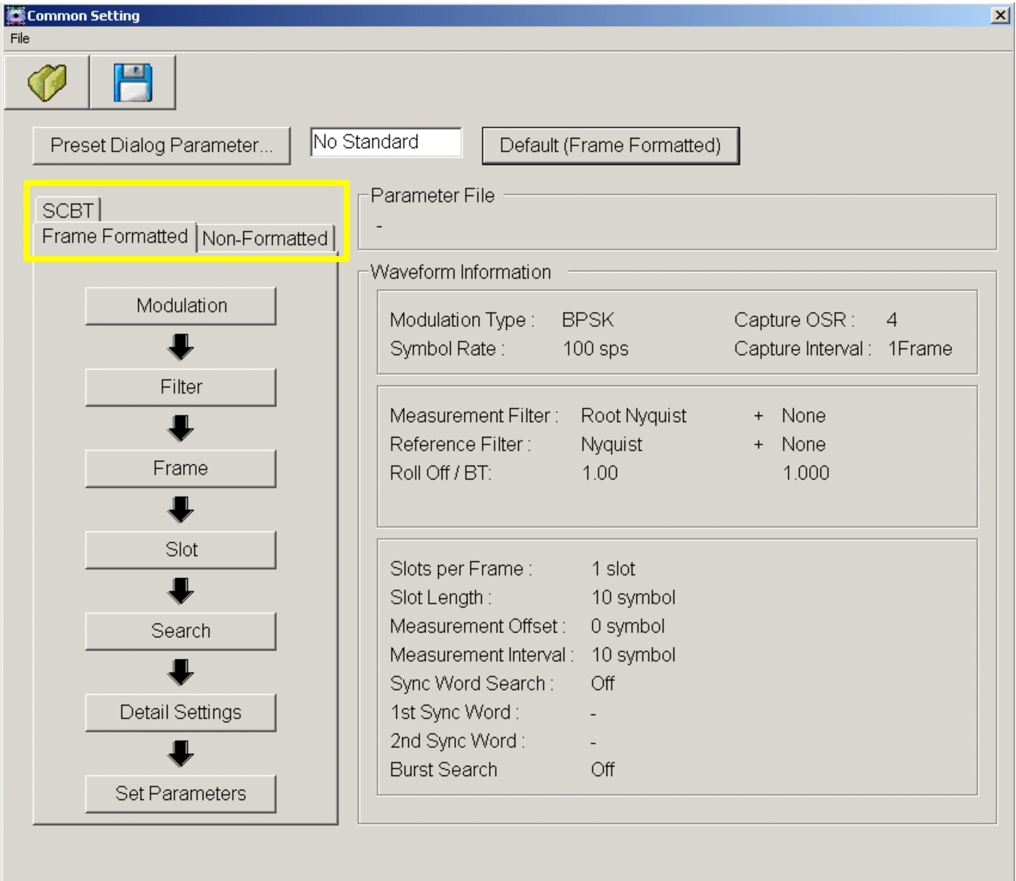


Figure 3.4.5-2 Common Setting Dialog Box, when MX269017A-071 is installed

3.4.6 Modulation

Press the **Modulation** button in the Common Setting dialog box to display the modulation parameter setting dialog box.

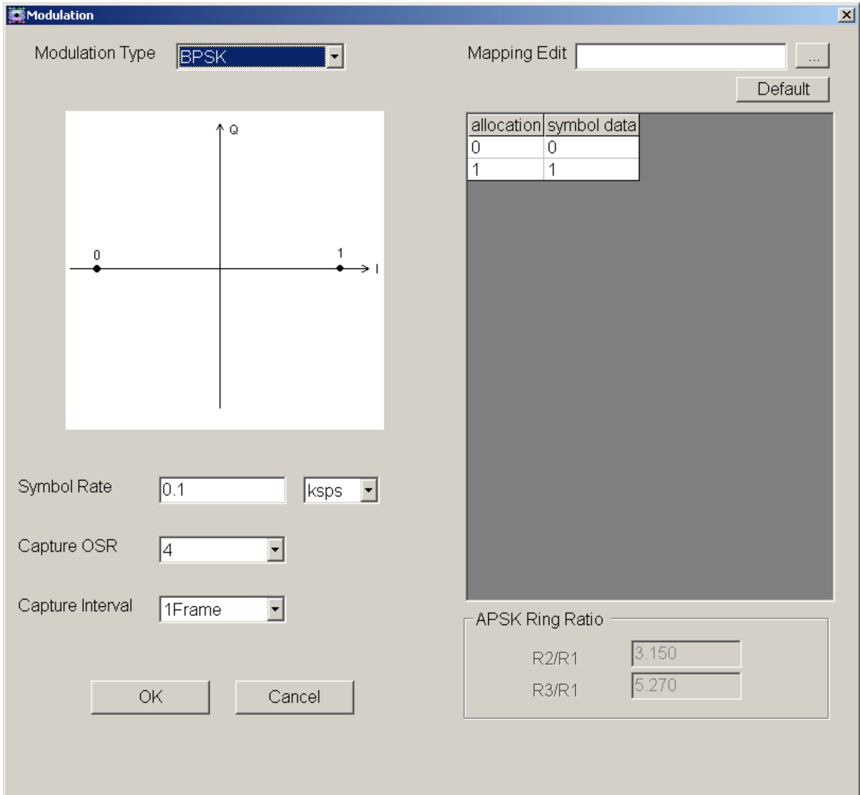


Figure 3.4.6-1 Modulation Parameter Setting Dialog Box

When **SCBT** is selected, the Modulation Parameter Setting dialog box is displayed as the figure below. When **SCBT** is selected, only the following parameters can be set.

- Modulation Type
- Signal Type
- Burst Period
- GI Size
- FFT Size
- Subcarrier Spacing
- Lower Guard Subcarrier
- Uppwer Guard Subcarrier

When **SCBT** is selected, the symbol rate is calculated automatically by the following formula and cannot be set manually. Also, Span is constantly 5 MHz.

Symbol Rate = FFT Size × Subcarrier Spacing

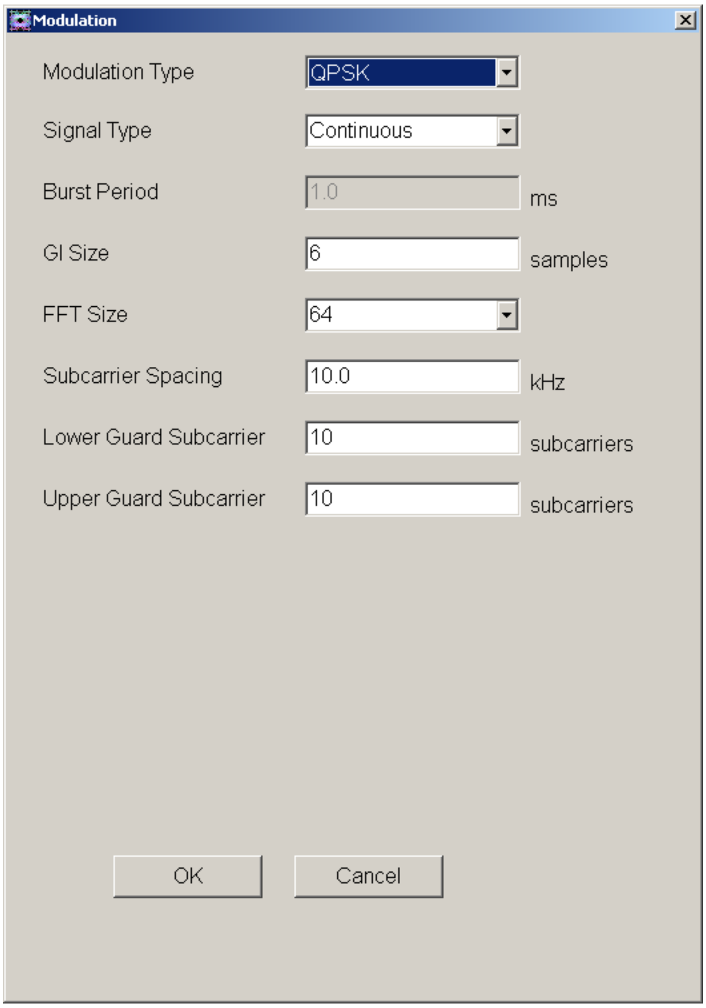


Figure 3.4.6-2 Modulation Parameter Setting Dialog Box (SCBT)

Modulation Type

■ Summary

Select the modulation type for the measured signal.
Select primary modulation type when SCBT is selected.

■ Setting options

BPSK	Measures the signal as a BPSK-modulated signal.
DBPSK	Measures the signal as a DBPSK-modulated signal.
PI/2DBPSK	Measures the signal as a π/2DBPSK-modulated signal.
QPSK	Measures the signal as a QPSK-modulated signal.
O-QPSK	Measures the signal as a Offset-QPSK-modulated signal.
DQPSK	Measures the signal as a DQPSK-modulated signal.
PI/4DQPSK	Measures the signal as a π/4DQPSK-modulated signal.
8PSK	Measures the signal as an 8PSK-modulated signal.
D8PSK	Measures the signal as a D8PSK-modulated signal.
16QAM	Measures the signal as a 16QAM-modulated signal.
32QAM	Measures the signal as a 32QAM-modulated signal.

64QAM	Measures the signal as a 64QAM-modulated signal.
128QAM	Measures the signal as a 128QAM-modulated signal.
256QAM	Measures the signal as a 256QAM-modulated signal.
2FSK	Measures the signal as a 2-value FSK-modulated signal.
4FSK	Measures the signal as a 4-value FSK-modulated signal.
H-CPM	Measures the signal as a H-CPM-modulated signal. (Used for Inbound measurement of APCO-P25 Phase2)
2ASK	Measures the signal as a 2-value ASK-modulated signal.
4ASK	Measures the signal as a 4-value ASK-modulated signal.
MSK	Measures the signal as a MSK-modulated signal.

Installed MX269017A-001 in MS2840A/MS2850A

16APSK	Measures the signal as a 16APSK-modulated signal
32APSK	Measures the signal as a 32APSK-modulated signal

Installed MX269017A-011 in MS2840A/MS2850A

512QAM	Measures the signal as a 512QAM-modulated signal
1024QAM	Measures the signal as a 1024QAM-modulated signal
2048QAM	Measures the signal as a 2048QAM-modulated signal

Only the following options are displayed when SCBT is selected.

QPSK	Measures the signal as a QPSK-primary modulated signal
16QAM	Measures the signal as a 16QAM-primary modulated signal
64QAM	Measures the signal as a 64QAM-primary modulated signal
256QAM	Measures the signal as a 256QAM-primary modulated signal

☞ 1.2.2 Options

Auto (Deviation Auto Detection)

■ Summary

Selects Deviation mode.

■ Setting options

Selected	Detects Deviation automatically.
Cleared	Uses a user-specified value as Deviation.

Modulation Index

■ Summary

Sets the modulation index for the 2FSK signal.

■ Setting range

0.20 to 10.00

Maximum Frequency Deviation

■ Summary

Sets the maximum frequency Deviation for the 4FSK signal.

■ Setting range

120 to 300000 Hz

Mapping Edit

■ Summary

Mapping Edit is used to change the bit value in the symbol data column corresponding to that in the allocation column from the default setting.

The setting is changed by recalling the file that specifies the bit value in the symbol data column corresponding to that in the allocation column.

For the file format details, refer to “Appendix B.2 Mapping Edit Setting File Description Method”.

Mapping Edit function is available when Frame Formatted is selected for Measuring Object.

Symbol Rate

■ Summary

Sets the symbol rate of the measured signal.

■ Setting range

Table 3.4.6-1 shows the setting ranges. Note the frequency range shall be limited according to the installed options.
The entire measurement signal must not exceed the analysis bandwidth (SPAN) to perform the measurement correctly.

■ Resolution

0.1 sps

Table 3.4.6-1 Setting Range of Symbol Rate (Earlier than Package V12.00.00)

Model	Options			
MS2830A	006/106	005/105 /007/009	077	078
MS2840A	006/106	005/105 /009/109	077/177	078/178
MS269xA		Other than right	077/177	004/078/178
Modulation type	**Symbol rate setting range [symbol/s]**			
BPSK QPSK π/4DQPSK 8PSK 16QAM 32QAM 64QAM 128QAM 256QAM 2ASK 4ASK	0.1 k to 5M	0.1 k to 35 M (Non-Formatted) 0.1 k to 12.5 M (Frame Formatted)	0.1 k to 70 M (Non-Formatted) 0.1 k to 25 M (Frame Formatted)	0.1 k to 140 M (Non-Formatted) 0.1 k to 50M (Frame Formatted)
2FSK 4FSK H-CPM	0.1 k to 2.5 M	0.1 k to 6.25 M	0.1 k to 12.5 M	0.1 k to 25 M
MSK	0.1 k to 5 M	0.1 k to 35 M (Span Up=Off) 0.1 k to 12.5 M (Span Up=On)	0.1 k to 70 M (Span Up=Off) 0.1 k to 25 M (Span Up=On)	0.1 k to 140 M (Span Up=Off) 0.1 k to 50 M (Span Up=On)
O-QPSK	0.1 k to 1.25 M	0.1 k to 3.125 M	0.1 k to 6.25 M	0.1 k to 12.5 M

Table 3.4.6-2 Setting Range of Symbol Rate 1/2 (Package V12.00.00 and Later)

Model	**Options**			
MS2830A	**006/106**	**005/105 /007/009**	**077**	**078**
MS2840A	**006/106**	**005/105 /009/109**	**077/177**	**078/178**
MS269xA		**Other than right**	**077/177**	**004/078/178**
Max. Sampling Rate (max. SP)	20 MHz	50 MHz	100 MHz	200 MHz
Max. Analysis Bandwidth (Span)	10 MHz	31.25 MHz	62.5 MHz	125 MHz
Capture OSR	**Max. Setting Symbol Rate [symbol/s] (0.1 k to max. SP / Capture OSR)**			
32	0.625 M	1.5625 M	3.125 M	6.25 M
16	1.25 M	3.125 M	6.25 M	12.5 M
8	2.5 M	6.25 M	12.5 M	25 M
4	5 M	12.5 M	25 M	50 M
2	10 M	25 M	50 M	100 M
1	20 M	50 M	100 M	200 M

Table 3.4.6-3 Setting Range of Symbol Rate 2/2 (Package V12.00.00 and Later)

Model	**Options**			
MS2850A	**032**	**033**	**034**	
Max. Sampling Rate (max. SP)	325 MHz	650 MHz	1300 MHz	
Max. Analysis Bandwidth (Span)	255 MHz	510 MHz	1000 MHz	
Capture OSR	**Max. Setting Symbol Rate [symbol/s] (0.1 k to max. SP / Capture OSR)**			
32	10.15625 M	20.3125 M	40.625 M*	
16	20.3125 M	40.625 M	81.25 M*	
8	40.625 M	81.25 M	162.5 M*	
4	81.25 M	162.5 M	325 M*	
2	162.5 M	325 M	650 M*	
1	325 M	650 M	1300 M*	

*: This can be set when Carrier Frequency is 4.2 GHz or more.

Span Up

■ Summary

Defines the span width for the symbol rate when **Modulation Type** is other than 2FSK, 4FSK, H-CPM, O-QPSK. In the Package V12.00.00 and later, the span width is not displayed and Capture OSR is displayed.

■ Setting range

When selected: Wide span width
When not selected: Narrow span width

Capture OSR

■ Summary

Sets the over sampling rate when capturing the reception signal. The reception bandwidth (SPAN) of the measuring instrument is changed using this parameter.

Table 3.4.6-4 lists the operations.
When a value has not been set, the parameter in the CommonSetting file is used as the default value.

When an out-of-range value is set, the value is changed to the optimal value. However, the measurement may not be performed correctly depending on the status of the reception signal.

Table 3.4.6-4 Operation of Capture OSR

Function	Operation of Capture OSR	
	When Decreasing Capture OSR	When Increasing Capture OSR
Reception bandwidth	Narrowed	Widened
Sampling rate	Decreased	Increased
Capture waveform size	Decreased	Increased
Frequency error detection range	Narrowed	Widened
Analysis speed	Increased	Decreased

■ Setting range

1 to 32
The upper limit value is limited by the main-frame hardware option.

■ Default

Table 3.4.6-5 lists the default values.

Table 3.4.6-5 Capture OSR Default Value

Modulation Type	Capture OSR Default Value
2FSK, 4FSK, HCPM	8
OQPSK	16
Other than those above	4

Span

■ Summary

This value is used in the measuring instrument. This value is calculated based on the **Modulation Type** and **Symbol Rate**. For Package V12.00.00 and later, this value is calculated based on **Capture OSR**.

It is calculated as follows:

Table 3.4.6-6 When Modulation Type is not 2FSK/4FSK/H-CPM/O-QPSK

Span [Hz]	Symbol Rate (SR) [sps]
1 k	0.1 k ≤ SR ≤ 0.5 k
2.5 k	0.5 k < SR ≤ 1.25 k
5 k	1.25 k < SR ≤ 2.5 k
10 k	2.5 k < SR ≤ 5 k
25 k	5 k < SR ≤ 12.5 k
50 k	12.5 k < SR ≤ 25 k
100 k	25 k < SR ≤ 50 k
250 k	50 k < SR ≤ 125 k
500 k	125 k < SR ≤ 250 k
1 M	250 k < SR ≤ 500 k
2.5 M	500 k < SR ≤ 1.25 M
5 M	1.25 M < SR ≤ 2.5 M
10 M	2.5 M < SR ≤ 5 M
25 M	5 M < SR ≤ 12.5 M
31.25 M*1	12.5 M < SR ≤ 35 M
50 M*2	12.5 M < SR ≤ 25 M
62.5 M *1	35 M < SR ≤ 70 M
100 M*2	25 M < SR ≤ 50 M
125 M*1	70 M < SR ≤ 140 M

*1: Span Up = Off

*2: Span Up = On

Table 3.4.6-7 When Modulation Type is 2FSK/4FSK/H-CPM

Span [Hz]	Symbol Rate (SR) [sps]
1 k	0.1 k ≤ SR ≤ 0.25 k
2.5 k	0.25 k < SR ≤ 0.625 k
5 k	0.625 k < SR ≤ 1.25 k
10 k	1.25 k < SR ≤ 2.5 k
25 k	2.5 k < SR ≤ 6.25 k
50 k	6.25 k < SR ≤ 12.5 k
100 k	12.5 k < SR ≤ 25 k
250 k	25 k < SR ≤ 62.5 k
500 k	62.5 k < SR ≤ 125 k
1 M	125 k < SR ≤ 250 k
2.5 M	250 k < SR ≤ 625 k
5 M	625 k < SR ≤ 1.25 M
10 M	1.25 M < SR ≤ 2.5 M
25 M	2.5 M < SR ≤ 6.25 M
50 M	6.25 M < SR ≤ 12.5 M
100 M	12.5 M < SR ≤ 25 M

Table 3.4.6-8 When Modulation Type is O-QPSK

Span [Hz]	Symbol Rate (SR) [sps]
1 k	0.1 k ≤ SR ≤ 0.125 k
2.5 k	0.125 k < SR ≤ 0.3125 k
5 k	0.3125 k < SR ≤ 0.625 k
10 k	0.625 k < SR ≤ 1.25 k
25 k	1.25 k < SR ≤ 3.125 k
50 k	3.125 k < SR ≤ 6.25 k
100 k	6.25 k < SR ≤ 12.5 k
250 k	12.5 k < SR ≤ 31.25 k
500 k	31.25 k < SR ≤ 62.5 k
1 M	62.5 k < SR ≤ 125 k
2.5 M	125 k < SR ≤ 312.5 k
5 M	312.5 k < SR ≤ 625 k
10 M	625 k < SR ≤ 1.25 M
25 M	1.25 M < SR ≤ 3.125 M
50 M	3.125 M < SR ≤ 6.25 M
100 M	6.25 M < SR ≤ 12.5 M

For Package V12.00.00 and later, this value is set according to the following tables.

- Table 3.4.6-2 Setting Range of Symbol Rate 1/2 (Package V12.00.00 and Later)
- Table 3.4.6-3 Setting Range of Symbol Rate 2/2 (Package V12.00.00 and Later)

If the Span is 50 MHz or more, then the setting range of the carrier frequency shall be limited as follows:

Table 3.4.6-9 Frequency range if the Span is 50 MHz or more

Model Name	Option	Frequency Range
MS2690A	-	100 MHz to 6 GHz
MS2691A	-	
MS2692A	-	
	067/167	100 MHz to 26.5 GHz
MS2830A-040	-	300 MHz to 3.6 GHz
MS2830A-041	-	300 MHz to 6 GHz
MS2830A-043	-	300 MHz to 13.5 GHz
MS2830A-044	-	300 MHz to 6 GHz
	067/167	300 MHz to 26.5 GHz
MS2830A-045	-	300 MHz to 6 GHz
	067/167	300 MHz to 43 GHz
MS2840A-040	-	300 MHz to 3.6 GHz
MS2840A-041	-	300 MHz to 6 GHz
MS2840A-044	-	300 MHz to 6 GHz
	067/167	300 MHz to 26.5 GHz
MS2840A-046	-	300 MHz to 6 GHz
	067/167	300 MHz to 44.5 GHz
MS2850A-047	-	300 MHz to 6 GHz
	067/167	300 MHz to 32 GHz
MS2850A-046	-	300 MHz to 6 GHz
	067/167	300 MHz to 44.5 GHz

Capture Interval

■ Summary

Sets Capture Interval (number of frames to capture) for one measurement. It is selectable only when Measuring Object is set to Frame Formatted.

When set to No Formatted, Capture Interval is fixed to “1 Frame”.

■ Setting options

1 Frame, 10 Frames

■ Default

1 Frame

APSK Ring Ratio

■ Summary

Sets the radius of the reference signal when Modulation Type is APSK.

Table 3.4.6-10 Restriction of APSK Ring Ratio Setting

Modulation Type	R2/R1	R3/R1
16APSK	✓	–
32APSK	✓	✓
Other than above	–	–

✓: Selectable. –: Not selectable.

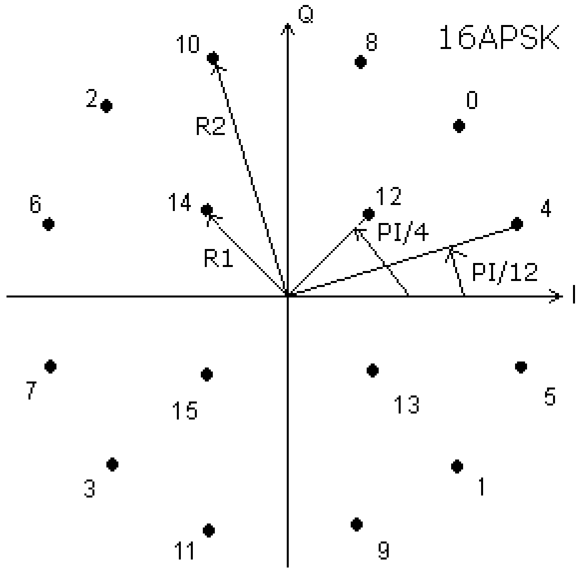


Figure 3.4.6-3 APSK Ring Ratio 16APSK

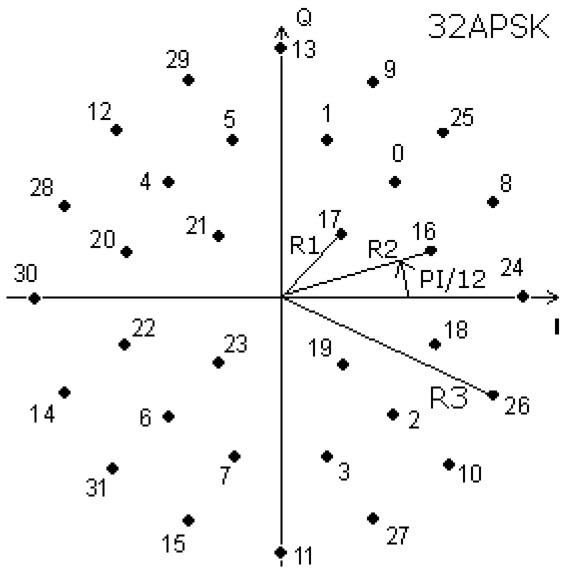


Figure 3.4.6-4 APSK Ring Ratio 32APSK.

■ Setting range

R2/R1: 2.000 to 4.000

R3/R1: 4.000 to 9.000

When an out-of-range value is set, the value is rounded to a value within the setting range.

Signal Type

■ Summary

Sets the measurement signal to continuous or burst signal.

■ Setting options

Continuous, Burst

■ Default

Continuous

Burst Period

■ Summary

Sets the burst period when the measurement signal has burst signal.

This can be set only when Signal Type is Burst.

■ Setting range

1 to 1000 ms

■ Resolution

0.1 ms

GI Size

■ Summary

Sets the sample number of guard interval of the measurement signal.

■ Setting range

6 to 32

FFT Size

■ Summary

Sets the FFT size of the measurement signal.

■ Setting options

64, 128

■ Default

64

Subcarrier Spacing

■ Summary

Sets subcarrier spacing of the measurement signal.

■ Setting range

10 to 18 kHz

■ Resolution

0.5 kHz

Lower Guard Subcarrier

■ Summary

Sets the number of lower guard subcarriers among guard subcarriers of the measurement signals.

■ Setting range

10 to 30

Upper Guard Subcarrier

■ Summary

Sets the number of upper guard subcarriers among guard subcarriers of the measurement signals.

■ Setting range

10 to 30

3.4.7 Filter

Press the **Filter** button in the Common Setting dialog box to display the filter parameter setting dialog box.

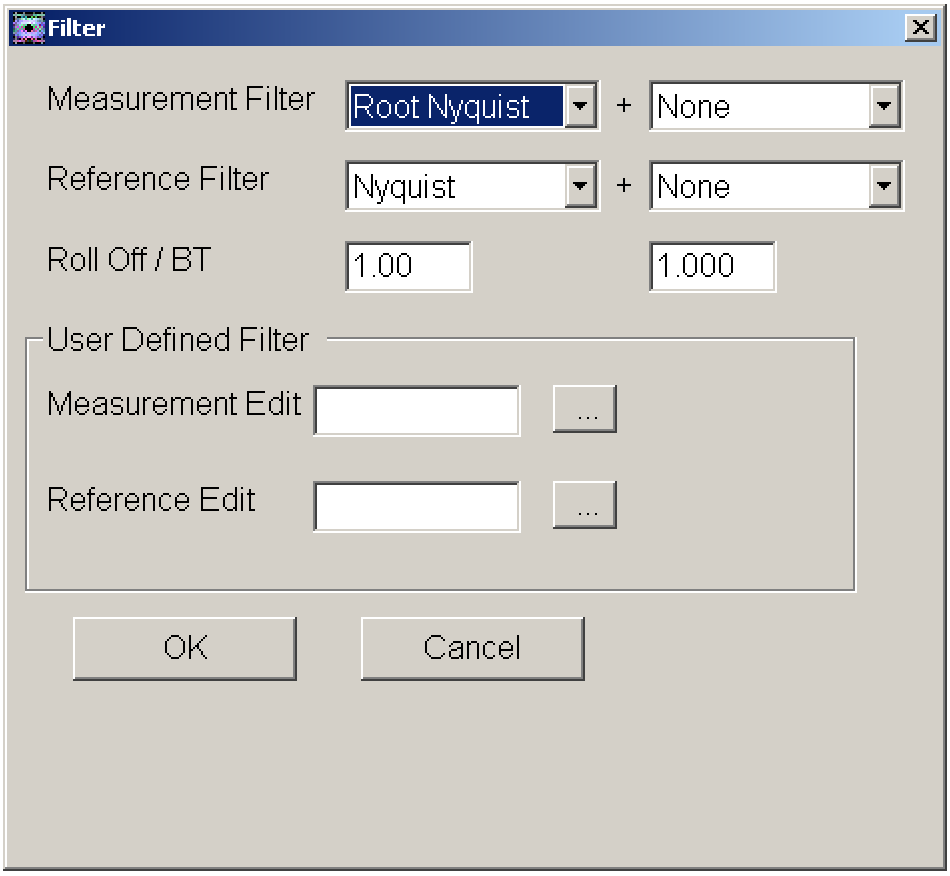


Figure 3.4.7-1 Filter Parameter Setting Dialog Box

Measurement Filter

■ Summary

Sets the reception filter. The Filter Parameter Setting dialog box shows the basic filter on the left and the 2nd filter on the right. Displayed characteristics are combined characteristics of 2 filters.

■ Setting options

Table 3.4.7-1 Setting Options of Measurement Filter

Filter Type	Modulation Type			
	2FSK	4FSK	H-CPM	Other than left
Root Nyquist	✓	✓	✓	✓
Nyquist	✓	✓	✓	✓
None	✓	✓	✓	✓
Gaussian	✓	✓	✓	–
ARIB STD-T98	–	✓	–	–
Rect	–	✓	–	–
Inverse Rect	–	✓	–	–
Inverse Gaussian	–	✓	–	–
H-CPM_P25	–	–	✓	–
User Defined	✓	✓	✓	✓

✓: Selectable.

–: Not selectable.

Table 3.4.7-2 Setting Options of 2nd Measurement Filter

Filter Type	Modulation Type	
	4FSK	Other than left
None	✓	✓
Rect	✓	–
Inverse Rect	✓	–
Inverse Gaussian	✓	–

✓: Selectable.

–: Not selectable.

Reference Filter

■ Summary

Sets the filter used for the reference signal. The Filter Parameter Setting dialog box shows the filter on the left and the 2nd filter on the right. Displayed characteristics are combined characteristics of 2 filters.

For details on Gaussian and Gaussian2 filter, refer to Appendix G “Filter Function”.

■ Setting options

Table 3.4.7-3 Setting Options of Reference Filter

Filter Type	Modulation Type						
	O-QPSK	2FSK	4FSK	H-CPM	2ASK /4ASK	MSK	Other than left
Root Nyquist	✓	✓	✓	✓	✓	✓	✓
Nyquist	✓	✓	✓	✓	✓	✓	✓
Gaussian	–	✓	✓	✓	✓	✓	–
Gaussian2	–	✓	✓	✓	✓	–	–
ARIB STD-T98	–	–	✓	–	–	–	–
Half-sine	✓	–	–	–	–	–	–
Rect	–	✓	✓	✓	–	–	–
H-CPM_P25	–	–	–	✓	–	–	–
User Defined	✓	✓	✓	✓	✓	✓	✓

✓: Selectable.
–: Not selectable.

Table 3.4.7-4 Setting Options of 2nd Reference Filter

Filter Type	Modulation Type	
	O-QPSK	Other than left
None	✓	✓
Half-sine	✓	–

✓: Selectable.
–: Not selectable.

Roll Off / BT

■ Summary

This sets the filter roll off ratio (Root Nyquist/Nyquist/ARIB STD-T98) or bandwidth time product. This is applied when Measurement Filter or Reference Filter setting is set to Root Nyquist, Nyquist, ARIB STD-T98, Gaussian or Inverse Gaussian.

■ Setting range

0.03 to 1.00 (Filter)

0.030 to 1.000 (2nd Filter)

User Defined Filter

■ Summary

When User Defined is set at Measurement Filter or Reference Filter, any filter (user filter) can be used.

For details on user filter and definition filter, refer to Appendix D "User Defined Filter".

Measurement Edit

■ Summary

This selects the definition file for the user filter used as the Measurement Filter. If no file is specified, the setting is the same as **Root Nyquist**.

Reference Edit

■ Summary

This selects the definition file for the user filter used as the Reference Filter. If no file is specified, the setting is the same as Nyquist.

Measurement Filter

Measurement filter is used to filter the received signal just before demodulation. Some systems split the pulse-shaping filter between the transmitter and receiver side (ex. Root Nyquist at transmitter and Root Nyquist at receiver) and in this case the filter at the receiver side is the Measurement filter.

Reference Filter

Reference filter is used to filter the reference (no error) signal. It is the total filtering used in the system (transmitter filter plus receiver filter).

Filter and 2nd Filter

For both Measurement Filter and Reference Filter, normally select the type of Filter only and select None for 2nd Filter. Then, the characteristics of Measurement Filter and Reference Filter shall be those set in the Filter Parameter Setting dialog box.
If other than None is selected for both Filter and 2nd Filter, then the characteristics of Measurement Filter and Reference Filter are combined characteristics of Filter and 2nd Filter (Figure 3.4.7-2).

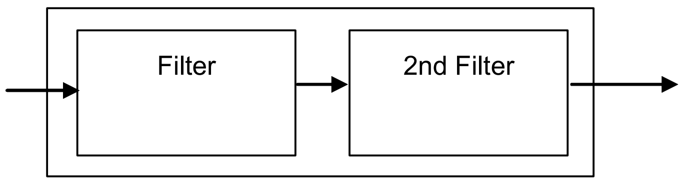


Figure 3.4.7-2 Schematic diagram of Filter and 2nd Filter

On Filter Settings and Measurement

The signal received by the measuring instrument passes through the measurement filter. Next, the signal is demodulated and the bit string of the transmission signal is generated. A symbol data string is generated through symbol mapping from the generated bit string. The symbol data string is then passed through the reference filter, and the resulting signal is used as the reference signal. The difference between the received signal that has passed through the measurement filter and the reference signal is used to calculate the modulation analysis result's EVM, Phase Error and Magnitude Error.

Table 3.4.7-5 Common Measurement and Reference Filter settings

Pulse-shaping Filter used in transmitter	Measurement Filter	Reference Filter
Root Nyquist	Root Nyquist	Nyquist
Nyquist	None	Nyquist
Gaussian	None	Gaussian

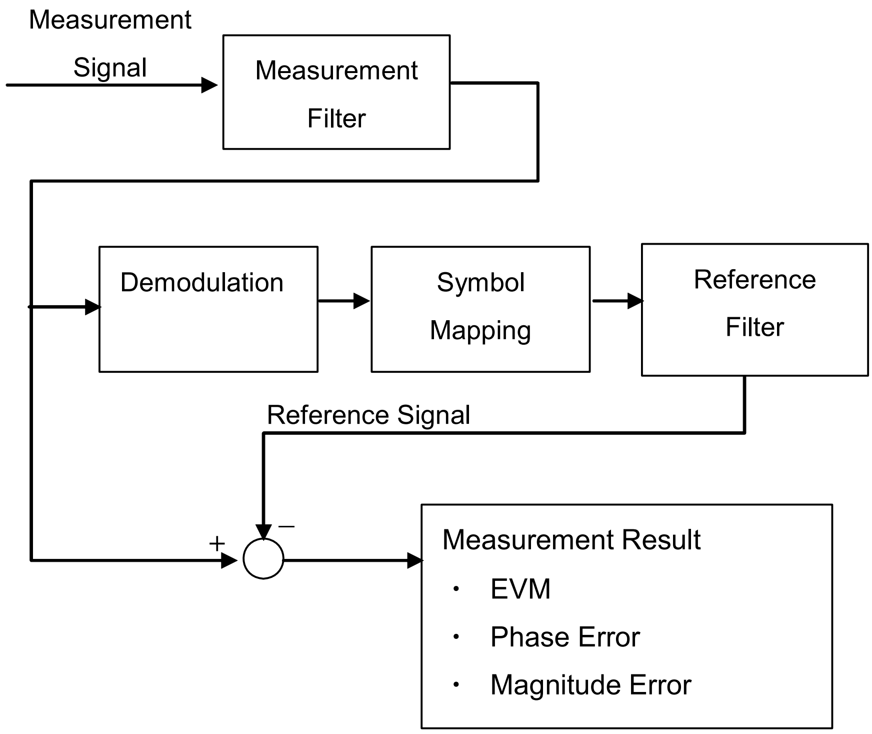


Figure 3.4.7-3 Measurement Block Diagram

When **SCBT** is selected, the Filter parameter setting dialog box is displayed (Figure 3.4.7-4). However, the setting is available only when the MX269017A-072 is installed.

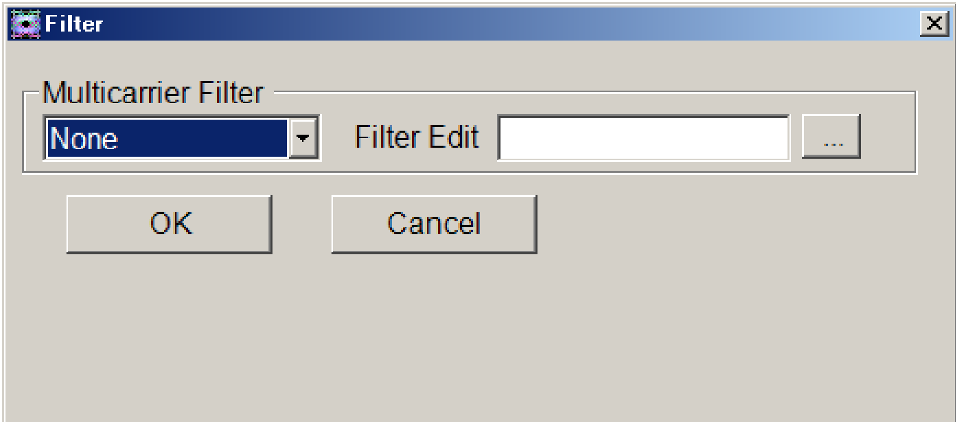


Figure 3.4.7-4 Filter Parameter Setting Dialog Box (SCBT)

Multicarrier Filter

■ Summary

Turns On or Off the filter that removes the adjacent waves.

■ Setting options

None	Turns Off the filter that removes the adjacent waves.
User Defined	Uses a user-defined filter coefficients for the filter that removes the adjacent waves.

For details on user filter and definition file, refer to Appendix D "User Defined Filter".

Filter Edit

■ Summary

This selects the definition file for the filter that removes the adjacent waves. If no file is specified, it is regarded that Multicarrier Filter is set to **None**.

3.4.8 Data

Set the interval for measurement. The Data parameters can be set when **Non-Formatted** has been selected for Measuring Object.

Press the **Data** button in the Common Setting dialog box to display the data parameter setting dialog box.

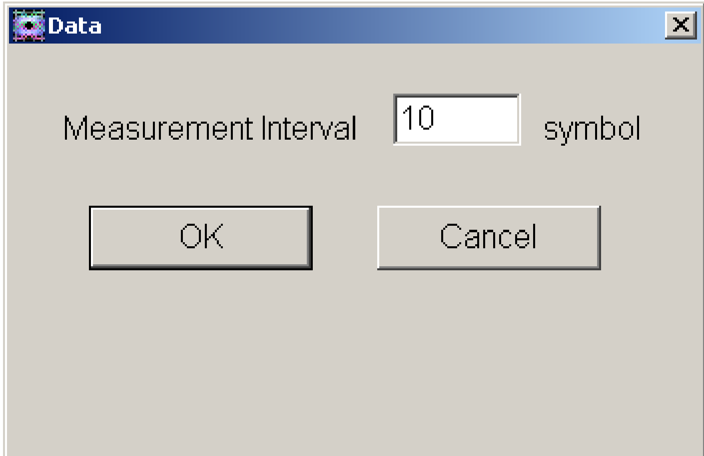


Figure 3.4.8-1 Data Parameter Setting Dialog Box

Measurement Interval

■ Summary

Sets the measurement interval in symbols. Measurement is performed for the symbol interval specified for **Measurement Interval**.

■ Setting range

10 to 4096

3.4.9 Frame

The Frame parameters can be set when **Frame Formatted** has been selected for Measuring Object.

Press the **Frame** button in the Common Setting dialog box to display the Frame parameter setting dialog box.

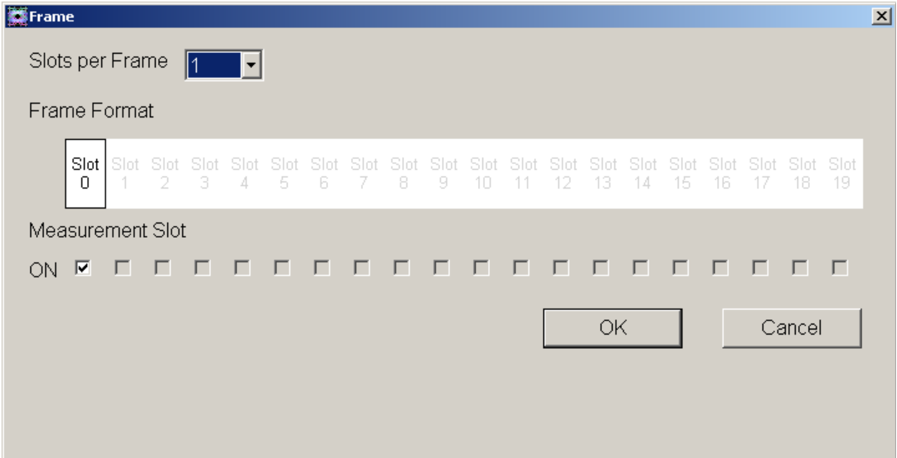


Figure 3.4.9-1 Frame Parameter Setting Dialog Box

Slots per Frame

■ Summary

Sets the number of slots in one frame.

■ Setting range

1 to 20

Measurement Slot

■ Summary

This specifies the slot to analyze. Select the check box for the slot to be analyzed. If the slot is inactive, clear its check box.

■ Setting range

When selected:	The target slot will be analyzed.
When not selected:	The target slot will not be analyzed.

3.4.10 Slot

The Slot parameters can be set when **Frame Formatted** has been selected for Measuring Object. Press the **Slot** button in the Common Setting dialog box to display the slot parameter setting dialog box.

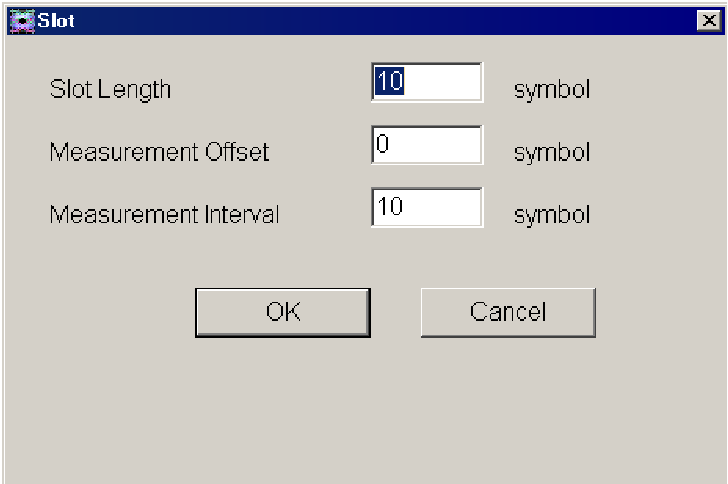


Figure 3.4.10-1 Slot Parameter Setting Dialog Box

Slot Length

■ Summary

Sets the number of symbols in one slot.

■ Setting range

10 to 4096

Measurement Offset

■ Summary

Sets the start position of the measurement interval in symbols. The reference position of the measurement offset is the first symbol of the slot.

■ Setting range

0 to (Slot Length – 10)

Measurement Interval

■ Summary

Sets the measurement interval in symbols. The symbol interval set in **Measurement Interval** is displayed as the measurement result.

■ Setting range

10 to (Slot Length – Measurement Offset)

■ Setting example

When one slot includes 120 symbols and the measured interval is the 110-symbol interval starting at the third symbol.

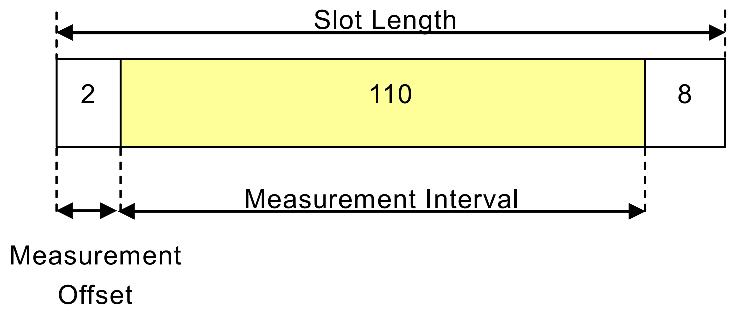


Figure 3.4.10-2 Slot Format Setting Parameter Scheme

Set the parameters in the slot parameter setting dialog box as follows:

- Slot Length = 120
- Measurement Offset = 2
- Measurement Interval = 110

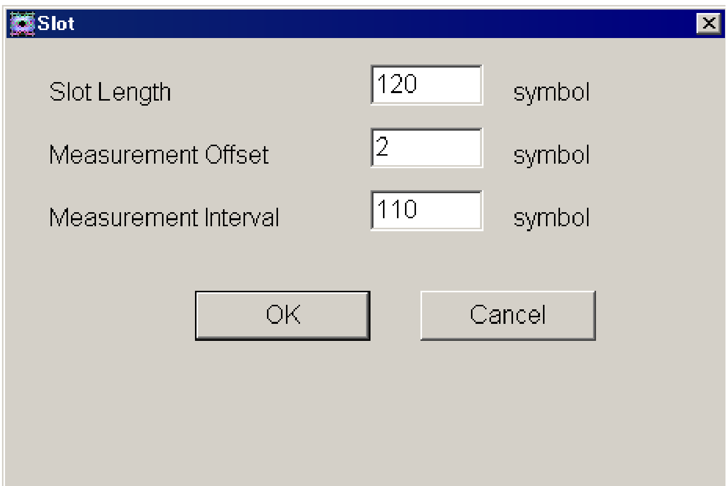


Figure 3.4.10-3 Setting example

3.4.11 Search

Set the Search parameter that determines the symbol positions in the slot. The search parameters can be set when **Frame Formatted** has been selected for Measuring Object.

Press the **Search** button in the Common Setting dialog box to display the search parameter setting dialog box.

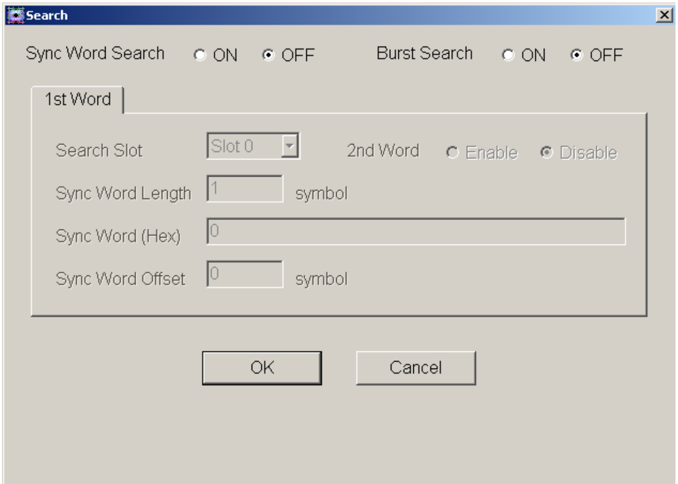


Figure 3.4.11-1 Search Parameter Setting Dialog Box

Sync Word Search

■ Summary

Sets whether to search for a sync word consisting of a specific pattern. This setting is switched on or off by selecting a radio button.

By executing a sync word search, the position of symbols in slots can be accurately detected.

■ Setting range

ON, OFF

Burst Search

■ Summary

Sets whether to detect burst signals. This setting is switched on or off by selecting a radio button.

Set Burst Search to ON when a burst signal that makes up a ramp between slots is measured. Burst Search executes burst search using (Input Level – 20) dB as the level threshold.

■ Setting range

ON	Conducts burst search
OFF	Does not conduct burst search

1st Word/2nd Word

■ Summary

Two types of Sync word patterns can be set. The settings on the **1st Word** and **2nd Word** tabs can be switched between.

2nd Word Search

■ Summary

Sets whether to detect the **2nd word**. This setting is switched on or off by selecting a radio button. 2nd word detection is executed when detection of the 1st word has failed.

■ Setting range

Enable	Conducts 2nd Word search.
Disable	Does not conduct 2nd Word search

Search Slot

■ Summary

Sets the number of the slot in which a sync word was detected. Detection starts from the position at which the measured signal was captured, and a slot number is set for the position at which a sync word was first detected. If the same sync word is set in multiple slots, the detected slot number might differ from the actual slot number. To detect the actual slot number, use an external trigger.

☞ 3.7 Setting Trigger

■ Setting range

Slot numbers for which Measurement Slot is set to ON.

☞ 3.4.9 Frame

Sync Word Length

■ Summary

Sets the length of the sync word in Symbols. The length varies according to the Modulation Type setting and the character number of the input sync word (HEX).

■ Setting range

The value for the sync word length needs to satisfy the setting ranges of both Table 3.4.11-1 and Table 3.4.11-2.

Table 3.4.11-1 Setting Range for Sync Word Length (Modulation Type)

Modulation Type	Setting Range [symbol]
BPSK, DBPSK, PI/2DBPSK, 2FSK, 2ASK, MSK	1 to (128 or Slot Length, whichever smaller)
QPSK, O-QPSK, DQPSK, PI/4DQPSK, 4FSK, H-CPM, 4ASK	1 to (64 or Slot Length, whichever smaller)
8PSK, D8PSK	1 to (42 or Slot Length, whichever smaller)
16QAM, 16APSK	1 to (32 or Slot Length, whichever smaller)
32QAM, 32APSK	1 to (25 or Slot Length, whichever smaller)
64QAM	1 to (21 or Slot Length, whichever smaller)
128QAM	1 to (18 or Slot Length, whichever smaller)
256QAM	1 to (16 or Slot Length, whichever smaller)
512QAM	1 to (14 or Slot Length, whichever smaller)
1024QAM	1 to (12 or Slot Length, whichever smaller)
2048QAM	1 to (11 or Slot Length, whichever smaller)

Table 3.4.11-2 Setting Range for Sync Word Length (Number of characters of Sync Word (HEX))

Item	Value [symbol]
Maximum	(Number of characters of Sync Word (HEX)) × 4 / (Bits per symbol)
Minimum	{(Number of characters of Sync Word (HEX)) – 1) × 4 / (Bits per symbol)} + 1

Note:

The decimal point is suppressed.

3

Measurement

Table 3.4.11-3 Bits per symbol of Modulation Type

Modulation Type	Bits/Symbol
BPSK, DBPSK, PI/2DBPSK,2FSK, 2ASK, MSK	1
QPSK, O-QPSK, DQPSK, PI/4DQPSK, 4FSK, H-CPM, 4ASK	2
8PSK, D8PSK	3
16QAM, 16APSK	4
32QAM, 32APSK	5
64QAM	6
128QAM	7
256QAM	8
512QAM	9
1024QAM	10
2048QAM	11

Sync Word (HEX)

■ Summary

Sets the sync word. Specify the sync word as a left-aligned hexadecimal value, assuming the first bit in the sync word to be the MSB.

■ Setting range

Number of characters: (Sync Word Length) × (Bits per symbol)/4, and round it up to the whole number.

Word: 0 to F (HEX)

Sync Word Offset

■ Summary

Sets the interval between the first symbol in the slot and the first symbol in the sync word, in symbols.

■ Setting range

0 to (Slot Length [Symbol] - Sync Word Length [Symbol])

3.4.12 Detail Settings

To show Details Settings dialog box, press **Detail Settings** in the Common Setting dialog box.

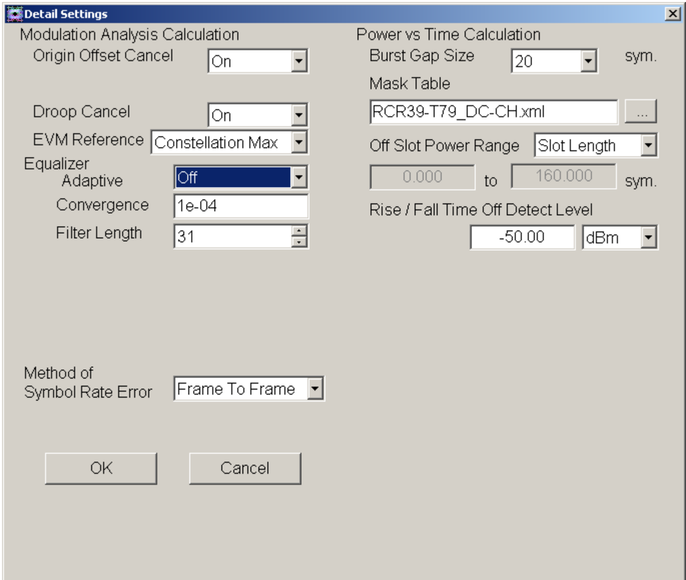


Figure 3.4.12-1 Detail Settings Dialog Box
(When Modulation Type is other than 2FSK/4FSK/H-CPM/MSK)

The parameters (Adaptive, Convergence, and Filter Length) for Equalizer can be set when Modulation Type is other than 2FSK, 4FSK, H-CPM or MSK.

Adaptive

■ Summary

Sets Equalizer Mode.

■ Setting options

On	Uses Equalizer. The filter coefficients of Equalizer are updated for each measurement.
Hold	Uses Equalizer. The filter coefficients are used, without updating from the values used before selecting **Hold**.
Off	Does not use Equalizer.

Convergence

■ Summary

Sets Convergence factor for updating the Equalizer filter.

■ Setting range

1.0e-20 to 1

Filter Length

■ Summary

Sets Filter Length for Equalizer.

At Filter Length, 8 means 1 symbol.

■ Setting range

11 to 501 (1.375 [symbol] to 62.625 [symbol])

Note:

Only an odd number can be set. When an even number is entered, one is added to make it odd.

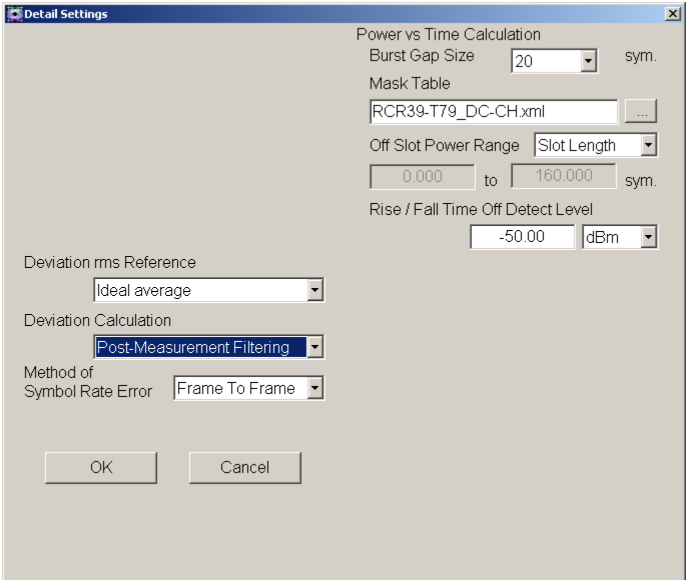


Figure 3.4.12-2 Detail Settings Dialog Box (When Modulation Type is 2FSK/4FSK)

Deviation Calculation

The parameters for Deviation calculation can be set when Modulation Type is 2FSK or 4FSK.

■ Summary

This sets the timing to calculate Deviation when Modulation Type is 2FSK or 4FSK. This parameter becomes available when Modulation Type is **2FSK** or **4FSK**.

■ Options

Pre-Measurement Filtering

Calculates Deviation before applying Measurement Filter. Use for measuring frequency shift at 4FSK, based on ARIB STD-T98.

Post-Measurement Filtering

Calculates Deviation after applying Measurement Filter. Use for inputting general FSK modulation signal.

Deviation rms Reference

The parameter for calculating Deviation rms is available when 2FSK is selected as Modulation Type and Deviation Auto is OFF.

■ Summary

Sets reference value to calculate Deviation rms.

■ Options

Ideal average

Calculates Deviation Error with signal deviation average as reference.

Nominal settings

Calculates Nominal Deviation from Symbol Rate and Modulation Index.

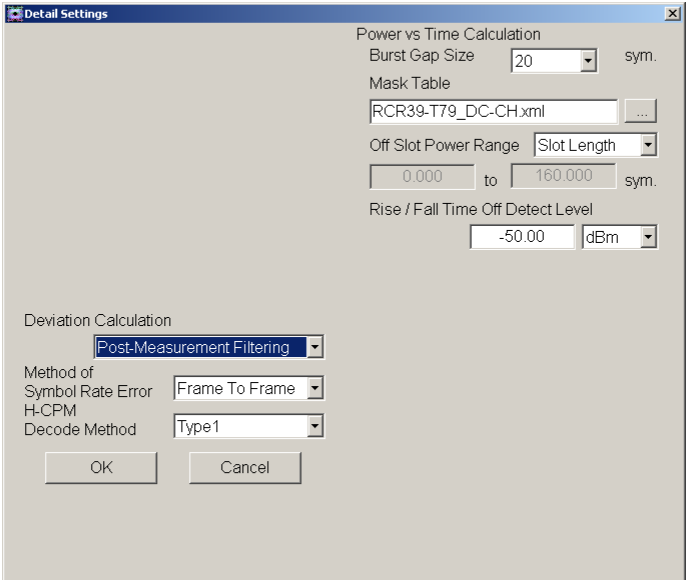


Figure 3.4.12-3 Detail Settings Dialog Box
(When Modulation Type is H-CPM)

H-CPM Decode Method

When H-CPM is selected as Modulation Type, the parameter for calculating ideal signal is available.

■ Summary

Sets decode method for calculating ideal signal when Modulation Type is H-CPM.

■ Options

Type1

Decodes by ISI (intersymbol interference) reduction filter. Reduces ISI generated by H-CPM transmission filter specified in TIA102.BBAA, and obtains the original signal information. Usable only for small error signal.

Type2

Decodes by Vitabi. On interval of 14 symbols is required before and after the analysis interval.

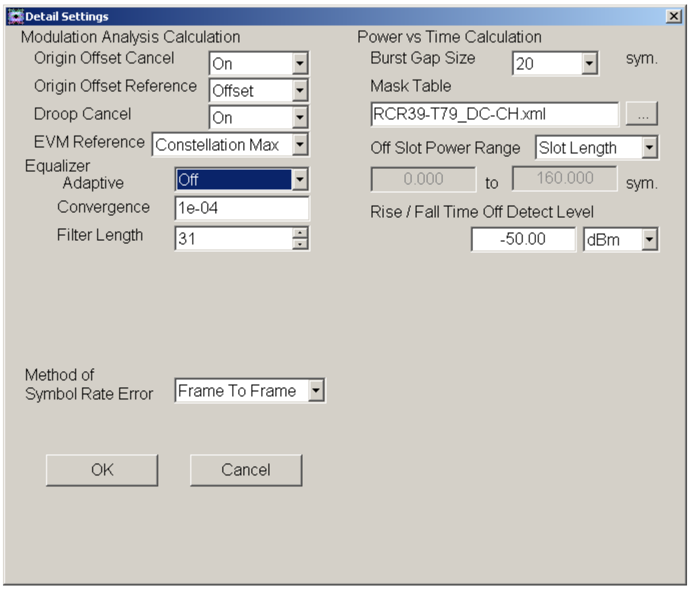


Figure 3.4.12-4 Detail Settings Dialog Box (Origin Offset Cancel)

Origin Offset Cancel

The parameters related to Origin Offset calibration can be set.

■ Summary

Sets the operation mode of Origin Offset Cancel.

■ Options

On	Calibrates Origin Offset. The effect caused due to Origin Offset is removed from the measurement results.
Off	Does not calibrate Origin Offset.

Origin Offset Reference

When Modulation Type is set to O-QPSK, the parameters related to Origin Offset calculation criteria can be set.

■ Summary

Sets calculation criteria for Origin Offset measurement.

■ Options

Offset	Combined power with IQ symbol time shifted by 0.5 symbol.
Actual	IQ power of actual signals.

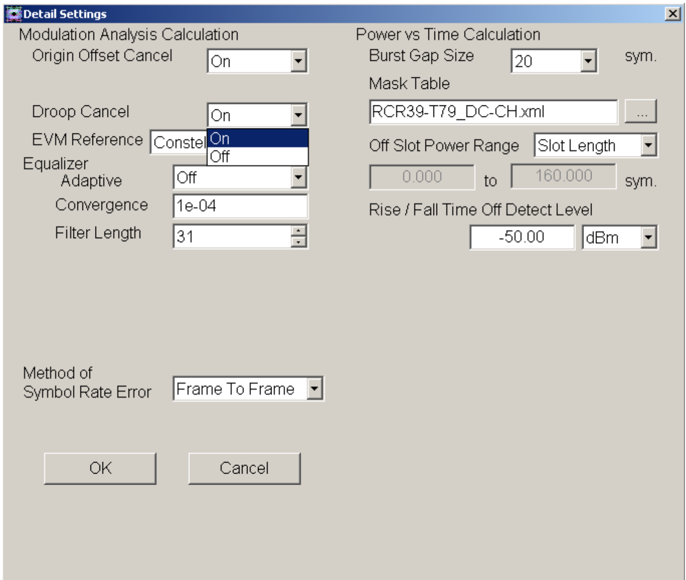


Figure 3.4.12-5 Detail Settings Dialog Box (Droop Cancel)

Droop Cancel

The parameters related to Droop Cancel can be set.

■ Summary

Sets the operation mode of Droop Cancel.

■ Options

On	Performs Droop Cancel, and removes the effect caused due to Droop from the measurement results. (Default)
Off	Does not perform Droop Cancel.

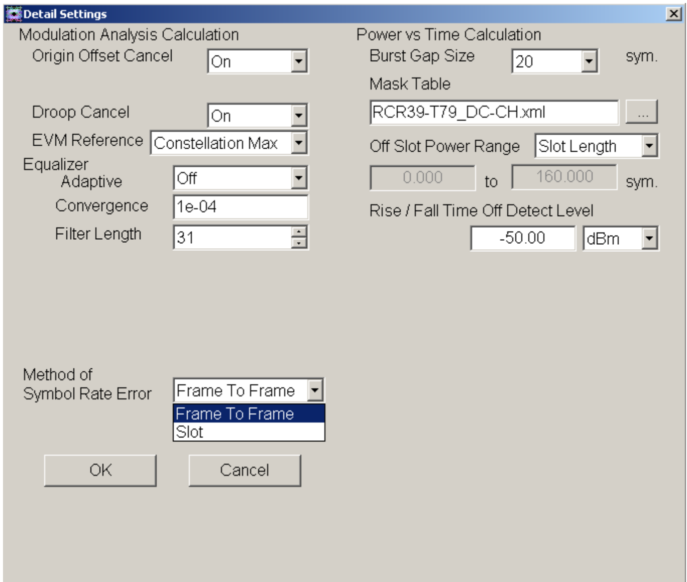


Figure 3.4.12-6 Detail Settings Dialog Box
(Method of Symbol Rate Error)

Method of Symbol Rate Error

The parameter related to the Symbol Rate Error measurement mode is set.

■ Summary

Sets the Symbol Rate Error measurement mode.

■ Options

Frame To Frame

Searches Sync Word per frame and calculates Symbol Rate Error from the time difference among frames. Capture Interval should be set to 10 Frames.

Slot

Detects symbol timings within one slot and calculates Symbol Rate Error from the temporal change of the symbol timings. Can perform measurement without using Sync Word.

☞ 3.9.2 Setting capture interval

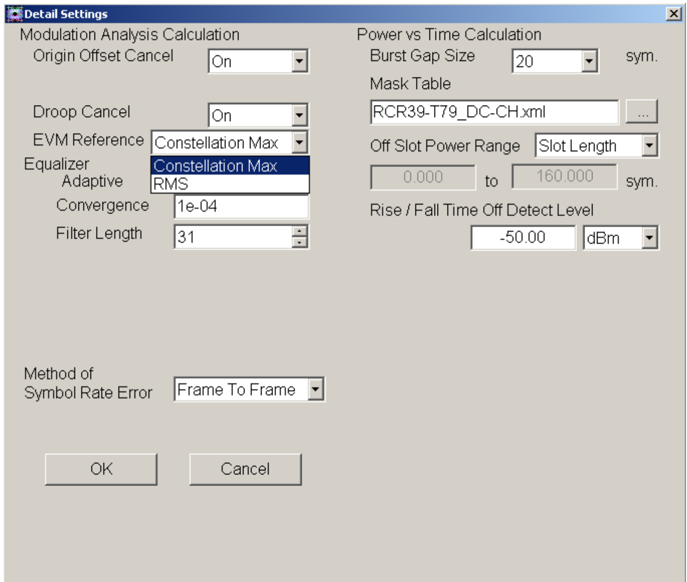


Figure 3.4.12-7 Detail Settings Dialog Box (EVM Reference)

EVM Reference

Sets parameters related to the EVM measurement method. This function is available when Modulation Type is other than FSK and ASK.

■ Summary

Sets the EVM reference for the EVM measurement.

■ Options

Constellation Max

Calculates EVM based on a symbol point located in the outermost layer of constellation.

RMS Calculates EVM based on the average power of all symbol points.

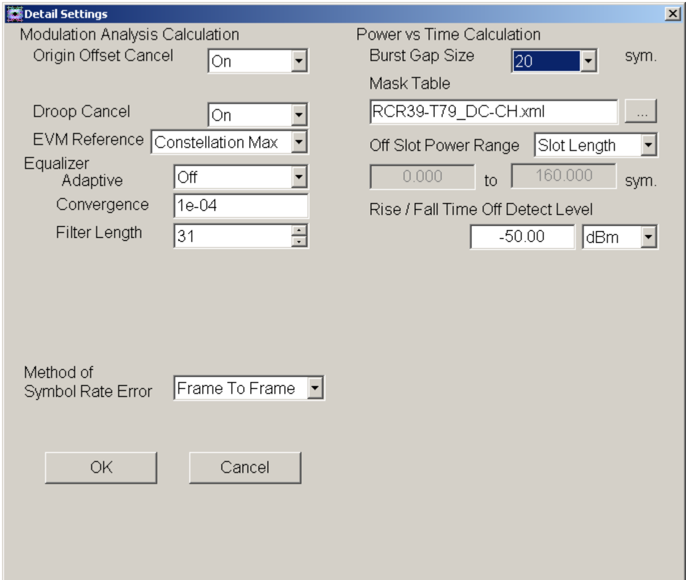


Figure 3.4.12-8 Detail Settings Dialog Box (Power vs Time Calculation)

The parameters (Burst Gap Size, Mask Table, Off Slot Power Range, Off Slot Power User Start / Stop, Rise / Fall Time Off Detect Level) can be set for the Power vs Time measurement, when Measuring Object is Frame Formatted.

Burst Gap Size

■ Summary

Sets the number of data to measure before rise and after fall of a burst waveform.

For details, refer to Appendix H “Power vs Time Measurement Interval”.

■ Options

20, 40, 60, 80, 100 [symbol]

Mask Table

■ Summary

Loads the mask for Preset. Filter, Roll Off rate, and filter bandwidth settings can be loaded by loading the mask.
When the Mask Table box is empty, no mask is called.
When Default.xml is selected, the mask data is initialized.

For the details of preset mask settings, refer to Appendix F “Power vs Time Mask”.

Off Slot Power Range

■ Summary

Selects the calculation range of Off Slot Power.

For details, refer to Appendix H “Power vs Time Measurement Interval”.

■ Options

Meas. Interval

Off Slot Power is calculated in the range below:
Measurement Offset to
Measurement Offset + Measurement Interval
It is the same range as Modulation Analysis.

Slot Length

Calculates Off Slot Power in the range of 0 to Slot Length.

User

Calculates Off Slot Power in a user-defined range.

Off Slot Power User Start / Stop

■ Summary

Displays or sets the calculation range of Off Slot Power.

Displays the automatically calculated range when Off Slot Power Range is Meas. Interval or Slot Length.

It can be set when Off Slot Power Range is User.

■ Setting range

–Burst Gap Size to Slot Length+Burst Gap Size

■ Details

The input value is automatically adjusted to the nearest value in 0.125 symbols and maintained.

Rise / Fall Time Off Detect Level

■ Summary

Sets the level to detect Off in the burst waveform in the Rise/Fall Time measurement.

Either [dBm] or [dB] can be set as a unit.

For details, refer to Appendix H “Power vs Time Measurement Interval”.

■ Setting range

–80 to –10

3.4.13 Set Parameters

Here you confirm the parameters set so far.

To confirm the parameter change, press **Set Parameters** in the Common Setting dialog box. The Common Setting dialog box closes when **Set Parameters** is pressed.

While the Common Setting dialog box is displayed, the setting of each parameter is not applied.

To cancel the parameter change, do one of the followings:

- Press the F8 Close key.
- Select **Close** from the **File** menu.
- Click the close button at the top right of the Common Setting dialog box.

If the parameter settings were canceled, the settings from before the Common Setting dialog box was opened are maintained.

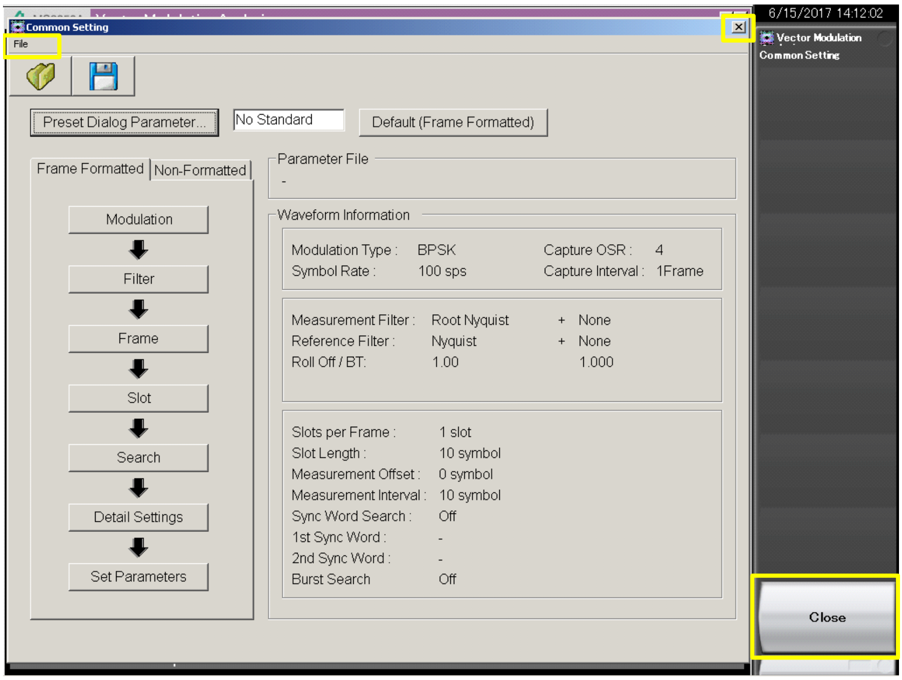


Figure 3.4.13-1 Cancelling Parameter Settings

3.4.14 Subcarrier MAP

The **Subcarrier MAP** button is displayed only when Measuring Object is set to SCBT.

Press the **Subcarrier MAP** button on the Common Setting dialog box to display a dialog box to set the Subcarrier MAP file.
For details of the Subcarrier MAP file, refer to Appendix J “Subcarrier MAP/Pilot IQ MAP file”.

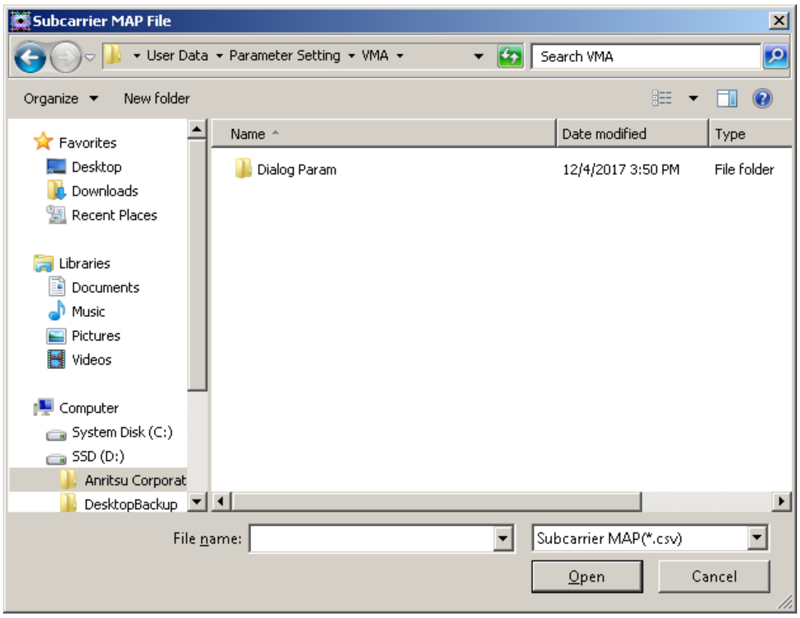


Figure 3.4.14-1 Subcarrier MAP Selection Dialog Box

3.4.15 Pilot IQ MAP

The **Pilot IQ MAP** button is displayed only when Measuring Object is set to SCBT, and is enabled after setting the Subcarrier MAP file.

Pressing the **Pilot IQ MAP** button on the Common Setting dialog box displays a dialog box to set the Pilot IQ MAP file.
For details of the Pilot IQ MAP file, refer to Appendix J "Subcarrier MAP/Pilot IQ MAP file".

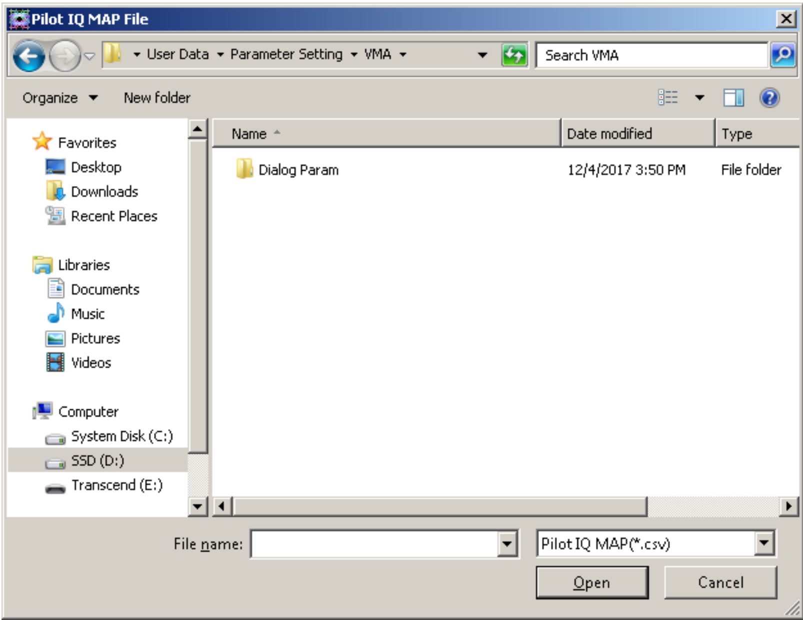


Figure 3.4.15-1 Pilot IQ MAP Selection Dialog Box

3.5 Setting Measurement Items

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

3.5.1 Modulation Analysis

Pressing F1 (Modulation Analysis) on the Measure function menu displays the Modulation Analysis function menu.

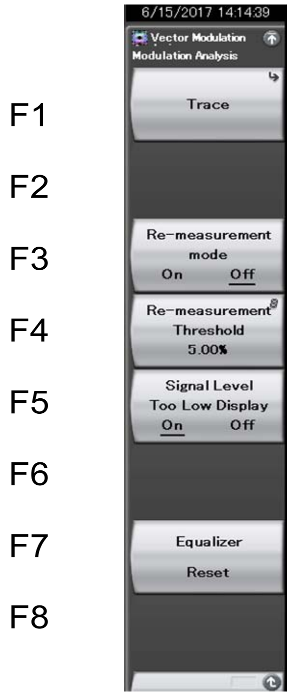


Figure 3.5.1-1 Modulation Analysis function menu

Table 3.5.1-1 Modulation Analysis Function Menu

Menu	Function
Trace	Opens the Trace menu. ☞ 3.5.1.1 Trace
Re-measurement Mode	Set the re-measurement mode. ☞ 3.5.1.2 Re-measurement mode
Re-measurement Threshold	This command sets the threshold value when the re-measurement mode is active. ☞ 3.5.1.2 Re-measurement mode
Signal Level Too Low Display	Turns on/off the Signal Level Too Low display. ☞ 3.5.1.3 Signal Level Too Low Display
Equalizer Reset	Initializes filter coefficients of Equalizer. ☞ 3.5.1.4 Equalizer Reset

3.5.1.1 Trace

Pressing F1 (Trace) on the Modulation Analysis function menu or Trace displays the Trace function menu.

Figure 3.5.1.1-1 Trace Function Menu

Table 3.5.1.1-1 Trace Function Menu

Menu	Function
Select Trace	Sets the trace area to be manipulated.
Trace Mode	Sets the measurement result to be displayed in the trace area.
Scale	Sets the scale of the graph results.
Target Slot Number	Sets the slot number for analysis.
Storage	Sets the storage mode.
Zoom In/Zoom Out	Switches the number of trace areas to display between 1 and 4.
Next Trace	Switches the trace area to be manipulated.
Next View	If a 4-trace split screen is displayed, switches between Traces 1 to 4 and Traces 5 to 8.
(Page 2)	
Result Select	Switches the measurement items to be displayed as numeric results.
Custom Numeric Setting	Selects the items to display in the custom numeric.
Specific Word Setting	Sets the position of the specific word to analyze.
BER Setting	Sets BER.
Numeric Only	Displays numeric results only, without plotting them in a graph.

Select Trace

■ Summary

Sets the trace area to be manipulated. The trace area to be manipulated is enclosed in a green frame.

■ Setting options

Trace 1 to Trace 8

Trace Mode

■ Summary

Sets the measurement result to be displayed in the trace area to be manipulated.

☞ 3.8 Trace Mode

Scale

■ Summary

Sets the scale of the graph result in the trace area to be manipulated. The scale setting for the measurement results selected in Trace Mode is displayed.

☞ 3.8 Trace Mode

Target Slot Number

■ Summary

Set the slot number for displaying analysis results. This parameter can be set when **Frame Formatted** has been selected for Measuring Object.

☞ 3.4.9 Frame

■ Setting options

Slot number for which Measurement Slot has been set to ON.

☞ 3.4.9 Frame

Storage

■ Summary

Sets the storage mode.

■ Setting options

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

Storage: Mode

■ Summary

Sets whether to update the data at every measurement or display the average value.

■ Setting options

Off	Updates the data every time it measures.
Average	Displays average every time it measures.
Average & Max	Displays average and maximum value every time it measures.

Storage: Count

■ Summary

Sets the number of measurements.

■ Setting range

2 to 9999

Zoom In/Zoom Out

■ Summary

Sets whether to display the measurement result in four-trace split screen or one-trace screen.

■ Setting options

Zoom In	Displays a one-trace screen to be manipulated.
Zoom Out	Displays a four-trace split screen to be manipulated.

Next Trace

■ Summary

Switches to the next trace.

When manipulating Trace 1, executing this command switches to Trace 2. If manipulating Trace 8, Trace 1 is switched to.

Next View

■ Summary

If a 4-trace split screen is displayed, the displayed traces are switched between Traces 1 to 4 and Traces 5 to 8.

■ Setting options

Trace 1 - 4	Switches the displayed traces to Traces 1 to 4.
Trace 5 - 8	Switches the displayed traces to Traces 5 to 8.

Result Select

■ Summary

Switches measurement items to be displayed as numeric results when selecting Zoom Out.

2FSK/4FSK/H-CPM:	Selects FSK or Fidelity.*
Other than those above:	Selects EVM or MER as measurement items to be displayed.

*: Selects either Linear or IQ to display the Constellation screen and Eye Diagram screen.

Custom Numeric Setting

■ Summary

Selects the items to display in the custom numeric on the trace screen.

■ Setting options

Result 1 - 7	Selects the analysis results to display in numerical values.
Bar Graph Result 1 - 2	Selects the analysis results to display in graph.

■ User Name

Inputs user name when changing the item name of the analysis result to display. (Up to 16 characters)

■ Min

Sets the minimum value in bar graph.

■ Max

Sets the maximum value in bar graph.

■ Unit

Sets the unit in bar graph.

Specific Word Setting

■ Summary

Sets the position to analyze the specific word.

■ Slot Number

Sets the slot number to analyze the specific word. (0 to 19)

■ Top Position

Specifies the head position of the specific word in the slot to analyze. (1 to 4097 – Word Width)

■ Word Width

Sets the word width of the specific word. (1 to 32)

BER Setting

■ Summary

Sets the BER measurement.

Notes:

- The BER function is unavailable when the Sync Word Search is Off.
- The BER function is available only when Frame Formatted is selected for Measuring Object.

☞ 3.4.5 Measuring Object

■ BER

On Sets the BER measurement to On.

Off Sets the BER measurement to Off.

■ BER Pattern

Selects a test pattern to use for the BER measurement.

For details of the test patterns, refer to Appendix E.

☞ Appendix E BER Pattern

■ Slot Number

Sets the slot number to perform the BER measurement.

Numeric Only

■ Summary

Displays numeric results only, without plotting them in a graph.

If a graph is not required, this helps improve the measurement speed.

■ Setting options

On Displays numeric results only.
This is available only when Trace Mode is Numeric or Custom Numeric.

Off Displays numeric results and also plots them to a graph. (Default)
This is available, regardless of Trace Mode.

3.5.1.2 Re-measurement mode

Pressing F3 (Re-measurement mode) at the Modulation Analysis function menu sets the Re-measurement mode On and Off.
When the Re-measurement mode is On, when the next measurement exceeds the threshold value, re-measurement is performed automatically once only.

Table 3.5.1.2-1 Measurement result used for judgement

Modulation	Measurement Result
2FSK/4FSK/H-CPM	FSK Error (peak)
Other than those above	EVM (peak)

The threshold value is set by pressing F4 (Re-measurement Threshold).

3.5.1.3 Signal Level Too Low Display

Pressing F5 (Signal Level Too Low Display) at the Modulation Analysis function menu sets the warning display when the signal is too low either On or Off.

This display indicates that the signal level is either too low or not present; it does indicate the measurement validity.

3.5.1.4 Equalizer Reset

Pressing F7 (Equalizer Reset) on the Modulation Analysis function menu initializes filter coefficients of Equalizer.

In the following cases, Equalizer may malfunction and may not provide a correct measurement result:

- When the quality of input signal is degraded, or no signal is input
- When filter coefficients of Equalizer, which are updated and used for measurement, are different from the setting of input signals

To recover this to the normal operation, initialize Equalizer filter coefficients after inputting appropriate signals or setting them correctly.

3.5.2 Power vs Time Measurement

This section describes how to set the Power vs Time measurement. When Measuring Object is SCBT, the Power vs Time measurement cannot be performed.

3.5.2.1 Setting Averaging Display Method (Storage Mode)

This section describes how to set the averaging display method.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Storage** to display the **Storage** function menu.
5. Press **Mode** to display the **Mode** dialog box.
6. Set the display mode, and then press **Set**.

■ Setting options

Table 3.5.2.1-1 Storage Mode Setting Options

Settings	Description
Off	Average not displayed
On	Average displayed

3.5.2.2 Setting Average Storage Count (Storage Count)

This section describes how to set the average storage count.

Note:

This setting is only enabled when On is selected at Storage Mode.

☞ 3.5.2.1 Setting Averaging Display Method (Storage Mode)

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Storage** to display the **Storage** function menu.
5. Press **Count** to display the **Storage Count** dialog box.
6. Input the average storage count, and then press **Set**.

■ Setting options

Table 3.5.2.2-1 Storage Count Setting Options

Item	Settings
Maximum Value	9999
Minimum Value	2

3.5.2.3 Setting Averaging Calculation Method (Average Type)

This section describes how to set the type of averaging calculation method.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Storage** to display the **Storage** function menu.
5. Press **Average Type** and switch to **Pwr** or **Log-Pwr**.

■ Setting options

Table 3.5.2.3-1 Average Type Setting Options

Settings	Description
Pwr	Performs RMS averaging
Log-Pwr	Performs log base 10 mean averaging

3.5.2.4 Setting Measurement Results Type (Trace Mode)

This section describes how to set the type of results displayed on the screen.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Trace Mode** to display the **Trace Mode** function menu.
5. Select the type of measurement results.

■ Setting options

Table 3.5.2.4-1 Trace Mode Setting Options

Settings	Description
Rise and Fall	Displays Slot Rise and Fall
Slot	Displays all Slot segments
Frame	Displays 1 Frame

3.5.2.5 Setting Graph Vertical Axis Units (Unit)

This section describes how to set the units of the graph vertical axis.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Unit**, and switch to **dB** or **dBm**.

■ Setting options

Table 3.5.2.5-1 Unit Setting Options

Settings	Description
dB	Displays vertical axis in dB units
dBm	Displays vertical axis in dBm units

3.5.2.6 Setting Measurement Displayed on Graph (Display Item)

This section describes how to set the type of measurement results displayed on the graph.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Display Item**, and switch to **Average** or **All**.

■ Setting options

Table 3.5.2.6-1 Display Item Setting Options

Settings	Description
Average	Displays average for each point
All	Displays average, min., and max. for each point

3.5.2.7 Setting Slot (Slot)

This section describes how to set a slot number for graph while **Rise and Fall** or **Slot** is selected in the Trace Mode.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Slot** to display the **Slot** dialog box.
5. Input the slot number, and then press **Set**.

■ Setting options

Table 3.5.2.7-1 Slot Setting Options

Item	Settings
Maximum Value	19
Minimum Value	0

3.5.2.8 Setting Upper Limit Line Segment Separator (Mask Setup-Upper Limit-Time Point/Segment)

This section describes how to set the Upper Limit Line Segment separator.

Note:

Mask user settings are not initialized by Preset.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Mask Setup** to display the **Power vs Time Mask Setup** dialog box.
4. Switch to **Rise Upper Limits** or **Fall Upper Limits** on the **Mask Setup** function menu.
5. Input Time Point value.
6. Press **Set** to input the input value.

Note:

The default **Power vs Time Mask Setup** dialog box is Rise Upper Limits.

■ Setting options

Table 3.5.2.8-1 Time Point Setting Options (at Rise Upper Limits)

Item	Settings
Maximum Value	999.99 × *k**
Minimum Value	–999.99 × *k**
Resolution	0.01

*: *k* is automatically set when setting the Symbol Rate. For the relation of the Symbol Rate setting and *k*, refer to Table 3.5.2.8-3.

Table 3.5.2.8-2 Time Point Setting Options (at Fall Upper Limits)

Item	Settings
Maximum Value	999.99 × *k**
Minimum Value	–999.99 × *k**
Resolution	0.01

*: *k* is automatically set when setting the Symbol Rate. For the relation of the Symbol Rate setting and k, refer to Table 3.5.2.8-3.

3

Measurement

Table 3.5.2.8-3 Relation of Symbol Rate Setting and *k*

Symbol Rate	*k*
100 sps ≤ Symbol Rate < 1 ksps	10 ms
1 ksps ≤ Symbol Rate < 10 ksps	1 ms
10 ksps ≤ Symbol Rate < 100 ksps	100 μs
100 ksps ≤ Symbol Rate < 1 Msps	10 μs
1 Msps ≤ Symbol Rate < 10 Msps	1 μs
10 Msps ≤ Symbol Rate < 100 Msps	100 ns
100 Msps ≤ Symbol Rate ≤ 140 Msps	10 ns

3.5.2.9 Setting Upper Limit Line Upper Limit and Evaluation Standard (Mask Setup-Upper Limit-Limit Setup)

This section describes how to set the upper limit and evaluation standard for the Upper Limit Line.

Note:

Mask user settings are not initialized by Preset.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Mask Setup** to display the **Power vs Time Mask Setup** dialog box.
4. Switch to **Rise Upper Limits** or **Fall Upper Limits** on the **Mask Setup** function menu.
5. Input REL Limit value, and press the unit button **dB**.
6. Input ABS Limit value, and press the unit button **dBm**.
7. Select the Fail Logic setting.
8. Press **Set** to input the input value.

Note:

The default **Power vs Time Mask Setup** dialog box is Rise Upper Limits.

■ Setting options

Table 3.5.2.9-1 REL Limit Setting Options

Item	Settings
Maximum Value	99.99 dB
Minimum Value	–99.99 dB
Resolution	0.01

Table 3.5.2.9-2 ABS Limit Setting Options

Item	Settings
Maximum Value	99.99 dBm
Minimum Value	–99.99 dBm
Resolution	0.01

Table 3.5.2.9-3 Fail Logic Setting Options

Settings	Description
ABS	Performs Pass/Fail evaluation using ABS Limit [dBm] setting
REL	Performs Pass/Fail judgment using REL Limit [dB] setting
ABS or REL	Judges as Pass if the evaluation is Pass either in ABS Limit (dBm) or in REL Limit (dB).
Off	Disables Pass/Fail evaluation

3.5.2.10 Setting Lower Limit Line Segment Separator (Mask Setup-Lower Limit-Time Point/Segment)

This section describes how to set the Lower Limit Line Segment separator.

Note:

Mask user settings are not initialized by Preset.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Mask Setup** to display the **Power vs Time Mask Setup** dialog box.
4. Switch to **Rise Upper Limits** or **Fall Upper Limits** on the **Mask Setup** function menu.
5. Input Time Point value, and press the unit button.
6. Press **Set** to input the input value.

Note:

The default **Power vs Time Mask Setup** dialog box is Rise Upper Limits.

■ Setting options

Table 3.5.2.10-1 Time Point Setting Options (at Rise Lower Limits)

Item	Settings
Maximum Value	999.99 × *k**
Minimum Value	–999.99 × *k**
Resolution	0.01

*: *k* is automatically set when setting the Symbol Rate. For the relation of the Symbol Rate setting and *k*, refer to Table 3.5.2.8-3.

Table 3.5.2.10-2 Time Point Setting Options (at Fall Lower Limits)

Item	Settings
Maximum Value	999.99 × *k**
Minimum Value	–999.99 × *k**
Resolution	0.01

*: *k* is automatically set when setting the Symbol Rate. For the relation of the Symbol Rate setting and *k*, refer to Table 3.5.2.8-3.

3.5.2.11 Setting Lower Limit Line Lower Limit and Evaluation Standard (Mask Setup-Lower Limit-Limit Setup)

This section describes how to set the lower limit and evaluation standard for the Lower Limit Line.

Note:

Mask user settings are not initialized by Preset.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** on the **Measure** function menu to display the **Power vs Time** function menu.
3. Press **Mask Setup** to display the **Power vs Time Mask Setup** dialog box.
4. Switch to **Rise Upper Limits** or **Fall Upper Limits** on the **Mask Setup** function menu.
5. Input REL Limit value, and press the unit button **dB**.
6. Input ABS Limit value, and press the unit button **dBm**.
7. Select the Fail Logic setting.
8. Press **Set** to input the input value.

Note:

The default **Power vs Time Mask Setup** dialog box is Rise Upper Limits.

■ Setting options

Table 3.5.2.11-1 REL Limit Setting Options

Item	Settings
Maximum Value	99.99 dB
Minimum Value	–99.99 dB
Resolution	0.01

Table 3.5.2.11-2 ABS Limit Setting Options

Item	Settings
Maximum Value	99.99 dBm
Minimum Value	–99.99 dBm
Resolution	0.01

Table 3.5.2.11-3 Fail Logic Setting Options

Settings	Description
ABS	Performs Pass/Fail evaluation using ABS Limit [dBm] setting
REL	Conducts Pass/Fail judgment using the REL Limit [dB] setting.
ABS or REL	Judges as Pass if the evaluation is Pass either in ABS Limit (dBm) or in REL Limit (dB).
Off	Disables Pass/Fail evaluation

3.5.2.12 Load Mask Setting-Standard Mask Table

Change the mask setting by loading the mask for Preset. Filter, Roll Off rate, and filter bandwidth settings can be loaded by loading the mask. When the mask is loaded normally, the mask title is displayed at bottom right of the Power vs Time graph. (Figure 3.5.2.12-1)

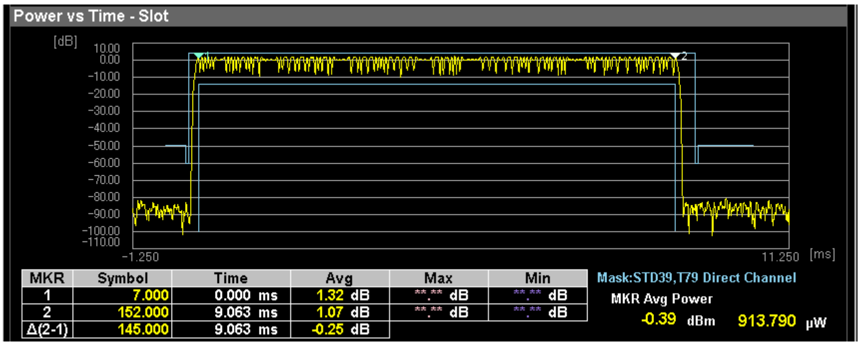


Figure 3.5.2.12-1 Mask Title Displayed

For the list of Preset with details, refer to Appendix F.

☞ Appendix F Mask for Power vs Time

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Load Mask Setting** to display the **Load Mask Setting** function menu.
4. Press **Standard Mask Table** to display the **Standard Mask Table** function menu.
5. Select the desired Preset setting from the list and press **Recall** to determine it as Mask setting value.

3.5.2.13 Mask Evaluation

This section shows an example of the limit line setting. How to set the upper limit lines as in Figure 3.5.2.13-1 is explained below. The setting values corresponding to Figure 3.5.2.13-1 are in Table 3.5.2.13-1. In this case, the lines actually used for judgment are shown in thick lines. If the measured value enters the shaded part, it is judged as Fail.

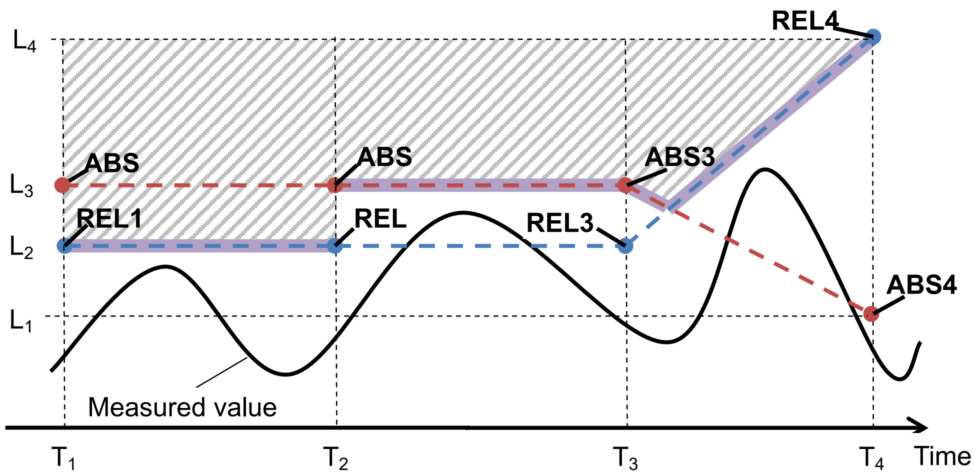


Figure 3.5.2.13-1 Mask Judgment Example

Table 3.5.2.13-1 Example of Limit Line Setting

No.	Time	REL [dB]	ABS [dBm]	Fail Logic
0	T1	L2 (REL1)	L3 (ABS1)	REL
1	T2	L2 (REL2)	L3 (ABS2)	ABS
2	T3	L2 (REL3)	L3 (ABS3)	ABS or REL
3	T4	L4 (REL4)	L1 (ABS4)	

In limit line setting, set Time, REL, ABS, and Fail Logic for each No. in the table.

First of all, define the line connecting REL1 to REL4 and the line connecting ABS1 to ABS4 as in Figure 3.5.2.13-1. REL[dB] specifies relative power to average power and ABS[dBm] specifies absolute power in ON interval.

Next, specify judgment method in each interval for the two lines by Fail Logic and make the limit line.

Fail Logic specifies if the line connecting one No. and the next No. is used as REL line or ABS line for judgment. ABS or REL, whichever has more margin, is used for judgment at each time. If set to Off, the interval is not judged.

3.5.2.14 Setting filter Type

The filter type used for Power vs Time measurement can be set.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Filter** to display the **Filter** function menu.
4. Press **Type,** and then select the filter type.

■ Setting options

Gaussian, Low Pass, Nyquist, Root Nyquist, Off

3.5.2.15 Setting filter Bandwidth(BW)

The filter bandwidth used for Power vs Time measurement can be set. The filter bandwidth is available when the filter type is **Gaussian**, **Low Pass**, **Nyquist**, or **Root Nyquist**.

The bandwidth is defined as follows, depending on the filter type:

Gaussian:	Equivalent noise bandwidth
Low Pass or **Nyquist**:	6-dB attenuation point
Root Nyquist:	3-dB attenuation point

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Filter** to display the **Filter** function menu.
4. Press **BW**, and then set the filter bandwidth.

■ Setting range

Table 3.5.2.15-1 Filter bandwidth (BW) Setting Options [Hz]

SPAN (minimum)*1	SPAN (maximum)	Minimum Value	Maximum Value
1 kHz	10 kHz	100 Hz	4 kHz
2.5 kHz	25 kHz	100 Hz	10 kHz
5 kHz	50 kHz	1.001 kHz	20 kHz
10 kHz	100 kHz	2.001 kHz	40 kHz
25 kHz	250 kHz	4.001 kHz	100 kHz
50 kHz	500 kHz	10.001 kHz	200 kHz
100 kHz	1 MHz	20.001 kHz	400 kHz
250 kHz	2.5 MHz	40.001 kHz	1 MHz
500 kHz	5 MHz	100.001 kHz	2 MHz
1 MHz	10 MHz	200.001 kHz	4 MHz
2.5 MHz	25 MHz	400.001 kHz	10 MHz
5 MHz	31.25 MHz	1.000 001 MHz	12.5 MHz
10 MHz	50 MHz	2.000 001 MHz	20 MHz
31.25 MHz	100 MHz	1.000 001 MHz	40 MHz
62.5 MHz	255 MHz	20.000 001 MHz	102 MHz
125 MHz	1 GHz*2	40.000 001 MHz	400 MHz*2
255 MHz	1 GHz*2	50.000 001 MHz	400 MHz*2
510 MHz	1 GHz*2	102.000 001 MHz	400 MHz*2
1 GHz*3	1 GHz*3	204.000 001 MHz	400 MHz

*1: Freq. Span at Modulation Analysis measurement

*2: When Carrier Frequency is less than 4.2 GHz, SPAN (maximum) is 510 MHz and Maximum Value is 204.000 000 MHz.

*3: This can be set when Carrier Frequency is 4.2 GHz or more.

Note:

The maximum value is limited depending on hardware option.

3.5.2.16 Setting filter Roll-off factor

The filter Roll-off factor used for Power vs Time measurement can be set. The filter Roll-off factor is available when the filter type is **Nyquist** or **Root Nyquist**.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Filter** to display the **Filter** function menu.
4. Press **Roll-off Factor,** and then set the roll-off factor.

■ Setting range

0.10 to 1.00

■ Resolution

0.01

3.5.2.17 Setting Vertical Scale in Graph (Logarithmic Scale)

Perform the following procedure to set the vertical scale in graph.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Scale** to display the **Scale** function menu.
5. Press **Vertical** to display the **Vertical** function menu.
6. Press **Log Scale Division** to switch the vertical scale.

■ Setting options

Table 3.5.2.17-1 Options for Logarithmic Scale Division

Options	Description
0.1 dB/Div	Sets the vertical scale to 0.1 dB/Div.
0.2 dB/Div	Sets the vertical scale to 0.2 dB/Div.
0.5 dB/Div	Sets the vertical scale to 0.5 dB/Div.
1 dB/Div	Sets the vertical scale to 1 dB/Div.
2 dB/Div	Sets the vertical scale to 2 dB/Div.
5 dB/Div	Sets the vertical scale to 5 dB/Div.
10 dB/Div	Sets the vertical scale to 10 dB/Div.
15 dB/Div	Sets the vertical scale to 15 dB/Div.
20 dB/Div	Sets the vertical scale to 20 dB/Div.

3.5.2.18 Setting Number of Vertical Scale Lines in Graph (Logarithmic Scale Line)

Perform the following procedure to set the number of vertical scale lines in graph for log scaling.

■ Procedure

1. Press **Measure** on the main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Scale** to display the **Scale** function menu.
5. Press **Vertical** to display the **Vertical** function menu.
6. Press **Log Scale Line** to change the number of scale lines.

■ Setting options

Table 3.5.2.18-1 Options for Logarithmic Scale Line

Options	Description
2	Sets the vertical scale line number to 2.
4	Sets the vertical scale line number to 4.
10	Sets the vertical scale line number to 10.
12	Sets the vertical scale line number to 12.

3.5.2.19 Wide Dynamic Range

This section describes how to use Wide Dynamic Range.

To use this function, the RF input level of the main frame has an upper limit and the restrictions apply to the settings.

☞ Appendix I Wide Dynamic Range

■ Procedure

1. Press **Measure** in main function menu to display the **Measure** function menu.
2. Press **Power vs Time** to display the **Power vs Time** function menu.
3. Press **Wide Dynamic Range** to turn it On or Off.

■ Options

Table 3.5.2.19-1 Wide Dynamic Range Options

Options	Description
On	Wide Dynamic Range is used.
Off	Wide Dynamic Range is not used.

Notes:

- Install the external attenuator so that the peak power of the input signal does not exceed +24 dBm.
- When Wide Dynamic Range is On, the following restrictions apply.
  Measurement Method: Single
  Pre-Amp: Off (unchangeable)
  Trigger Switch: On (unchangeable)
  Trigger Source: Frame (unchangeable)
- When a measurement other than Power vs Time is selected, Wide Dynamic Range is turned Off.

3.5.2.20 Rise and Fall Graph Scale Range (<Rise/Fall> Scale Range)

This section describes how to set the scale range of time axis in the Rise and Fall graph. It can be set when Trace Mode is **Rise and Fall**.

■ Procedure

1. Press **Trace** to display the **Trace** function menu.
2. Press **Trace Mode** to display the **Trace Mode** function menu and select **Rise and Fall**.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Scale** to display the **Scale** function menu.
5. Press **Horizontal** to display the **Horizontal (Scale)** function menu.
6. Press **<Rise> Range (+/-)** or **<Fall> Range (+/-)** to set the scale range.

■ Setting range

Table 3.5.2.20-1 <Rise/Fall> Scale Range

Item	Settings [symbol]
Minimum value	5
Minimum value	Burst Gap Size

3.5.2.21 Rise and Fall Graph Scale Offset (<Rise/Fall> Scale Offset)

This section describes how to set the Rise and Fall graph position by changing the scale offset of time axis. It can be set when Trace Mode is **Rise and Fall**.

■ Procedure

1. Press **Trace** to display the **Trace** function menu.
2. Press **Trace Mode** to display the **Trace Mode** function menu and select **Rise and Fall**.
3. Press **Trace** to display the **Trace** function menu.
4. Press **Scale** to display the **Scale** function menu.
5. Press **Horizontal** to display the **Horizontal (Scale)** function menu.
6. Change the scale offset of time axis by pressing **<Rise> Offset** or **<Fall> Offset** and set the Rise and Fall graph position.

■ Setting range

Table 3.5.2.21-1 <Rise/Fall> Scale Offset Setting Range

Item	Settings [symbol]
Minimum value	– (Burst Gap Size – Scale Range)
Maximum value	Burst Gap Size – Scale Range

3.5.3 Power Meter Measurement

Start the application (Power Meter Function first. Select F2 (Power Meter) in the Measure function menu to invoke the Power Meter function.

Settings of Carrier Frequency, Offset, and Offset Value are automatically reflected on the corresponding parameters. When these parameters are being recalled, you cannot execute Recall Current Application in Section 3.6.2 “Recalling parameters” of *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual Mainframe Operation*, *MS2830A Signal Analyzer Operation Manual Mainframe Operation*, *MS2840A Signal Analyzer Operation Manual Mainframe Operation*, or *MS2850A Signal Analyzer Operation Manual Mainframe Operation*.

For operations when invoking the function, refer to *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual Mainframe Operation*, *MS2830A Signal Analyzer Operation Manual Mainframe Operation*, *MS2840A Signal Analyzer Operation Manual Mainframe Operation*, or *MS2850A Signal Analyzer Operation Manual Mainframe Operation*.

3.6 Setting Markers

3.6.1 Modulation Analysis

Pressing F5 (Marker) on the main function menu or Marker displays the page 1 one of the Marker function menu.

The marker setting and whether to display the marker change depending on the Trace Mode setting for the trace to be manipulated.

☞ 3.8 Trace Mode

3.6.2 Power vs Time

This section describes how to set the parameters related to markers displayed at Power vs Time of the Measurement items (Measure).

☞ 3.5.2 Power vs Time Measurement

3.6.2.1 Displaying/Hiding Markers (Marker)

This section describes how to display or hide markers at the top and bottom of the graph window.

■ Procedure

1. Press **Marker** on the main function menu to display the **Marker** function menu.
2. Enable or disable by pressing **Marker**.

■ Setting range

Table 3.6.2.1-1 Marker Setting Options

Settings	Description
On	Enables marker function
Off	Disables marker function

3.6.2.2 Setting Graph Marker Position (Point)

This section describes how to set the positions of Marker 1 and Marker 2 in graph display.

■ Procedure [Changing Marker 1 position]

1. Press **Marker** on the main function menu to display the **Marker** function menu.
2. Select **Marker Number 1** from the **Marker** function menu.
3. Sets the Marker position by rotary knob, cursor keys, or ten keys.

■ Setting range

Table 3.6.2.2-1 Point Setting Range

Item	Settings [symbol]
Maximum value	(Slot Length×All Slot Number) + 20
Minimum value	–20

3.6.2.3 Displaying the Modulation Analysis Area (Marker to Modana Area)

The area that is currently under the modulation analysis is indicated by Marker 1 and Marker 2 in the graph.(Modana: Modulation Analysis)

Marker 1 and Marker 2 indicate the points below.
Marker 1: Measurement Offset [Symbol]
Marker 2: Measurement Offset + Measurement Interval [Symbol]

■ Procedure

1. Press **Marker** on the main function menu to display the **Marker** function menu.

2. Select **Marker to Modana** (Modulation Analysis) **Area**.

Note:

To hide the markers, set Marker to Off.

3.7 Setting 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.

■ Setting options

On, Off

Trigger Source

■ Summary

This sets the trigger source.

■ Setting options

Video	The Capture starts in synchronization with the rise or fall of the waveform.
Wide IF Video	An IF signal with a wide passing band of about 50 MHz is detected, and measurement starts in synchronization with the rise or fall of the detected signal.
External	Measurement starts with external trigger signal input.
External2	Measurement starts with external trigger signal input 2. (MS2850A only)
SG Marker	Starts measurement by the timing of the Vector Signal Generator option.
Frame	Starts measurement with the trigger of Frame Trigger Period which was generated inside the signal analyzer.

Trigger Slope

■ Summary

Sets the trigger polarity.

■ Setting options

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

Video Trigger Level

■ Summary

Sets the level threshold for detecting the slot.

■ Setting options

(–150 + Level Offset Value) to (+50 + Level Offset Value) dBm

■ Resolution

1 dBm

Wide IF Video Trigger Level

■ Summary

This sets the level threshold value for slot detection.

■ Setting range

(–60 + Level Offset Value) to (+50 + Level Offset Value) dBm

■ Resolution

1 dBm

Frame Trigger Period AUTO

■ Summary

This sets whether to set Frame Trigger Period automatically.

■ Setting options

On	Sets Frame Trigger Period automatically.
Off	Does not set Frame Trigger Period automatically. (manual setting is enabled)

■ Remarks

This can be set when Trigger Switch is On and Trigger Source is Frame.

When it is On, Frame Trigger Period is automatically calculated by the following formula.

(Slot Length [symbol] × Slot Per Frame [slot]) / Symbol Rate [sps]

Frame Trigger Period

■ Summary

This sets the frame trigger period.

■ Setting range

0.0000002 to 2.6843545 s

■ Remarks

This can be set when Trigger Switch is On, Trigger Source is Frame, and Frame Trigger Period AUTO is Off.

Trigger Delay

■ Summary

Sets the trigger delay.

■ Setting range

–2.00000000 to +2.00000000 s

3.8 Trace Mode

The Trace Mode setting specifies the type of the measurement result displayed on the Trace screen.

3.8.1 Modulation Analysis

When the measurement item (Measure) is set to Modulation Analysis, selectable Trace Mode types are as in Table 3.8.1-1.

Table 3.8.1-1 Trace Mode Type

Trace Mode	Function
Constellation	Displays the waveform of the analysis interval on IQ coordinate or frequency axis graph.
EVM vs Symbol	Displays the EVM of each symbol on a graph.
Magnitude Error vs Symbol	Displays the amplitude error of each symbol on a graph.
Phase Error vs Symbol	Displays the phase error of each symbol on a graph.
Frequency vs Symbol	Displays the FM frequency deviation of the waveform in the analysis interval on a graph.
Trellis	Displays the phase transition of the waveform in the analysis interval on a graph.
Eye Diagram	Displays the amplitude of the I phase and Q phase of the waveform in the analysis interval on a graph.
Numeric	Displays the numeric results.
I and Q vs Symbol	Displays the amplitude of the I phase and Q phase of the waveform in the analysis interval on a graph.
Magnitude vs Symbol	Displays the amplitude of the waveform in the analysis interval on a graph.
Phase vs Symbol	Displays the phase of the waveform in the analysis interval on a graph.
Signal Monitor	Displays the spectrum of the waveform in the analysis interval on a graph.
Symbol Table	Displays the demodulation bit for each symbol.
EqualizerAmplitude	Displays the equalizer amplitude characteristics.
Equalizer Phase	Displays the equalizer phase characteristics.
Equalizer Group Delay	Displays the equalizer group delay characteristics.
Equalizer Impulse Response	Displays the equalizer impulse response.
FSK Error vs Symbol	Displays the FSK error of each symbol on a graph.
Fidelity vs Symbol	Displays the analysis results of Modulation Fidelity vs Symbol.
Histogram	Displays the appearance frequency of each symbol.
Custom Numeric	Displays the numerical results that the user has specified in numerical values and bars.
EVM vs Subcarrier	Displays the EVM per subcarrier in the graph.

Whether the measurement result is displayed depends on the Modulation Type setting. The relationship between Modulation Type and the result display are described in Table 3.8.1-2. If the measurement result is not displayed, 'Not Supported' is displayed in the trace area.

Table 3.8.1-2 Modulation Type and Result Display

Trace Mode	Modulation Type			SCBT
	2FSK 4FSK H-CPM	MSK	Other than those left	
Constellation	✓	✓	✓	✓
EVM vs Symbol	✓	✓	✓	✓
Magnitude Error vs Symbol	✓	✓	✓	–
Phase Error vs Symbol	✓	✓	✓	–
Frequency vs Symbol	✓	✓	–	–
Trellis	✓	✓	✓	–
Eye Diagram	✓	✓	✓	–
Numeric	✓	✓	✓	✓
I and Q vs Symbol	✓	✓	✓	–
Magnitude vs Symbol	✓	✓	✓	–
Phase vs Symbol	✓	✓	✓	–
Signal Monitor	✓	✓	✓	–
Symbol Table	✓	✓	✓	–
Equalizer Amplitude	–	–	✓	–
Equalizer Phase	–	–	✓	–
Equalizer Group Delay	–	–	✓	–
Equalizer Impulse Response	–	–	✓	–
FSK Error vs Symbol	✓	✓	–	–
Fidelity vs Symbol	✓	✓	–	–
Histogram	✓	✓	–	–
Custom Numeric	✓	✓	✓	✓
EVM vs Subcarrier	–	–	–	✓

✓: Displays measured results.

–: Does not display measured results.

The measurement result display format and marker setting conditions differ for each Trace Mode. For details, refer to the following sections:

3.8.1.1 Constellation

Displays the Constellation analysis result in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

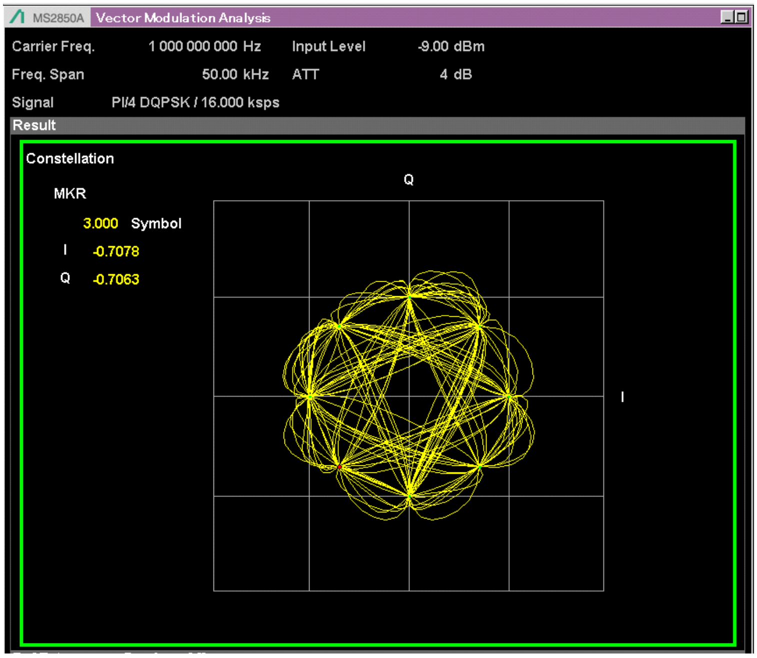


Figure 3.8.1.1-1 Constellation Result (Interpolation On)

Graph display result

■ Summary

Displays the waveform in the analysis interval on the IQ axis. The IQ waveform is normalized and displayed with the vector of the outermost symbol position. When the modulation is set to 2FSK, 4FSK, or H-CPM, the frequency deviation of each symbol can be displayed with the horizontal axis as normalized frequency.

Scale

■ Summary

Sets the interpolation between the symbols displayed on the graph.

Scale: Interpolation

■ Summary

Sets the data interpolation between the symbols displayed on the graph and the display complementation. On the interpolation display, data is interpolated by using the number of splits between symbols specified in Points/Symbol and a graph is displayed with each data connected with straight lines.

■ Setting options

On	Performs interpolation display.
Off	Does not perform interpolation display.

Scale: Points/Symbol

■ Summary

Sets how many splits are allowed when the data interpolation between symbols is executed.

■ Setting options

1point	Does not split the symbol interval (Used for connecting the symbols with straight lines.).
2point	Split the symbol interval into 2 (This is available only when Modulation Type is O-QPSK.).
8points	Splits the symbol interval into 8.

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Constellation)

■ Summary

When Frame Formatted or Non-Formatted is selected for Measuring Object, sets the symbol for marker target in Constellation results display. When SCBT is selected for Measuring Object, sets OFDM symbol for marker target.

■ Setting range

When Frame Formatted or Non-Formatted is selected for Measuring Object.
(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data,
☞ 3.4.10 Slot

When SCBT is selected for Measuring Object.
0 to (Symbol number defined in Subcarrier MAP) – 1

☞ 3.4.14 Subcarrier Map

■ Resolution

When Frame Formatted or Non-Formatted is selected for Measuring Object.

1 symbol	When Interpolation is set to Off, or Interpolation is set to On and Points/Symbol is set to 1 point
0.125 symbol	When Interpolation is set to On and Points/Symbol is set to 8 points
0.5 symbol	When Interpolation is set to On and Points/Symbol is set to 2 points

When SCBT is selected for Measuring Object.
1 symbol

Marker Subcarrier Number (Constellation)

■ Summary

This is available when SCBT is selected for Measuring Object. Sets the subcarrier for marker target in Constellation results display.

■ Setting range

0 to (FFT Size – (Lower Guard Subcarrier)
– (Upper Guard Subcarrier) – 1)

☞ 3.4.6 Modulation

■ Resolution

1 subcarrier

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

Result Select

■ Summary

Sets Constellation and Eye Diagram to display in frequency or in IQ.

■ Setting options

Linear	Displays Constellation in frequency. (This is available only when Modulation Type is 2FSK, 4FSK, H-CPM, or MSK.)
IQ	Displays Constellation in IQ.

3.8.1.2 EVM vs Symbol

Displays EVM vs Symbol analysis result in the Trace. The result of each such analysis is displayed, regardless of the storage mode.

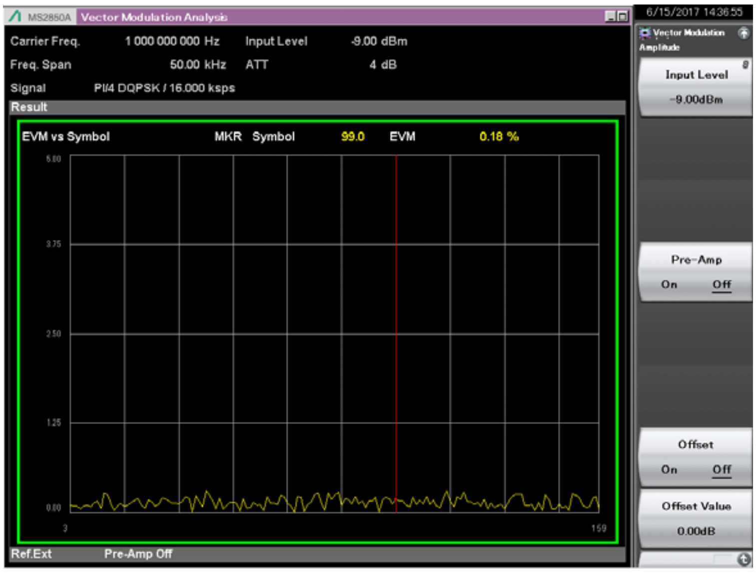


Figure 3.8.1.2-1 EVM vs Symbol Result

Graph result display

■ Summary

Displays EVM of each symbol in the analysis interval as a percentage.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper limit of the vertical axis scale of the graph result.

■ Setting range

5%, 10%, 20%, 50%

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (EVM vs Symbol)

■ Summary

Sets the target of the marker on the EVM vs Symbol result display.

■ Setting range

When Frame Formatted or Non-Formatted is selected for Measuring Object.

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data

☞ 3.4.10 Slot

When SCBT is selected for Measuring Object.

0 to (Symbol number defined in Subcarrier MAP) – 1

☞ 3.4.14 Subcarrier Map

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.3 Magnitude Error vs Symbol

Displays Magnitude Error vs Symbol analysis result in the Trace. The result of each such analysis is displayed, regardless of the storage mode.

Figure 3.8.1.3-1 Magnitude Error vs Symbol Result

Graph display result

■ Summary

Displays the amplitude error of each symbol in the analysis interval as a percentage.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting range

±5%, ±10%, ±20%, ±50%

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Magnitude Error vs Symbol)

■ Summary

Sets the marker target in the Magnitude Error vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval-1)

☞ 3.4.8 Data

☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.4 Phase Error vs Symbol

Displays Phase Error vs Symbol analysis result in the Trace. The result of each such analysis is displayed, regardless of the storage mode.

Figure 3.8.1.4-1 Phase Error vs Symbol Result

Graph display result

■ Summary

Displays the phase error of each symbol in the analysis interval in degrees.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting range

±5 degree, ±10 degree, ±20 degree, ±50 degree

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Phase Error vs Symbol)

■ Summary

Sets the marker target in the Phase Error vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data

☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.5 Frequency vs Symbol

Displays Frequency vs Symbol analysis result in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

Figure 3.8.1.5-1 Frequency vs Symbol Result

Graph display result

■ Summary

Displays the frequency deviation of each 1/8th of the symbol interval in the analysis interval in Hz units.

Scale

■ Summary

Sets vertical scale of a graphical result.

■ Setting range

The graph scale is calculated from the Span value, which is calculated from the value of the setting parameter. The upper and lower limits of the graph are calculated by using the following formula:

Graph's upper/lower limits = ±(Span/ 2) Hz

☞ 3.4.6 Modulation

Scale: Zoom

■ Summary

Sets the vertical scale for the graphical waveform of results.

■ Setting range

0.10 to 5.00

■ Default

1.00

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Frequency vs Symbol)

■ Summary

Sets the marker target in the Frequency vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data
☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

Highlight Symbols

■ Summary

Selects whether to highlight symbols.

■ Setting options

On, Off

3.8.1.6 Trellis

Displays the analysis result of the phase transition in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

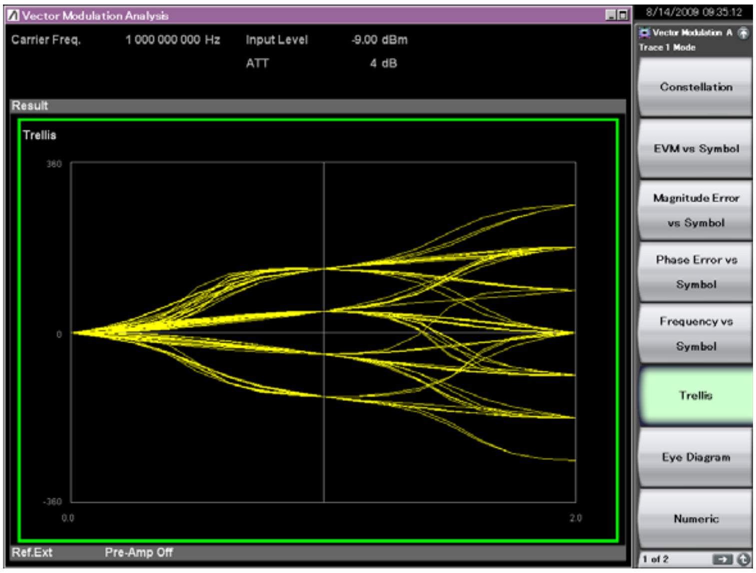


Figure 3.8.1.6-1 Trellis Result

Graph display result

■ Summary

Displays the phase transition for each 1/8th of the symbol in the analysis interval, in degrees.

The graph's horizontal axis is displayed in intervals of 2 symbols.

Scale

■ Summary

The graph's vertical axis scale is fixed to ±360 degrees.

Marker

■ Summary

There is no marker function.

3.8.1.7 Eye Diagram

Displays the amplitude analysis result of the I phase and Q phase, in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

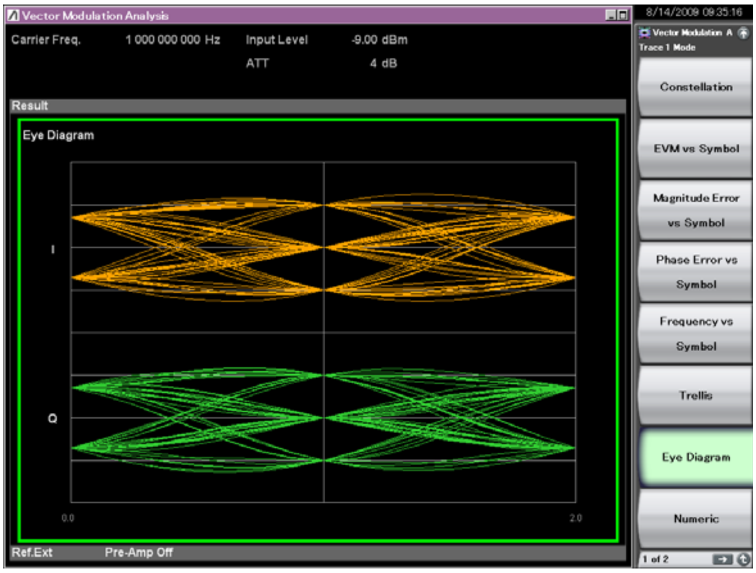


Figure 3.8.1.7-1 Eye Diagram Result

Graph display result

■ Summary

Displays the normalized amplitude of the I phase and Q phase for each 1/8th of the symbol in the analysis interval.
When modulation is set to 2FSK, 4FSK, or H-CPM, the frequency deviation of each symbol can be displayed with the horizontal axis as normalized frequency.
The graph's horizontal axis is displayed in 2-symbol intervals.

Scale

■ Summary

Sets the vertical scale for the graphical plot of results.

Scale: Zoom

■ Summary

Sets the vertical scale for the graphical waveform of results.

■ Setting range

0.01 to 5.00

■ Default

1.00

Scale: Offset

■ Summary

Sets the vertical-scale offset for the graphical plot of results. This is added to the reference scale. This is available only when Modulation Type is 2FSK, 4FSK or H-CPM.

■ Setting range

±(Symbol Rate) Hz

■ Default

0 [Hz]

Marker

■ Summary

No marker function is available.

Result Select

■ Summary

Sets Constellation and Eye Diagram to display in frequency or in IQ.

■ Setting options

Linear	Displays Eye Diagram in frequency. When the Modulation Type is 2ASK or 4ASK, the waveform given by $\sqrt{I^2+Q^2}$ is plotted.
IQ	Displays Eye Diagram in IQ.

3.8.1.8 Numeric

Displays the numeric result of modulation analysis in the trace area. 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 maximums of the results in the specified number of measurements for Average & Max, respectively.

☞ 3.5.1.1 Trace

The measured items vary depending on the Modulation Type setting. If a 4-trace split screen is displayed, Filtered Power, Frequency Error (ppm), Droop Factor, MER (rms, peak), or Deviation at Ts/2 is not displayed on the screen.

Figure 3.8.1.8-1 Numeric Result (When Modulation Type is PI/4DQPSK)

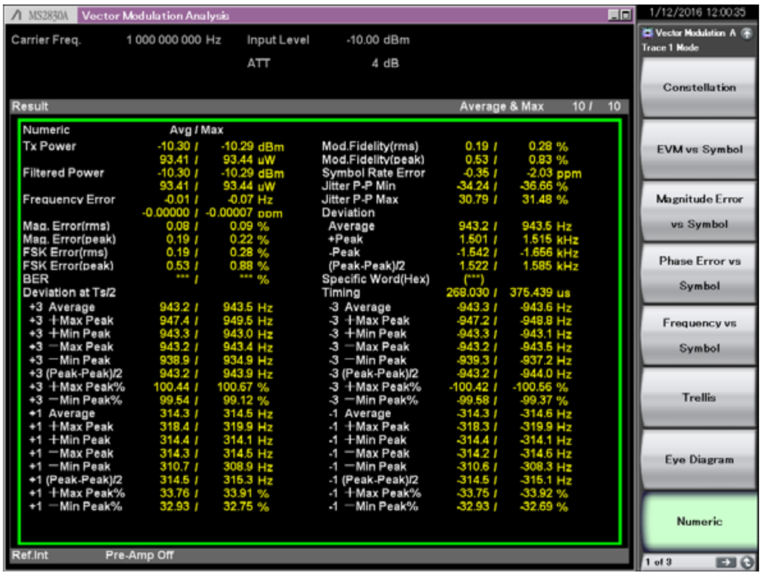


Figure 3.8.1.8-2 Numeric Result
(When Modulation Type is 4FSK)

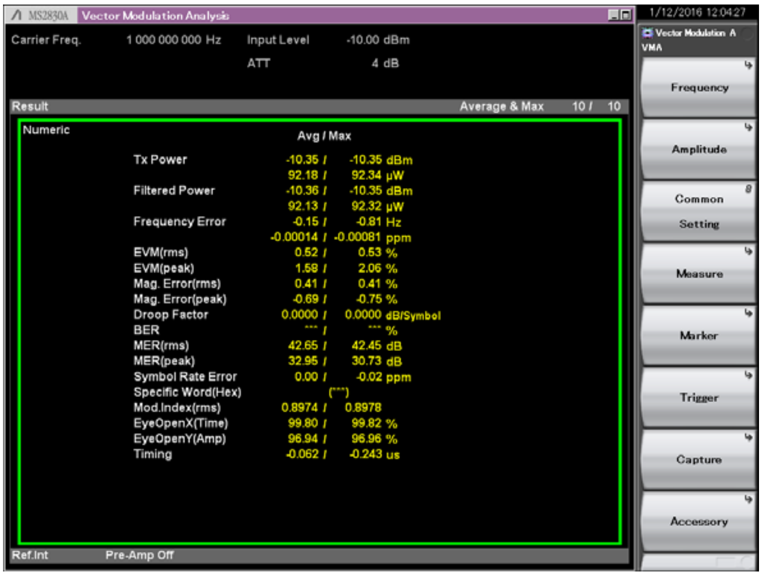


Figure 3.8.1.8-3 Numeric Result
(When Modulation Type is 2ASK/4ASK)

Figure 3.8.1.8-4 Numeric Result (SCBT)

Scale – [Power]

■ Summary

Toggles between [dBm] and [W] for the unit of measurement result. Select the Unit menu by pressing F5 (Unit) at Scale menu, select Unit-Power menu by pressing F1 (Power), and select either F1 (dBm) or F5 (W).

Scale – [Symbol Rate]

■ Summary

Sets the unit of numeric results, selecting one from [ppm], [mHz] and [Hz]. On the Scale menu F5 (Unit), select the Unit menu, select F2 (Symbol Rate), select the Unit-Symbol Rate menu, and then select F1 (ppm), F2 (mHz) or F3 (Hz).

Table 3.8.1.8-1 Measured Items

Measured Items	Modulation Type			SCBT
	2FSK 4FSK H-CPM	2ASK 4ASK	Other than those left	
Tx Power	✓	✓	✓	✓
Filtered Power	✓	✓	✓	–
Frequency Error	✓	✓	✓	✓
EVM (rms)	–	✓	✓	✓
EVM (peak)	–	✓	✓	✓
Phase Error (rms)	–	–	✓	–
Phase Error (peak)	–	–	✓	–
Magnitude Error (rms)	✓	✓	✓	–
Magnitude Error (peak)	✓	✓	✓	–
FSK Error (rms)	✓	–	–	–
FSK Error (peak)	✓	–	–	–
Modulation Fidelity (rms)	✓	–	–	–
Modulation Fidelity (peak)	✓	–	–	–
Symbol Rate Error	✓	✓	✓	–
Jitter P-P Min	✓	–	–	–
Jitter P-P Max	✓	–	–	–
Deviation	✓	–	–	–
Deviation rms (%)	✓*2	–	–	–
Deviation at Ts/2	✓*3	–	–	–
BER	✓*4	✓*4	✓*4	–
Specific Word (Hex)	✓	✓	✓	–
Origin Offset	–	–	✓	✓
Droop Factor	–	✓	✓	–
IQ Gain Imbalance	–	–	✓*6	–
Quadrature Error	–	–	✓*6	–
MER (rms)	–	✓	✓	–
MER (peak)	–	✓	✓	–
Offset EVM (rms)	–	–	✓*1	–
Offset EVM (peak)	–	–	✓*1	–
Modulation Index (rms)	–	✓*5	–	–
Eye Opening (X-Time)	–	✓*5	–	–
Eye Opening (Y-Amplitude)	–	✓*5	–	–
Timing Offset	✓	✓	✓	✓

✓: Displays measured results.

–: Does not display measured results.

*1: Only O-QPSK
*2: Only 2FSK
*3: Only 2FSK and 4FSK
*4: Only BER = On
*5: Only 2ASK and 4ASK
*6: Except BPSK

Tx Power

■ Summary

Displays the average RF level before the signal has passed through the measurement filter

Filtered Power

■ Summary

Displays the average RF level after the signal has passed through the measurement filter.

Frequency Error

■ Summary

Displays the frequency error.

EVM (rms)

■ Summary

Displays rms value of EVM.

EVM (peak)

■ Summary

Displays the EVM Peak value and the number of the symbol for which the peak value was detected.

Phase Error (rms)

■ Summary

Displays rms value of Phase Error.

Phase Error (peak)

■ Summary

Displays the Phase Error Peak value and the number of the symbol for which the peak value was detected.

Magnitude Error (rms)

■ Summary

Displays rms value of Magnitude Error.

Magnitude Error (peak)

■ Summary

Displays the Magnitude Error Peak value and the number of the symbol for which the peak value was detected.

FSK Error (rms)

■ Summary

Displays rms value of FSK Error.

FSK Error (peak)

■ Summary

Displays the FSK Error Peak value and the number of the symbol for which the peak value was detected.

Modulation Fidelity (rms)

■ Summary

Displays rms value of Modulation Fidelity.

Modulation Fidelity (peak)

■ Summary

Displays the Modulation Fidelity Peak value and the number of the symbol for which the peak value was detected.

Symbol Rate Error

■ Summary

Displays Symbol Rate Error. Select a measurement mode with Method of Symbol Rate Error.

☞ 3.4.12 Detail Settings

Jitter P-P Min

■ Summary

Displays the minimum peak-to-peak value for jitter.

Jitter P-P Max

■ Summary

Displays the maximum peak-to-peak value for jitter.

Deviation

■ Summary

Displays the average value, peak value, and peak-to-peak value of the frequency deviation.

Deviation rms (%)

■ Summary

Displays rms value of Deviation in %.

Deviation at Ts/2

■ Summary

Displays the average value, the maximum + frequency peak value, the minimum + frequency peak value, the maximum – frequency peak value, the minimum – frequency peak value, and peak-to-peak value of the frequency deviation.

BER

■ Summary

Displays the Bit Error Rate.

Specific Word

■ Summary

Displays an extracted part of specific bits.

Origin Offset

■ Summary

Displays origin offset value.

Droop Factor

■ Summary

Displays droop factor.

IQ Gain Imbalance

■ Summary

Displays the amplitude difference between the I phase and the Q phase.

Quadrature Error

■ Summary

Displays how perpendicular the I phase is to the Q phase.

MER (rms)

■ Summary

Displays rms value of MER.

MER (peak)

■ Summary

Displays the MER peak value and the number of the symbol for which the peak value was detected.

Offset EVM (rms)

■ Summary

Displays rms value of Offset EVM.

Offset EVM (peak)

■ Summary

Displays the Offset EVM peak value and the number of the symbol for which the peak value was detected.

Modulation Index (rms)

■ Summary

Displays the Modulation Index in ratio (no unit).

Eye Opening (X-Time)

■ Summary

Displays the Eye Opening (X-Time) in %.

Eye Opening (Y-Amplitude)

■ Summary

Displays the Eye Opening (Y-Amplitude) in %.

Timing Offset

■ Summary

Displays the time difference between external trigger and Symbol [0], in units of μs.

☞ 3.7 Setting Trigger
☞ 3.4.11 Search

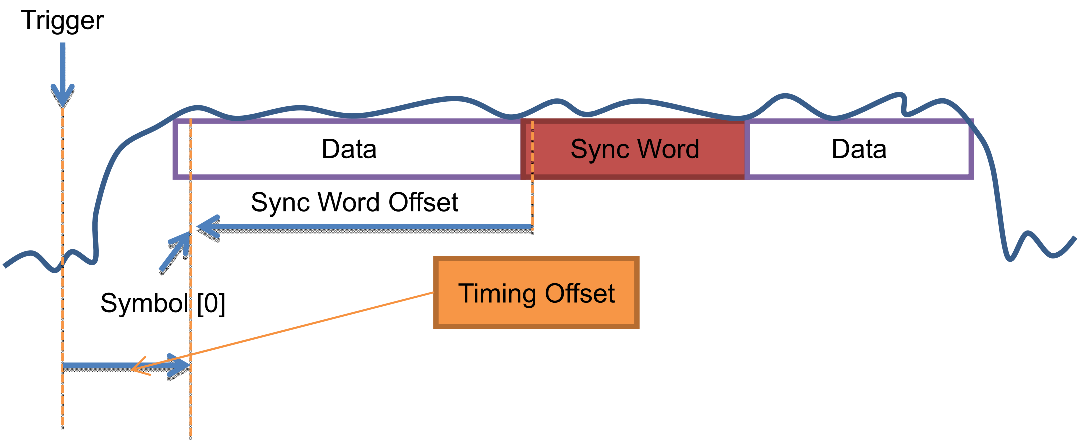


Figure 3.8.1.8-5 Timing Offset Measurement Mode

3.8.1.9 I and Q vs Symbol

Displays the amplitude analysis results of the I phase and the Q phase, in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

Figure 3.8.1.9-1 I and Q vs Symbol Result

Graph display result

■ Summary

Displays the normalized amplitude of the I phase and Q phase for each 1/8th of the symbol in the analysis interval.

Scale

■ Summary

The graph's vertical axis scale is fixed to ±2.0.

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (I and Q vs Symbol)

■ Summary

Sets the marker target in the I and Q vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data
☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.10 Magnitude vs Symbol

Displays Magnitude vs Symbol analysis result in the Trace. The result of each such analysis is displayed, regardless of the storage mode.

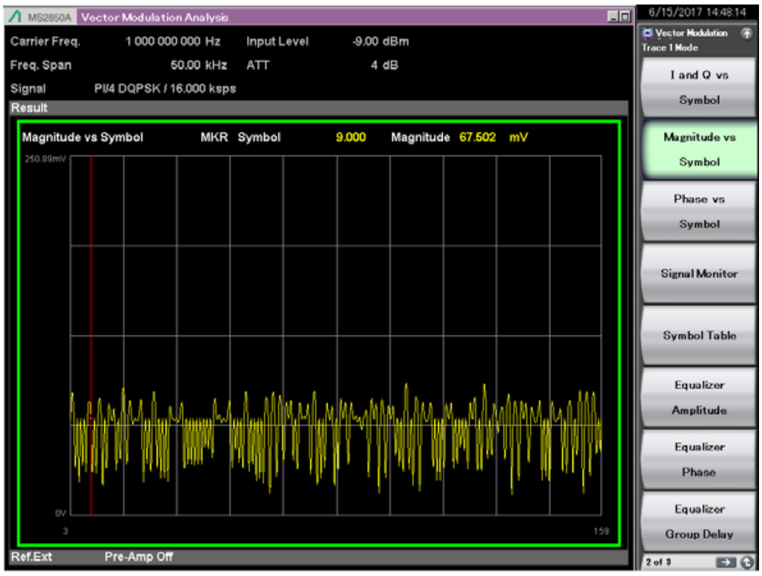


Figure 3.8.1.10-1 Magnitude vs Symbol Result

Graph display result

■ Summary

Displays the amplitude for each 1/8th of the symbol in the analysis interval in volts.

Scale

■ Summary

The graph's vertical axis scale is fixed according to the Input Level setting.

0 to $\sqrt{50 \times 1000 \times 10^{(InputLevel+10)/10}}$ mV

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Magnitude vs Symbol)

■ Summary

Sets the marker target in the Magnitude vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data
☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.11 Phase vs Symbol

Displays the analysis result of Phase vs Symbol in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

Figure 3.8.1.11-1 Phase vs Symbol Result

Graph display result

■ Summary

Displays the phase for each 1/8th of the symbol in the analysis interval, in degrees.

Scale

■ Summary

Sets vertical scale of a graphical result.

■ Setting range

The graph's vertical axis scale is up to ±180 degrees.

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (Phase vs Symbol)

■ Summary

Sets the marker target in the Phase vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data
☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.12 Signal Monitor

Displays the spectrum in the trace area. The result of each such analysis is displayed, regardless of the storage mode.

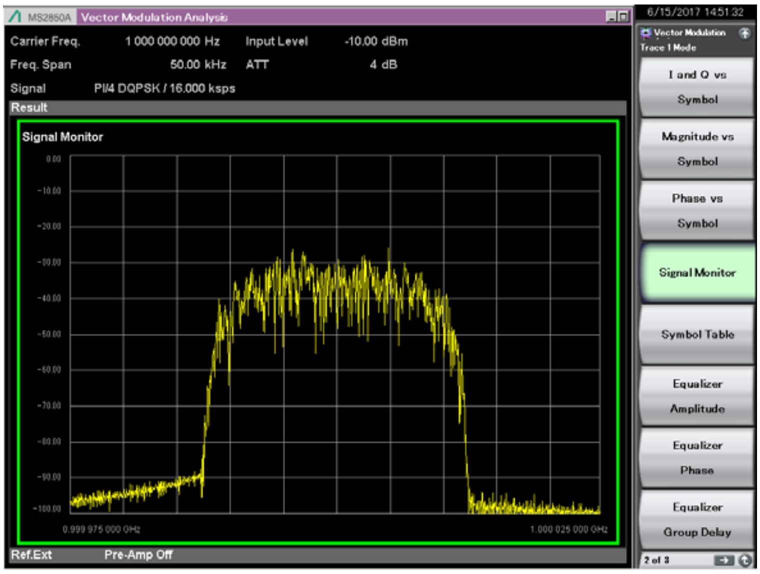


Figure 3.8.1.12-1 Signal Monitor Result

Graph display result

■ Summary

Displays the spectrum in the analysis interval.
The range of the graph's horizontal axis is fixed to ±(Span/2) [Hz].
The value of Span is calculated from the Modulation setting and the Symbol Rate setting.

☞ 3.4.6 Modulation

Scale

■ Summary

Sets vertical scale of a graphical result.

■ Setting range

–10 to –100 dB (in 0.1 dB steps)
Reference level (0 dB) shall be +10 dB from the Input Level setting.

Marker

■ Summary

No marker function is available.

3.8.1.13 Symbol Table

Displays the analysis result of Symbol Table in the trace area. The result of each such analysis is displayed, regardless of the storage mode setting.

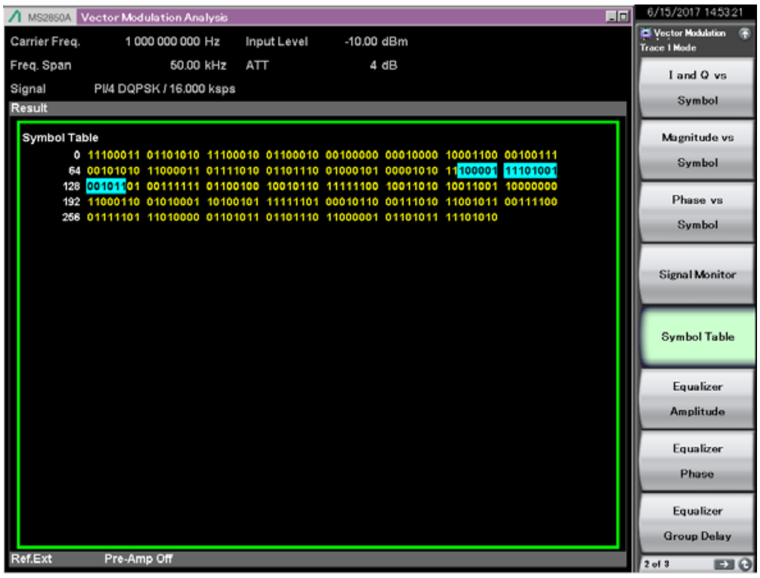


Figure 3.8.1.13-1 Symbol Table Result

Graph display result

■ Summary

Displays the demodulation result for each symbol.

When a sync word is set for Sync Word of the Search parameters and Sync Word Search is On, the sync words found are highlighted in blue. In this search, if Scale is set to **Hex**, even a hexadecimal number that includes a sync word only partially is highlighted in blue.

Thus, depending on the position of the sync words found, the sync word and the sync word found may not be the same hexadecimal numbers.

In the figure above, “E1 E9 2D” is highlighted in blue with the scale set to **Hex** when the sync word is “87A4B (1000 0111 1010 0100 1011)”.

Scale

■ Summary

Switches the measurement unit of numeric result between **Binary** and **Hex**. On the Scale menu, select F5 (Unit) to select the Unit menu, select F4 (Symbol) to select the Symbol menu, and specify F1 (Binary) or F2 (Hex).

3.8.1.14 Equalizer Amplitude

This function displays the Equalizer Amplitude analysis results at Trace. The analysis results are displayed each time irrespective of the Storage mode setting.
The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

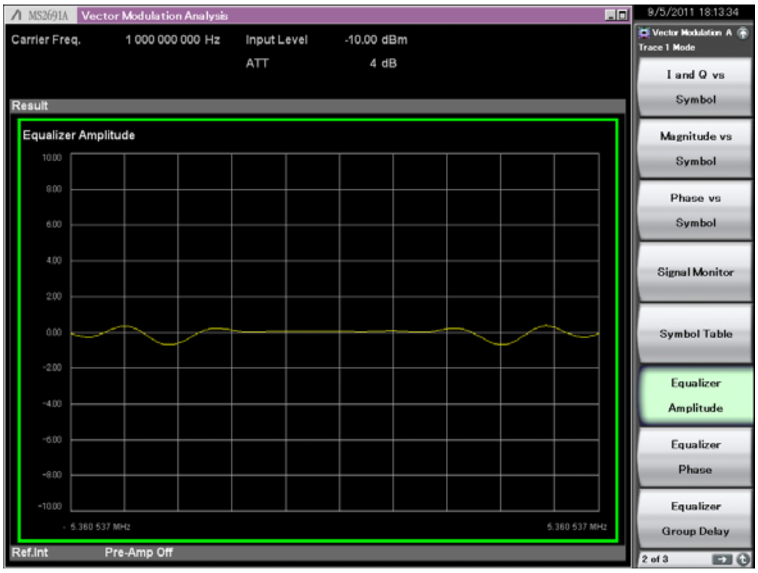


Figure 3.8.1.14-1 Equalizer Amplitude Result

Graph display result

■ Summary

Displays the equalizer amplitude characteristics in dB.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting options

+0.1 dB to +50 dB

3.8.1.15 Equalizer Phase

This displays the Equalizer Phase analysis results at Trace. The analysis results are displayed each time irrespective of the Storage mode setting. The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

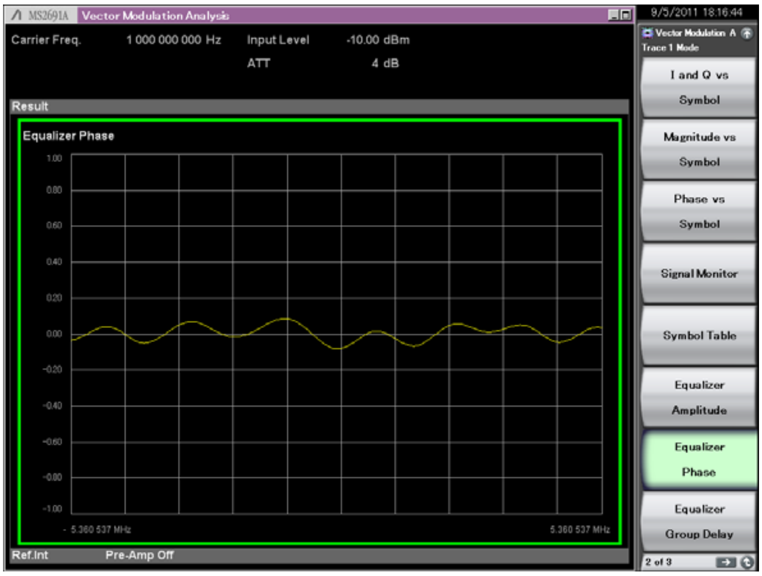


Figure 3.8.1.15-1 Equalizer Phase Result

Graph display result

■ Summary

Displays the equalizer phase characteristics in degree.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting options

+1 Degree to +180 degree

3.8.1.16 Equalizer Group Delay

This displays the Equalizer Group Delay analysis results at Trace. The analysis results are displayed each time irrespective of the Storage mode setting.
The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

Figure 3.8.1.16-1 Equalizer Group Delay Result

Graph display result

■ Summary

Displays the equalizer group delay characteristics in s.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting options

+100 ns to +1 ms

3.8.1.17 Equalizer Impulse Response

This displays the Equalizer Impulse Response analysis results at Trace. The analysis results are displayed each time irrespective of the Storage mode setting.
The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

Figure 3.8.1.17-1 Equalizer Impulse Response Result

Graph display result

■ Summary

Displays the equalizer impulse response in dB.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper and lower limits of the vertical axis scale of the graph result.

■ Setting options

20 dB, 50 dB, 100 dB

3.8.1.18 FSK Error vs Symbol

Displays FSK Error vs Symbol analysis result in the Trace. The result of each such analysis is displayed, regardless of the storage mode setting.

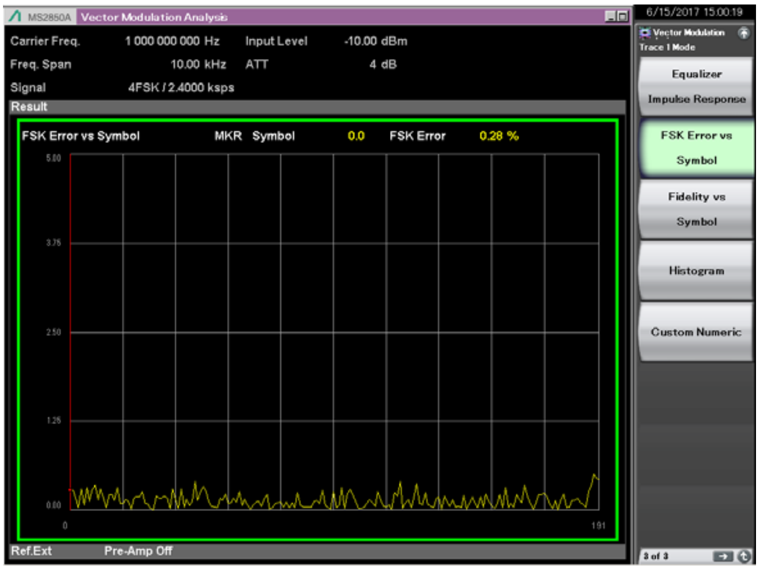


Figure 3.8.1.18-1 FSK Error vs Symbol Result

Graph display result

■ Summary

This displays the FSK Error for each symbol in the analysis segment in % units.

Scale

■ Summary

Sets vertical scale of a graphical result.

Scale: Vertical

■ Summary

Sets the upper limit of the vertical axis scale of the graph result.

■ Setting options

5%, 10%, 20%, 50%

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Number (FSK Error vs Symbol)

■ Summary

Sets the marker target in the FSK Error vs Symbol result display.

■ Setting range

(Measurement Offset) to (Measurement Interval – 1)

☞ 3.4.8 Data
☞ 3.4.10 Slot

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.19 Fidelity vs Symbol

Displays the analysis results of Modulation Fidelity vs Symbol in Trace. The results are displayed only when the modulation is set to 2FSK, 4FSK, or H-CPM. The result of each analysis is displayed, regardless of the storage mode setting.

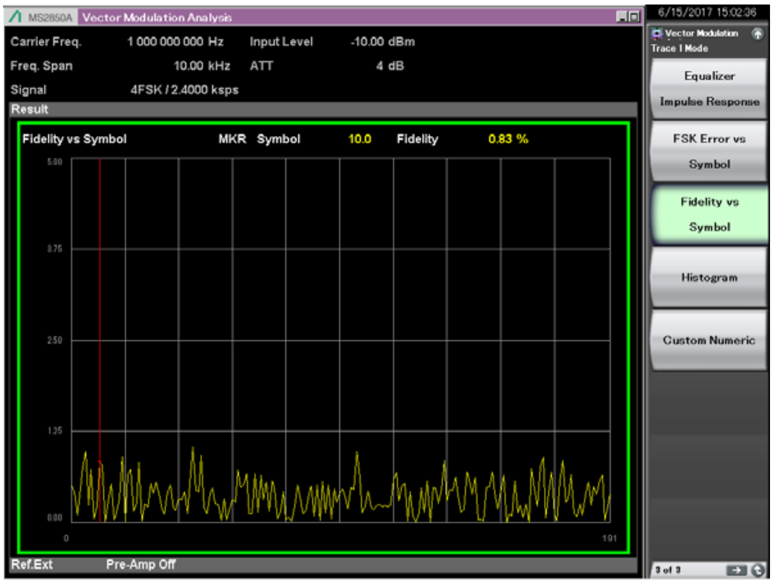


Figure 3.8.1.19-1 Modulation Fidelity vs Symbol Result

Graph display result

■ Summary

Displays Modulation Fidelity of each symbol in the analysis interval in percentage.

Scale

■ Summary

Sets the vertical axis scale of the graph result.

Scale: Vertical

■ Summary

Sets the upper limit of the vertical axis scale of the graph result.

■ Setting options

5%, 10%, 20%, 50%

Marker

■ Summary

Selects marker function between On and Off.

■ Setting options

On, Off

Marker Link

■ Summary

Selects whether to turn On or Off the synchronization of markers in separate traces.

■ Setting options

On, Off

3.8.1.20 Histogram

Displays the appearance frequency of each symbol in Trace. The results are displayed only when the modulation is set to 2FSK, 4FSK, or H-CPM.

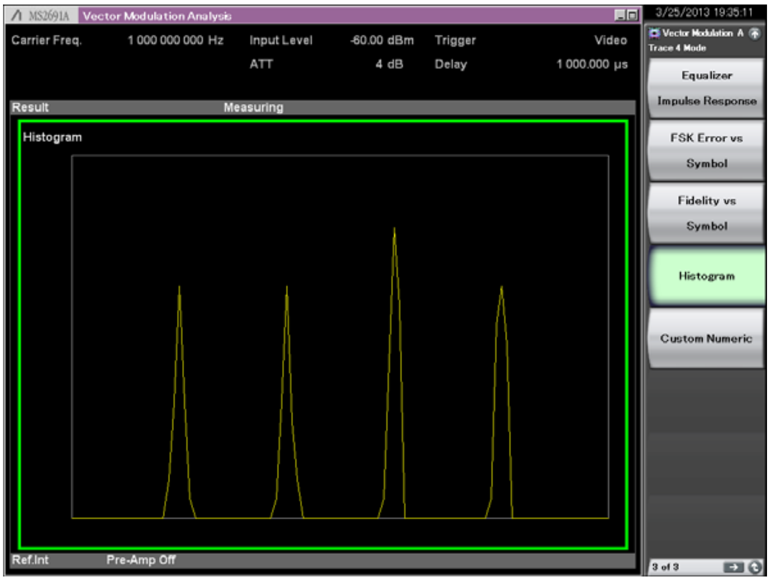


Figure 3.8.1.20-1 Histogram Result

Graph display result

■ Summary

Displays the frequency elements of each symbol. The horizontal axis represents normalized frequency and the vertical axis represents appearance frequency.

Scale

■ Summary

The graph's vertical axis scale is fixed to 0 to 1.

3.8.1.21 Custom Numeric

Displays the numeric result of modulation analysis in figures and bars in the trace area. The items to display can be selected from numeric result items arbitrarily.

If the Storage Mode is set to Off, the analysis result of each measurement is displayed. If set to Average, the average analysis result of plural measurements is displayed. If set to Average & Max, the average and maximum of the analysis results are displayed.

Note:

The custom numeric cannot be enlarged in display.

Figure 3.8.1.21-1 Custom Numeric Result

Display result

Refer to 3.8.1.8 "Numeric" for detail.

3.8.1.22 EVM vs Subcarrier

Displays analysis result of EVM vs Subcarrier in Trace. The result of each analysis is displayed, regardless of the storage mode setting.

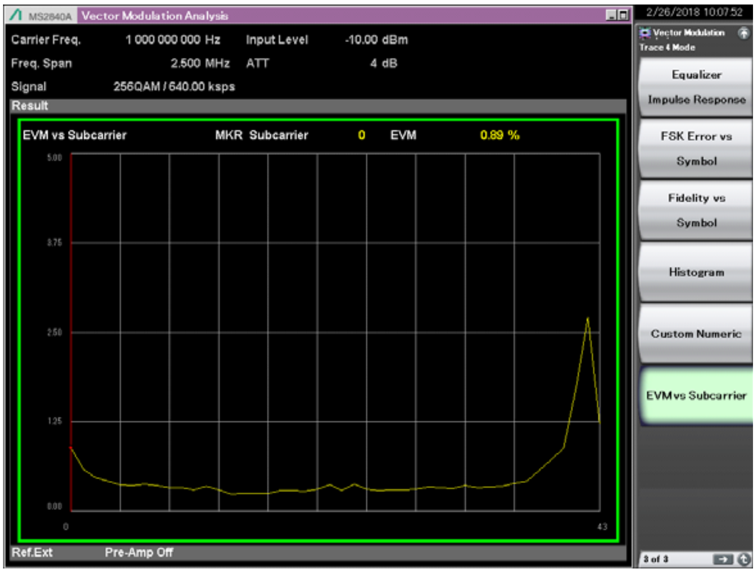


Figure 3.8.1.22-1 EVM vs Subcarrier Result

Results displayed in graph

■ Summary

Displays EVM per subcarrier between analysis intervals in %.

Scale

■ Summary

Sets the vertical axis scale of the graph result.

Scale: Vertical

■ Summary

Sets the upper limit of the vertical axis scale of the graph result.

■ Setting options

5%, 10%, 20%, 50%

Marker

■ Summary

Turn the Marker On/Off.

■ Setting options

On, Off

Marker Number (EVM vs Subcarrier)

■ Summary

Sets the marker target on the EVM vs Subcarrier result display.

■ Setting range

0 to (FFT Size – (Lower Guard Subcarrier)
– (Upper Guard Subcarrier) – 1)

☞ 3.4.6 Modulation

Marker Link

■ Summary

Turns On or Off the synchronization of marker movements in separate traces.

■ Setting options

On, Off

3.8.2 Power vs Time

Displays the numeric result of power vs time in figures and bars in the trace area. The items to display can be selected from numeric result items arbitrarily.

Table 3.8.2-1 Trace Mode Type

Trace Mode	Function
Rise and Fall	Displays Rise and Fall of Slot.
Slot	Displays all the intervals of Slot.
Frame	Displays one frame.

3.8.2.1 Rise and Fall

Displays the analysis result of Rise and Fall in the trace area.

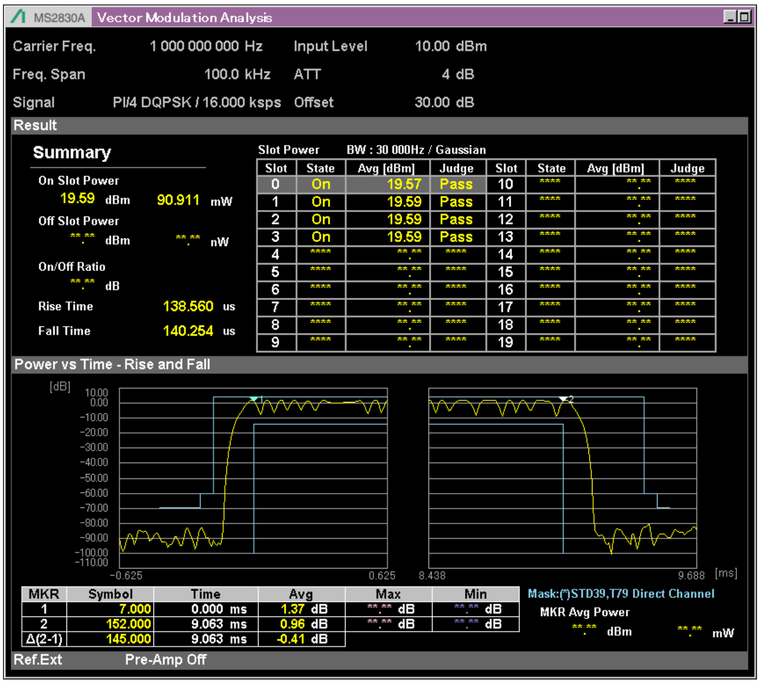


Figure 3.8.2.1-1 Rise and Fall Result

Numeric results

■ Summary

Displays analysis results of each slot.

For measurement intervals of Slot Avg Power, On Slot Power, Off Slot Power, Rise Time, and Fall Time refer to Appendix H "Power vs Time Measurement Interval".

Summary

■ Summary

Displays the On slot average power, the Off slot average power, the difference between them, Rise Time, and Fall Time.

On Slot Power

■ Summary

Displays the average power of the slots that are On.

Off Slot Power

■ Summary

Displays the average power of the slots that are Off.
The calculation range can be changed by Off Slot Power Range.
When Off Slot Power Range is User and all slot states are On, the measurement is performed in a user-defined range on all the slots.

☞ 3.4.12 Detail Settings

On/Off Ratio

■ Summary

Displays the difference between the On slot power and the Off slot power.

Rise Time

■ Summary

Displays the average rise time of each On slot. When multiple slots are On, the measurement result of each slot is averaged. The measurement result of each slot can be queried by remote command.

Fall Time

■ Summary

Displays the average fall time of each On slot. When multiple slots are On, the measurement result of each slot is averaged. The measurement result of each slot can be queried by remote command.

BW

■ Summary

Displays filter bandwidth, type, and Roll-off factor at measurement.

Slot

■ Summary

Displays the slot number.

State

■ Summary

Displays On/Off state of the slot.

Avg [dBm]

■ Summary

Displays the power after filtering of the slot.

When the level offset is On, the level offset value is added.

Judge

■ Summary

Displays the Template judgment result of the slot.

Graph display result

■ Summary

Displays Power vs Time at rise and fall of the slot.

Slot

■ Summary

Sets the slot number to display graph result. (0 to 19)

Unit

■ Summary

Selects a unit for the vertical axis of the graph.

■ Setting options

dB, dBm

Display Item

■ Summary

Selects the analysis results to display in the graph.

■ Setting options

Average	Displays only the average value.
All	Displays the average, minimum, and maximum values.

Marker Display Results

■ Summary

Displays markers in the graph of Power vs Time.

MKR

■ Summary

Sets the position of each marker.(Marker1, Marker2)

Symbol

■ Summary

Displays marker position information in symbols.

Reference for position information is the starting point of the measurement interval.

Time

■ Summary

Displays marker position information in time.
Reference for position information is the starting point of the analysis interval.

Avg

■ Summary

Displays the average of the analysis results at the position where the marker is selected.

Max

■ Summary

Displays the maximum value of the analysis results at the position where the marker is selected.

Min

■ Summary

Displays the minimum value of the analysis results at the position where the marker is selected.

MKR Avg Power

■ Summary

Displays the average power within the interval indicated by Marker1 and Marker2.
The waveform data of current trace mode is used to calculate the average power.

3.8.2.2 Slot

Displays the analysis result of the slot in the trace area.

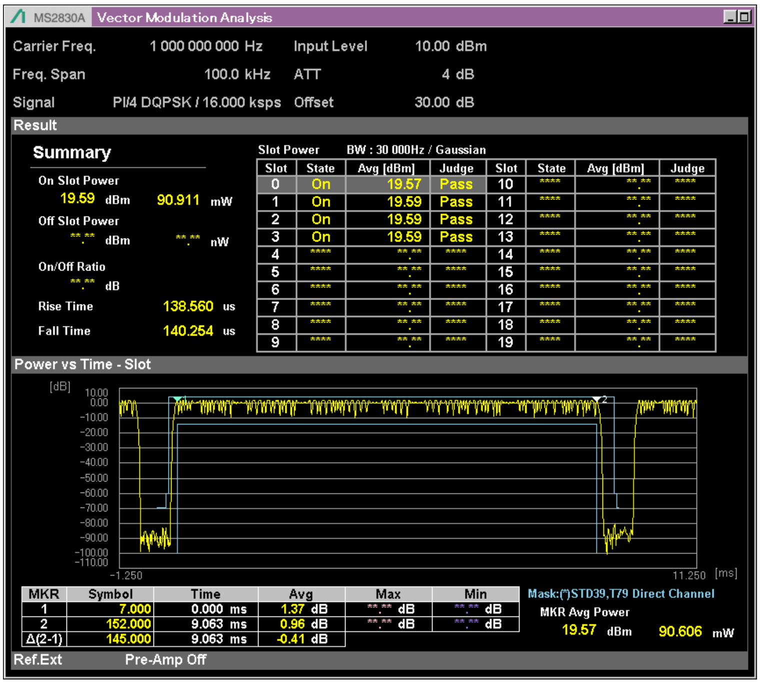


Figure 3.8.2.2-1 Slot Result

Numeric results

See Section 3.8.2.1 “Rise and Fall”.

Graph display result

See Section 3.8.2.1 “Rise and Fall”.

Marker Display Results

See Section 3.8.2.1 “Rise and Fall”.

3.8.2.3 Frame

Displays the analysis result of the frame in the trace area.

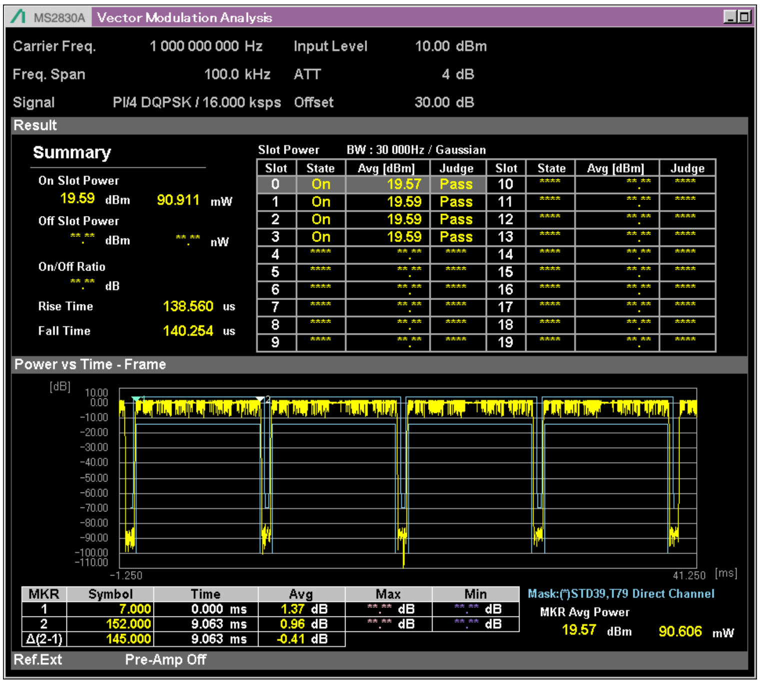


Figure 3.8.2.3-1 Frame Result

Numeric results

See Section 3.8.2.1 “Rise and Fall”.

Graph display result

See Section 3.8.2.1 “Rise and Fall”.

Marker Display Results

See Section 3.8.2.1 “Rise and Fall”.

3.9 Setting Capture

This section describes the settings of IQ data capture. Pressing 

(Capture) on the main function menu displays the Capture function menu.

Note:

The Capture function is unavailable for the Power vs Time measurement.

Table 3.9-1 Capture Function Menu

Menu	Function
Capture Time Auto Manual	Selects Auto (default) or Manual for IQ data capture mode. This is not available when the Replay function is executed. 3.9.1 Setting capture time
Capture Time Length *.*** *** ***s	Sets the capture time length of IQ data. This is not available when the Replay function is executed. 3.9.1 Setting capture time
Save Captured Data	Recalls the Save Captured Data function menu. Chapter 4 Digitize Function
Replay	Recalls the Replay function menu. Chapter 4 Digitize Function
Stop Replaying	Stops the Replay function. This is available only when the Replay function is executed. Chapter 4 Digitize Function
Analysis Offset Time	Tunes the analysis start position during replay. This is available only when the Replay function is executed. Chapter 4 Digitize Function
Capture Interval Frame	Selects 1 Frame (default) or 10 Frames for capture interval of IQ data to use for one analysis. This is not available when the Replay function is executed. 3.9.2 Setting capture interval

3.9.1 Setting capture time

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

- Auto

This captures the required data at each measurement in accordance with the Common Setting dialog box settings.

- Manual

This mode specifies the capture time for each measurement. The capture time is set at Capture Time Length. The Capture Time Length setting range changes according to the Span. (The Span is determined by the Symbol Rate at the Common Setting dialog box. Refer to section 3.4.6 Modulation.) When Capture Time Length is set, the mode becomes Manual automatically.

Table 3.9.1-1 Maximum Capture Time

Span [Hz]	Maximum Capture Time [s]
1 k	2000
2.5 k	2000
5 k	2000
10 k	2000
25 k	2000
50 k	1000
100 k	500
250 k	200
500 k	100
1 M	50
2.5 M	20
5 M	10
10 M	5
25 M	2
31.25 M	2
50 M	0.5
62.5 M	0.5
100 M	0.5
125 M	0.5

Table 3.9.1-2 Maximum Capture Time (MS2850A)

Span [Hz]	Maximum Capture Time [s]
255 M	0.05
510 M	0.05
1000 M	0.05

3.9.2 Setting capture interval

Sets capture interval (frame number to capture) for one measurement. This setting is available only when Frame Formatted is selected for Measuring Object. It is set to “1 Frame” when No Formatted is selected.

■ Summary

Sets capture length of measurement data for analysis.

■ Setting options

1 Frame, 10 Frames

■ Default

1 Frame

3.9.3 Automatically saving Common Setting parameters

By capturing IQ data, the Common Setting parameter file is automatically saved to the same folder as the Waveform folder. The saved Common Setting parameters are automatically loaded when replaying the captured IQ data.

The Common Setting parameter file is automatically saved as:

“[File name same as waveform (without extension)]_VMA.xml”

3.10 Saving Measurement Results

This section describes how to save measurement results to the internal memory or USB memory stick. Press Save when the VMA screen is displayed, and the Save function menu appears.

Note:

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

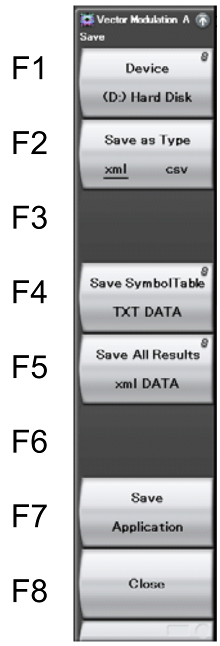


Figure 3.10-1 Save Function Menu

Table 3.10-1 Save Function Menu

Menu	Function
Device	Sets the save destination drive.
Save as Type	Sets the type of the file to be saved.
Save All Results	Saves all results measured by the MX269017A.
Save Application	Sets measurement parameters. ☞ *MS2690A/MS2691A/MS2692A, MS2830A, MS2840A, or MS2850A, Signal Analyzer operation manual Mainframe Operation*
Save SymbolTable	Saves symbol demodulation results.
Close	Closes the Save function menu.

Device

■ Summary

Sets the save destination drive.

■ Setting options

D, E, F, …

All available drives except drive C

Save as Type

■ Summary

Sets the type of the file to be saved.

■ Setting 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, refer to Table 2.7-2 “Responses of Modulation Analysis Result” in the *MX269017A Vector Modulation Analysis Software Operation Manual (Remote Control).*

The saved file is output under the name format of “VMA*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 “VMA*date*_00.xml,” “VMA*date*_01.xml,” “VMA*date*_02.xml,” …, up to “VMA*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/Vector Modulation Analysis

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

Save SymbolTable

■ Summary

Saves demodulation result for each symbol.
The data displayed in Symbol Table is saved, even if Trace Mode is not currently set to Symbol Table.

The saved file is output under the name format of "SymbolTable*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 "SymbolTable*date*_00.xml," "SymbolTable*date*_01.xml," "SymbolTable*date*_02.xml," …, up to "SymbolTable*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/Trace Data
/Vector Modulation Analysis

Figure 3.10-2 shows the save format for SymbolTable file.

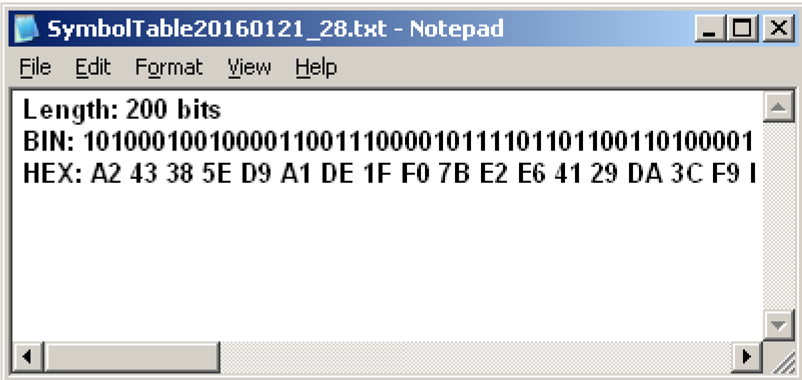


Figure 3.10-2 Save format for SymbolTable

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.
The Digitize function is available only when Measure is set to Modulation Analysis.

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.

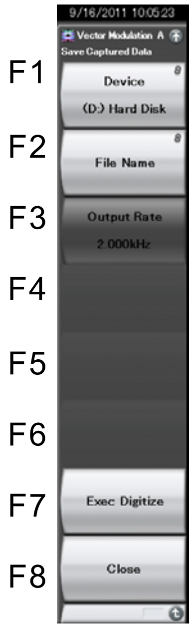


Figure 4.1-1 Save Captured Data function menu

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	Displays the output data rate (this setting cannot be configured).
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¥Vector Modulation Analysis

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 “Spurious”: Spurious mode
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 PreAmp [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).

Beginning of file →

I-phase data 1	(4Byte)
Q-phase data 1	(4Byte)
I-phase data 2	(4Byte)
Q-phase data 2	(4Byte)
I-phase data 3	(4Byte)
Q-phase data 3	(4Byte)

⋮

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.

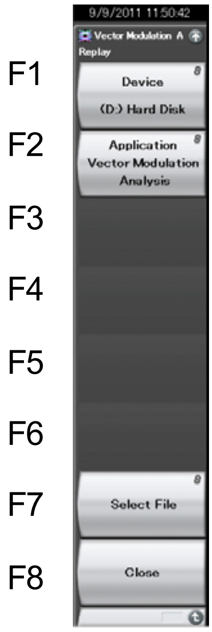


Figure 4.2-1 Replay Function Menu

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. The name of the file being replayed (without extension) is displayed under the screen.

Notes:

- Depending on the file type which is replayed, restriction applies to the range of symbol rate.
  For details about the settings while Replay function is being executed, refer to the following:
  ☞ 4.2.5 “Characteristics of Replayable IQ Data Files”
- When starting the Replay function, the settings are restored to those saved in the Common Setting values in the Common Setting parameter file if the file is in the same folder. If the file is not in the same folder, the settings are initialized except for the parameters specified in Table 4.1.1-1.
  ☞ 3.9.3 “Automatically saving Common Setting parameters”

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
Frequency Band Mode
Input Level
Pre Amp
Storage Mode
Storage Count
Average Mode
Trigger Switch
Trigger Source
Trigger Slope
Trigger Delay
Continuous Measurement
Single Measurement
Capture Time Auto/Manual
Capture Time Length
Pre-selector Auto Tune
Pre-selector Tune (Manual)
Pre-selector Tune Preset
Erase Warm Up Message

Note:

When Equalizer Adaptive is "On" or "Hold", the measurement results of replays may not match completely.

4.2.4 Tuning the Analysis Start Position During Replay

This section describes how to tune the analysis start position while the Replay function is being executed.

<Procedure>

1. Press F7 (Capture) on the main function menu.
2. Press F6 (Analysis Offset Time) on the Capture function menu to display the Analysis Offset Time setting dialog box.
3. Inputs the Analysis Offset Time.
4. Press **Set** to set the input value. The analysis start position is changed by the specified time length.

This function is available only when a long-time IQ data file is subject to the replay function. Refer to the following for how to set the time to capture an IQ data file.

☞ 3.9.1 “Setting capture time”

Analysis Offset Time

■ Summary

This function sets the position to start analysis during replay, by the offset from the reference position.

■ Setting range

Lower limit: 0

Upper limit: The range depends on the size of the replayed file, Common Setting parameters, Capture Time Length, Storage Count, etc.

■ Resolution

1 / Sampling Rate [Hz]

Sampling Rate [Hz] is changed according to Span.

For the relation between Span and Sampling Rate, refer to Table 2.2.2-1 “Frequency span and sampling rate” in the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Signal Analyzer Function Operation.*

For more information about “Span”, refer to Section 3.4.6 “Modulation”.

If the value set for the offset doesn’t match the resolution, the set value is rounded up.

■ Default

0.000000000 s

4.2.5 Conditions for IQ Data Files That Can Be Replayed

Table 4.2.5-1 shows the conditions for IQ data files for which replay analysis can be performed.

Table 4.2.5-1 IQ data file that can be replayed

Name	Value
Format	I, Q (32-bit Float Binary format) Only for IQ data saved with MX269017A.
Sample numbers	Dependent on the common setting value.

Under certain condition, measurement may not be executed. Note the following.

- While replaying, parameter included in Common Setting is restricted.
- The items to be restricted vary according to file type that is replayed.

If the message "Current Common Setting cannot measure IQ data file." is displayed, measurement may become possible by changing the following parameters.

- Decrease the setting value for:
  - Slot per Frame
  - Slot Length
  - Measurement Offset
  - Measurement Interval
- Increase the setting value for:
  - Symbol Rate
- Turn off the setting for:
  - Sync Word Search
  - Burst Search
  - Equalizer Adaptive
- Set to **None**, or change the filter coefficient.
  - Multicarrier Filter (When **SCBT** is selected.)

The measurement results during IQ data save and during replay may sometimes be different under the following conditions.

- When a different value is set at the Common Setting value at IQ data save and at replay.

4.2.6 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 the measuring instruments, setup methods, and performance test procedures required for testing the performance of the MS269xA, MS2830A, MS2840A, or MS2850A in which the MX269017A is installed.

5

Performance Test

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 of the MS269xA, MS2830A, MS2840A, or MS2850A from being degraded 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 of the MS269xA, MS2830A, MS2840A, or MS2850A.

- Carrier frequency accuracy
- Residual vector error
- Symbol rate error

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 is available in a separate file (for the PDF version), and on the last page of this manual (for the printed version).

5.1.2 Performance test items and instruments used

Table 5.1.2-1 lists measuring instruments used or performance tests.

Table 5.1.2-1 List of measuring instruments for performance test

Item	Model Name
MS2690A/MS2691A/MS2692A	MS2690A/MS2691A/MS2692A, MS2830A, MS2840A, or MS2850A
Vector signal generator with TDMA signal generation function	MG3710A + MX370102A
Power meter + Power sensor	ML2487B + MA2470D series
3 dB attenuator × 2	41KC-3

5.1.3 Setting of signal used for performance test

Use the MX370102A TDMA IQproducer (Ver. 16.01 or later is required) to create signals used for performance testing. Eighteen types of signals are used for performance testing. Specify the settings described in the following table for the TDMA IQproducer to create waveform files for each signal.

Table 5.1.3-1 Setting Parameters for Testsignal000 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	4FSK
Maximum frequency deviation	945 Hz
Symbol Rate	2.4 ksps
Over Sampling	16
Data	PN9
Filter	ARIB STD-T98
Roll Off	0.20
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal000

Table 5.1.3-2 Setting Parameters for Testsignal001 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	π/4DQPSK
Symbol Rate	4 ksps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal001

Table 5.1.3-3 Setting Parameters for Testsignal002 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	64QAM
Symbol Rate	4 ksps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal002

Table 5.1.3-4 Setting Parameters for Testsignal003 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	π/4DQPSK
Symbol Rate	500 ksps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal003

Table 5.1.3-5 Setting Parameters for Testsignal004 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	64QAM
Symbol Rate	500 ksps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal004

Table 5.1.3-6 Setting Parameters for Testsignal005 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	π/4DQPSK
Symbol Rate	5 Msps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal005

Table 5.1.3-7 Setting Parameters for Testsignal006 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	64QAM
Symbol Rate	5 Msps
Over Sampling	32
Data	PN9
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal006

Table 5.1.3-8 Setting Parameters for Testsignal007 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	256QAM
Symbol Rate	5 Msps
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off	1
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal007

Table 5.1.3-9 Setting Parameters for Testsignal008 Signal

Item	Value
Parameter setting sheet	Burst
Modulation Type	2FSK
Modulation Index	1
Symbol Rate	100 ksps
Over Sampling	8
The Number of Frames	1
The Number of Slots per Frame	2
Frame Format	1st Slot:On, 2nd Slot:Off
Data	PN9
1st Field	Ramp, 1 bit
2nd Field	Fixed, 2 bit, 1(Hex)
3rd Field	Fixed, 32 bit, 55555555(Hex)
4th Field	Fixed, 8 bit, E5(Hex)
5th Field	Data, 120 bit
6th Field	Fixed, 2 bit, 1(Hex)
7th Field	Ramp, 1 bit
8th Field	Guard 2 bit
Filter	Gaussian
Roll Off	0.5
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal008

Table 5.1.3-10 Setting Parameters for Testsignal009 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	2ASK
Modulation Index	1
Manchester Code	On
Symbol Rate	1.024 Msps
Over Sampling	4
Data	PN9
Filter	Gaussian2
Roll Off	0.5
RMS	1634
Package	TDMA_IQproducer
Pattern Name	TestSignal009

Table 5.1.3-11 Setting Parameters for Testsignal010 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	4ASK
Modulation Index	1
Symbol Rate	500 ksps
Over Sampling	8
Data	PN9
Filter	Gaussian2
Roll Off/BT	0.5
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal010

Table 5.1.3-12 Setting Parameters for Testsignal011 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	MSK
Modulation Index	0.5
Symbol Rate	5 Msps
Over Sampling	8
Data	PN9
Filter	Gaussian
Roll Off/BT	0.5
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal011

***Note*:**

From TestSignal012 to TestSignal017, read by TDMA IQproducer the parameter file for creating waveform patterns supplied with the product (V16.01 or later). Then change some parameters, for example, Symbol Rate, so that a waveform file can be generated for performance tests. The parameter file is stored in the following folder.

X:\IQproducer\TDMA\sample_parameter_file\UserDefined

("X:\IQproducer" is a folder where IQproducer is installed.)

Table 5.1.3-13 Setting Parameters for Testsignal012 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_2048QAM.txt
Symbol Rate	500 ksps
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal012*
Parameter File Name	NF_UserDefined_2048QAM.prm

*: The parameter needs to be edited after the parameter file has been read.

Table 5.1.3-14 Setting Parameters for Testsignal013 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_2048QAM.txt
Symbol Rate	5 Msps*
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal013*
Parameter File Name	NF_UserDefined_2048QAM.prm

*: The parameter needs to be edited after the parameter file has been read.

Table 5.1.3-15 Setting Parameters for Testsignal014 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_2048QAM.txt
Symbol Rate	5 Msps*
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal014*
Parameter File Name	NF_UserDefined_2048QAM.prm

*: The parameter needs to be edited after the parameter file has been read.

Table 5.1.3-16 Setting Parameters for Testsignal015 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_32APSK.txt
Symbol Rate	500 ksps
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal015*
Parameter File Name	NF_UserDefined_32APSK.prm

*: The parameter needs to be edited after the parameter file has been read.

Table 5.1.3-17 Setting Parameters for Testsignal016 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_32APSK.txt
Symbol Rate	5 Msps*
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal016*
Parameter File Name	NF_UserDefined_32APSK.prm

*: The parameter needs to be edited after the parameter file has been read.

Table 5.1.3-18 Setting Parameters for Testsignal017 Signal

Item	Value
Parameter setting sheet	No Format
Modulation Type	User Defined
Modulation Mapper	UM_32APSK.txt
Symbol Rate	5 Msps*
Over Sampling	4
Data	PN15
Filter	Root Nyquist
Roll Off/BT	1
RMS	1157
Package	TDMA_IQproducer
Pattern Name	TestSignal017*
Parameter File Name	NF_UserDefined_32APSK.prm

*: The parameter needs to be edited after the parameter file has been read.

5.2 Performance Test Items

Warm up the device to be tested and the measuring instruments for at least 30 minutes except if specified otherwise, in order to stabilize them sufficiently before running performance tests. Maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures and with little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity and other problems.

5.2.1 Testing Methods – Carrier Frequency Accuracy

(1) Test target standards

- Carrier frequency accuracy

(2) Measuring instrument for test

- Vector signal generator: MG3710A + MX370102A
- Power meter
- 3-dB attenuator × 2

(3) Setup

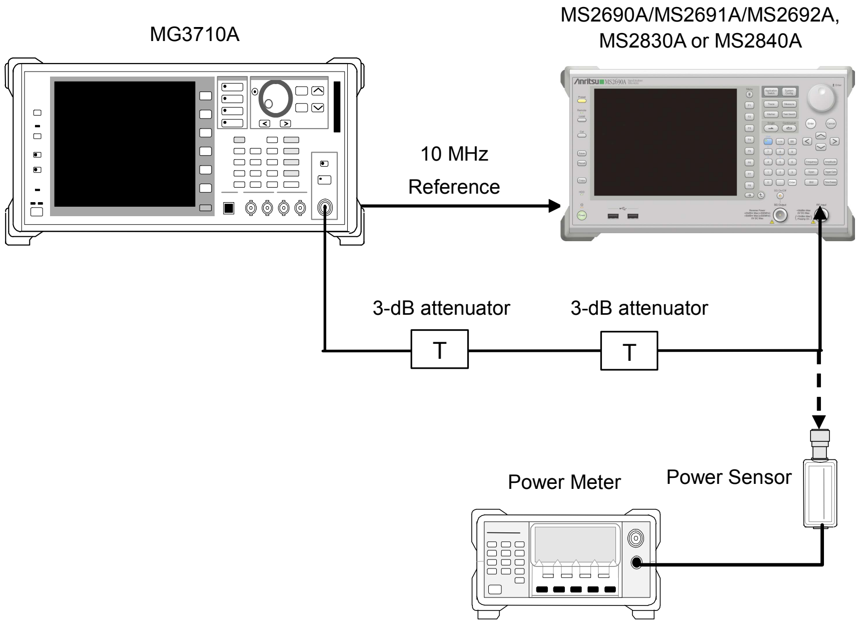


Figure 5.2.1-1 Setup

(4) Test procedure

Use the default values (value following preset execution) for parameters whose values are not indicated in the following procedure.

<Procedure>

TestSignal001

1. Set the MG3710A as follows:
   - Frequency: 30.0 MHz
   - Level: –15 dBm
   - Base Band Pattern: TestSignal001
   - Mod On/Off: On
   - Output: On

2. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
   - Center Frequency: 30.0 MHz
   - Input Level: –15 dBm
   - Reference Signal: Auto
   - Common Setting

     Measuring Object: Non-Formatted
     Modulation: PI/4DQPSK
     Symbol Rate: 4 ksps
     Measurement Filter: Root Nyquist+None
     Reference Filter: Nyquist+None
     Roll Off: 1.0
     Measurement Interval: 200 symbols

3. Select the Modulation Analysis screen.

4. Input the output signal from the MG3710A to the power meter and adjust this output level so that the power reading is –15 dBm ±0.1 dB.

5. Input the output signal from the MG3710A to the MS269xA, MS2830A, MS2840A, or MS2850A.

6. Press 

to perform measurement.

7. Confirm whether the measured carrier frequency error (carrier frequency accuracy)is within specifications.

8. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.

9. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal002

10. Specify TestSignal002 as the MG3710A pattern.
11. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	64QAM
Symbol Rate:	4 ksps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	200 symbols

12. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
13. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
14. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal003

15. Specify TestSignal003 as the MG3710A pattern.
16. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	PI/4DQPSK
Symbol Rate:	500 ksps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

17. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
18. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
19. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal004

20. Specify TestSignal004 as the MG3710A pattern.
21. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	64QAM
Symbol Rate:	500 ksps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

22. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
23. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
24. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal005

25. Specify TestSignal005 as the MG3710A pattern.
26. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	PI/4DQPSK
Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

27. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
28. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
29. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal006

30. Specify TestSignal006 as the MG3710A pattern.
31. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	64QAM
Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

32. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
33. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
34. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal007

35. Specify TestSignal007 as the MG3710A pattern.
36. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	256QAM
Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

37. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
38. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
39. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal000

40. Specify TestSignal000 as the MG3710A pattern.
41. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	4FSK
Symbol Rate:	2.4 ksps
Measurement Filter:	ARIB STD-T98+None
Reference Filter:	ARIB STD-T98+None
Roll Off:	0.20
Measurement Interval:	240 symbols

42. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
43. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
44. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal009

45. Specify TestSignal009 as the MG3710A pattern.
46. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	2ASK
Symbol Rate:	2.048 Msps
Measurement Filter:	None
Reference Filter:	Gausian
Roll Off:	0.5
Measurement Interval:	1600 symbols

47. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
48. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
49. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal010

50. Specify TestSignal010 as the MG3710A pattern.
51. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	4ASK
Symbol Rate:	500 ksps
Measurement Filter:	None
Reference Filter:	Gaussian
Roll Off:	0.5
Measurement Interval:	1600 symbols

52. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
53. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
54. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal011

55. Specify TestSignal011 as the MG3710A pattern.
56. Set as follows for the MS269xA, MS2830A, MS2840A, or MS2850A.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	MSK
Symbol Rate:	5 Msps
Measurement Filter:	None
Reference Filter:	Gaussian
Roll Off:	0.5
Measurement Interval:	4096 symbols

57. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 30 MHz, and repeat Steps 4 through 7.
58. Set the frequency of the MG3710A and MS269xA, MS2830A, MS2840A, or MS2850A to 2 GHz, and repeat Steps 4 through 7.
59. Set the frequency of the MG3710A and the main unit to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

The MS2840A or MS2850A can perform the following tests, under the condition that the MX269017A-001/011 is installed.

TestSignal012

60. Specify TestSignal012 as the MG3710A pattern.
61. Set the MS2840A or MS2850A as follows.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	2048QAM
Symbol Rate:	500 ksps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

    - Measure

      Modulation Analysis

Re-measurement mode:	On
Re-measurement Threshold:	1%

62 Set the frequency of the MG3710A and MS2840A, MS2850A to 30 MHz, and repeat Steps 4 through 7.

63. Set the frequency of the MG3710A and MS2840A, MS2850A to 2 GHz, and repeat Steps 4 through 7.

64. Set the frequency of the MG3710A and MS2840A, MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

TestSignal013

65. Specify TestSignal013 as the MG3710A pattern.
66. Set the MS2840A or MS2850A as follows.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	2048QAM
Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

    - Measure

      Modulation Analysis

Re-measurement mode:	On
Re-measurement Threshold:	1%

67. Set the frequency of the MG3710A and MS2840A, MS2850A to 30 MHz, and repeat Steps 4 through 7.

68. Set the frequency of the MG3710A and MS2840A, MS2850A to 2 GHz, and repeat Steps 4 through 7.
69. Set the frequency of the MG3710A and MS2840A, MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

TestSignal015

70. Specify TestSignal015 as the MG3710A pattern.
71. Set the MS2840A, MS2850A as follows.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	32APSK
Symbol Rate:	500 ksps
APSK Ring Ratio (R2/R1):	2.840
APSK Ring Ratio (R3/R1):	5.270
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

    - Measure

      Modulation Analysis

Re-measurement mode:	Off

72. Set the frequency of the MG3710A and MS2840A, MS2850A to 30 MHz, and repeat Steps 4 through 7.
73. Set the frequency of the MG3710A and MS2840A, MS2850A to 2 GHz, and repeat Steps 4 through 7.
74. Set the frequency of the MG3710A and MS2840A, MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

TestSignal016

75. Specify TestSignal016 as the MG3710A pattern.
76. Set the MS2840A, MS2850A as follows.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	32APSK
Symbol Rate:	5 Msps
APSK Ring Ratio (R2/R1):	2.840
APSK Ring Ratio (R3/R1):	5.270
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

    - Measure

      Modulation Analysis

Re-measurement mode:	Off

77 Set the frequency of the MG3710A and MS2840A, MS2850A to 30 MHz, and repeat Steps 4 through 7.

78. Set the frequency of the MG3710A and MS2840A, MS2850A to 2 GHz, and repeat Steps 4 through 7.

79. Set the frequency of the MG3710A and MS2840A, MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

Only the MS2850A can perform the following tests, under the condition that the MX269017A-001/011 is installed.

TestSignal014

80. Specify TestSignal014 as the MG3710A pattern.

81. Set the MG3710A as follows.
    - Mode
        ARB Setup
            Sampling Rate A: 200 MHz

82. Set the MS2850A as follows.
    - Common Setting
        Measuring Object: Non-Formatted
        Modulation: 2048QAM
        Symbol Rate: 50 Msps
        Measurement Filter: Root Nyquist+None
        Reference Filter: Nyquist+None
        Roll Off: 1
        Measurement Interval: 4096 symbols
        [Equalizer]Adaptive: On
        [Equalizer]Filter Length: 501
    - Measure
        Modulation Analysis
            Re-measurement mode: On
            Re-measurement Threshold: 1%

83. Set the frequency of the MG3710A and MS2850A to 800 MHz, and repeat Steps 4 through 7.

84. Set the frequency of the MG3710A and MS2850A to 2 GHz, and repeat Steps 4 through 7.

85. Set the frequency of the MG3710A and MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

TestSignal017

86. Specify TestSignal017 as the MG3710A pattern.
87. Set the MG3710A as follows.
    - Mode
      - ARB Setup
        - Sampling Rate A: 200 MHz
88. Set the MS2850A as follows.
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	32APSK
Symbol Rate:	50 Msps
APSK Ring Ratio (R2/R1):	2.840
APSK Ring Ratio (R3/R1):	5.270
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols
[Equalizer]Adaptive:	Off

    - Measure
      - Modulation Analysis
        - Re-measurement mode: Off

89 Set the frequency of the MG3710A and MS2850A to 800 MHz, and repeat Steps 4 through 7.

90. Set the frequency of the MG3710A and MS2850A to 2 GHz, and repeat Steps 4 through 7.

91. Set the frequency of the MG3710A and MS2850A to 3.5 GHz, and repeat Steps 4 through 7.

(5) Test results

Table 5.2.1-1 Carrier frequency accuracy

Signal Name	Modulation Method	Symbol Rate	Frequency	Min. Value	Deviation (Hz)	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 001	π/4DQPSK	4 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 002	64QAM	4 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 003	π/4DQPSK	500 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 004	64QAM	500 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 005	π/4DQPSK	5 Msps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 006	64QAM	5 Msps	30 MHz					
			2 GHz	–10 Hz		+10 Hz	±1 Hz	
			6 GHz*					
TestSignal 007	256QAM	5 Msps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 000	4FSK	2.4 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 009	2ASK	2.048 Msps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 010	4ASK	500 ksps	30 MHz					
			2 GHz					
			6 GHz*					
TestSignal 011	MSK	5 Msps	30 MHz					
			2 GHz					
			6 GHz*					

*: 6 GHz : MS2690A/MS2691A/MS2692A
3.5 GHz : MS2830A, MS2840A, MS2850A

Table 5.2.1-2 Carrier frequency accuracy (MS2840A/MS2850A)

Signal Name	Modulation Method	Symbol Rate	Frequency	Min. Value	Deviation (Hz)	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 012	2048QAM	500 ksps	30 MHz	−10 Hz		+10 Hz	±1 Hz	
			2 GHz					
			3.5 GHz					
TestSignal 013	2048QAM	5 Msps	30 MHz					
			2 GHz					
			3.5 GHz					
TestSignal 015	32APSK	500 ksps	30 MHz					
			2 GHz					
			3.5 GHz					
TestSignal 016	32APSK	5 Msps	30 MHz					
			2 GHz					
			3.5 GHz					

Table 5.2.1-3 Carrier frequency accuracy (MS2850A)

Signal Name	Modulation Method	Symbol Rate	Frequency	Min. Value	Deviation (Hz)	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 014	2048QAM	50 Msps	800 MHz	−10 Hz		+10 Hz	±1 Hz	
			2 GHz					
			3.5 GHz					
TestSignal 017	32APSK	50 Msps	800 MHz					
			2 GHz					
			3.5 GHz					

5.2.2 Testing Methods – Residual Vector Error

(1) Test target standards

- Residual EVM

(2) Measuring instrument for tests

- Vector signal generator: MG3710A + MX370102A
- Power meter
- 3-dB attenuator

(3) Setup

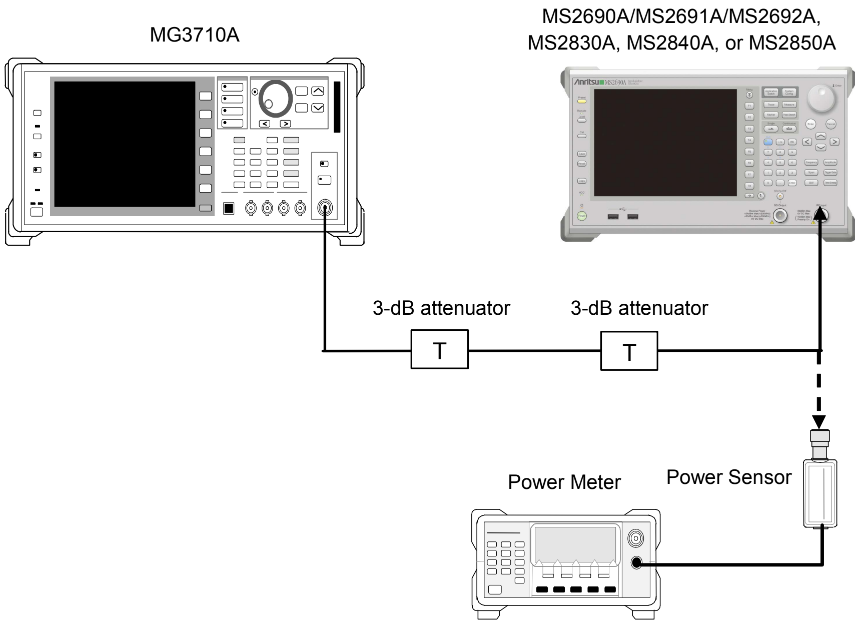


Figure 5.2.2-1 Setup

(4) Test Procedure

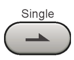
Use the default values (value following preset execution) for parameters whose values are not indicated in the following procedure.

<Procedure>

TestSignal001

1. Set the MG3710A as follows:
   - Frequency: 49.996 MHz
   - Level: –15 dBm
   - Base Band
     Pattern Combinatio: Edit
     Pattern (Memory A): TestSignal001
     Pattern (Memory B: Does not set
     Freq Offset: 4 kHz
   - Mod On/Of: On
   - Output: On

2. Set as follows for the MS2690A/MS2691A/MS2692A.
   - Center Frequency: 50.0 MHz
   - Input Level: –15 dBm
   - Reference Signal:Fixed to Internal
   - Trace
     Storage Mode: Average
     Storage Count: 20
   - Common Setting
     Measuring Object: Non-Formatted
     Modulation: PI/4DQPSK
     Symbol Rate: 4 ksps
     Measurement Filter: Root Nyquist+None
     Reference Filter: Nyquist+None
     Roll Off: 1.0
     Measurement Interval: 200 symbols

3. Select the Modulation Analysis screen.
4. Input the output signal from the MG3710A to the power meter and adjust this output level so that the power reading is –15 dBm ±0.1 dB.
5. Input the output signal from the MG3710A to the MX269017A.
6. Press 

to perform measurement.
7. Confirm that the measured EVM (rms) (Residual Vector Error) results satisfy the specifications.
8. Set the frequency of the MS2690A/MS2691A/MS2692A to 500 MHz.
9. Set the frequency of the MG3710A to 499.996 GHz, and repeat Steps 4 through 7.

TestSignal002

10. Set the MG3710A as follows:
    - Frequency: 49.996 MHz
    - Base Band
      Pattern (Memory A): TestSignal002
      Freq Offset: 4 kHz

11. Set the MS2690A/MS2691A/MS2692A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 64QAM
      Symbol Rate: 4 ksps
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1.0
      Measurement Interval: 200 symbols

12. Repeat Steps 4 to 7.

13. Set the frequency of the MS2690A/MS2691A/MS2692A to 500 MHz.

14. Set the frequency of the MG3710A to 499.996 GHz, and repeat Steps 4 through 7.

TestSignal003

15. Set the MG3710A as follows:
    - Frequency: 49.5 MHz
    - Base Band
      Pattern (Memory A): TestSignal003
      Freq Offset: 500 kHz

16. Set the MS2690A/MS2691A/MS2692A as follows:
    - Center Frequenc: 50.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: PI/4DQPSK
      Symbol Rate: 500 ksps
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1.0
      Measurement Interval: 4096 symbols

17. Repeat Steps 4 to 7.

18. Set the frequency of the MS2690A/MS2691A/MS2692A to 500 MHz.

19. Set the frequency of the MG3710A to 499.5 GHz, and repeat Steps 4 through 7.

20. Set the frequency of the main unit to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
21. Set the frequency of the MG3710A to 5999.5 MHz (for MS269xA) or 3499.5 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal004

22. Set the MG3710A as follows:
    - Frequency: 49.5 MHz
    - Base Band
      Pattern(Memory A): TestSignal004
23. Set the MS2690A/MS2691A/MS2692A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 64QAM
      Symbol Rate: 500 ksps
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1.0
      Measurement Interval: 4096 symbols
24. Repeat steps 4 to 7.
25. Set the frequency of the MS269xA, MS2830A, MS2840A, MS2850A to 500 MHz.
26. Set the frequency of the MG3710A to 499.5 GHz, and repeat Steps 4 through 7.
27. Set the frequency of the main unit to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
28. Set the frequency of the MG3710A to 5999.5 MHz (for MS269xA) or 3499.5 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal005

29. Set the MG3710A as follows:
    - Frequency: 45 MHz
    - Base Band
      Pattern (Memory A): TestSignal005
      Freq Offset: 5 MHz
30. Set the MS269xA, MS2830A, MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: PI/4DQPSK

Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

31. Repeat Steps 4 to 7.
32. Set the frequency of the main unit to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
33. Set the frequency of the MG3710A to 5995 MHz (for MS269xA) or 3495 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal006

34. Set the MG3710A as follows:
    - Frequency: 45 MHz
    - Base Band
      Pattern (Memory A): TestSignal006
35. Set the MS269xA, MS2830A, MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting

Measuring Object:	Non-Formatted
Modulation:	64QAM
Symbol Rate:	5 Msps
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1.0
Measurement Interval:	4096 symbols

36. Repeat Steps 4 to 7.
37. Set the frequency of the main unit to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
38. Set the frequency of the MG3710A to 5995 MHz (for MS269xA) or 3495 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal007

39. Set the MG3710A as follows:
    - Frequency: 45 MHz
    - Base Band
      Pattern (Memory A): TestSignal007

40. Set the MS269xA, MS2830A, MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting
      - Measuring Object: Non-Formatted
      - Modulation: 256QAM
      - Symbol Rate: 5 Msps
      - Measurement Filter: Root Nyquist+None
      - Reference Filter: Nyquist+None
      - Roll Off: 1.0
      - Measurement Interval: 4096 symbols
41. Repeat steps 4 to 7.
42. Set the frequency to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
43. Set the frequency of the MG3710A to 5995 MHz (for MS269xA) or 3495 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

TestSignal011

44. Set the MG3710A as follows:
    - Frequency: 45 MHz
    - Base Band
      Pattern (Memory A): TestSignal011
45. Set the MS269xA, MS2830A, MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz
    - Common Setting
      - Measuring Object: Non-Formatted
      - Modulation: MSK
      - Symbol Rate: 5 Msps
      - Measurement Filter: None
      - Reference Filter: Gaussian
      - Roll Off: 0.5
      - Measurement Interval: 4096 symbols
46. Repeat steps 4 to 7.
47. Set the frequency to 6000 MHz (MS269xA) or 3500 MHz (MS2830A, MS2840A, MS2850A).
48. Set the frequency of the MG3710A to 5995 MHz (for MS269xA) or 3495 MHz (for MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

The MS2840A or MS2850A can perform the following tests, under the condition that the MX269017A-001/011 is installed

TestSignal012

49. Set the MG3710A as follows:
    - Frequency: 49.5 MHz (MS2840A) or 799.5 MHz (MS2850A)
    - Base Band
      Pattern (Memory A): TestSignal012
      Freq Offset: 500 kHz
50. Set the MS2840A,MS2850A as follows:
    - Center Frequency: 50.0 MHz (MS2840A) or 800.0 MHz (MS2850A)
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 2048QAM
      Symbol Rate: 500 ksps
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
    - Measure
      Modulation Analysis
        Re-measurement mode: On
        Re-measurement Threshold: 1%
51. Repeat steps 4 to 7.
52. Set the frequency of the MS2840A, MS2850A to 3500 MHz.
53. Set the frequency of the MG3710A to 3499.5 MHz, and repeat Steps 4 through 7.

TestSignal013

54. Set the MG3710A as follows:
    - Frequency: 45.0 MHz (MS2840A) or 795.0 MHz (MS2850A)
    - Base Band
      Pattern (Memory A): TestSignal013
      Freq Offset: 5 MHz
55. Set the MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz (MS2840A) or 800.0 MHz (MS2850A)
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 2048QAM
      Symbol Rate: 5 Msps

Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

- Measure
  Modulation Analysis

Re-measurement mode:	On
Re-measurement Threshold:	1%

56. Repeat steps 4 to 7.
57. Set the frequency of the MS2840A, MS2850A to 3500 MHz.
58. Set the frequency of the MG3710A to 3495.0 MHz, and repeat Steps 4 through 7.

TestSignal015

59. Set the MG3710A as follows:
    - Frequency: 49.5 MHz (MS2840A) or 799.5 MHz (MS2850A)
    - Base Band

Pattern (Memory A):	TestSignal015
Freq Offset:	500 kHz

60 Set the MS2840A ,MS2850A as follows:
- Center Frequency: 50.0 MHz (MS2840A) or 800.0 MHz (MS2850A)
- Common Setting

Measuring Object:	Non-Formatted
Modulation:	32APSK
Symbol Rate:	500 ksps
APSK Ring Ratio (R2/R1):	2.840
APSK Ring Ratio (R3/R1):	5.270
Measurement Filter:	Root Nyquist+None
Reference Filter:	Nyquist+None
Roll Off:	1
Measurement Interval:	4096 symbols

- Measure
  Modulation Analysis

Re-measurement mode:	Off

61. Repeat steps 4 to 7.
62. Set the frequency of the MS2840A, MS2850A to 3500 MHz.
63. Set the frequency of the MG3710A to 3499.5 MHz, and repeat Steps 4 through 7.

TestSignal016

64. Set the MG3710A as follows:
    - Frequency: 45.0 MHz (MS2840A) or 795.0 MHz (MS2850A)
    - Base Band
      Pattern (Memory A): TestSignal016
      Freq Offset: 5 MHz

65 Set the MS2840A, MS2850A as follows:
    - Center Frequency: 50.0 MHz (MS2840A) or 800.0 MHz (MS2850A)
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 32APSK
      Symbol Rate: 500 ksps
      APSK Ring Ratio (R2/R1): 2.840
      APSK Ring Ratio (R3/R1): 5.270
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
    - Measure
      Modulation Analysis
        Re-measurement mode: Off

66. Repeat steps 4 to 7.

67. Set the frequency of the MS2840A, MS2850A to 3500 MHz.

68. Set the frequency of the MG3710A to 3495.0 MHz, and repeat Steps 4 through 7.

Only the MS2850A can perform the following tests, under the condition that the MX269017A-001/011 is installed.

TestSignal014

69. Set the MG3710A as follows:
    - Frequency: 800.0 MHz
    - Base Band
      Pattern (Memory A): TestSignal014
      - Cal
      Internal Channel Correction: On
    - Mode
      ARB Setup
      Sampling Rate A: 200 MHz

70. Perform IQ Cal (Cal Type: DC) on MG3710A.

71. Set the MS2850A as follows:
    - Center Frequency: 800.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 2048QAM
      Symbol Rate: 50 Msps
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
      [Equalizer]Adaptive: On
      [Equalizer]Filter Length: 501
    - Measure
      Modulation Analysis
      Re-measurement mode: On
      Re-measurement Threshold: 1%

72 Repeat steps 4 to 7.

73. Set the frequency of the MS2850A to 3500 MHz.

74. Set the frequency of the MG3710A to 3500.0 MHz.

75. Perform IQ Cal (Cal Type: DC) on MG3710A, and repeat steps 4 to 7.

TestSignal017

76. Set the MG3710A as follows:
    - Frequency: 800.0 MHz
    - Base Band
      Pattern (Memory A): TestSignal017
    - Mode
      ARB Setup
        Sampling Rate A: 200 MHz
77. Perform IQ Cal (Cal Type: DC) on MG3710A.
78. Set the MS2850A as follows:
    - Center Frequency: 800.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 32APSK
      Symbol Rate: 50 Msps
      APSK Ring Ratio (R2/R1): 2.840
      APSK Ring Ratio (R3/R1): 5.270
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
      [Equalizer]Adaptive: Off
    - Measure
      Modulation Analysis
        Re-measurement mode: Off
79. Repeat steps 4 to 7.
80. Set the frequency of the MS2850A to 3500 MHz.
81. Set the frequency of the MG3710A to 3500.0 MHz.
82. Perform IQ Cal (Cal Type: DC) on MG3710A, and repeat steps 4 to 7.

Only the MS2850A with 033/034 installed can perform the following tests, under the condition that the MX269017A-001/011 is installed.

TestSignal014

83. Set the MG3710A as follows:
    - Frequency: 800.0 MHz
    - Base Band
      Pattern (Memory A): TestSignal014
    - Cal
      Internal Channel Correction: On
    - Mode
      ARB Setup
      Sampling Rate A: 200 MHz
84. Perform IQ Cal (Cal Type: DC) on MG3710A.
85. Set the MS2850A as follows:
    - Center Frequency: 800.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 2048QAM
      Symbol Rate: 50 Msps
      Capture OSR: 8
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
      [Equalizer]Adaptive: On
      [Equalizer]Filter Length: 501
    - Measure
      Modulation Analysis
      Re-measurement mode: On
      Re-measurement Threshold: 1%

86 Repeat steps 4 to 7.

87. Set the frequency of the MS2850A to 3500 MHz.
88. Set the frequency of the MG3710A to 3500.0 MHz.
89. Perform IQ Cal (Cal Type: DC) on MG3710A, and repeat steps 4 to 7.

TestSignal017

90. Set the MG3710A as follows:
    - Frequency: 800.0 MHz
    - Base Band
      Pattern (Memory A): TestSignal017
    - Mode
      ARB Setup
        Sampling Rate A: 200 MHz

91. Perform IQ Cal (Cal Type: DC) on MG3710A.

92. Set the MS2850A as follows:
    - Center Frequency: 800.0 MHz
    - Common Setting
      Measuring Object: Non-Formatted
      Modulation: 32APSK
      Symbol Rate: 50 Msps
      Capture OSR: 8
      APSK Ring Ratio (R2/R1): 2.840
      APSK Ring Ratio (R3/R1): 5.270
      Measurement Filter: Root Nyquist+None
      Reference Filter: Nyquist+None
      Roll Off: 1
      Measurement Interval: 4096 symbols
      [Equalizer]Adaptive: Off
    - Measure
      Modulation Analysis
        Re-measurement mode: Off

93. Repeat steps 4 to 7.

94. Set the frequency of the MS2850A to 3500 MHz.

95. Set the frequency of the MG3710A to 3500.0 MHz.

96. Perform IQ Cal (Cal Type: DC) on MG3710A, and repeat steps 4 to 7.

Table 5.2.2-1 Residual Vector Error

Signal Name	Modulation Method	Symbol Rate	Frequency	Measured Value [% (rms)]	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 001	π/4DQPSK	4 ksps	50 MHz		MS269xA 0.5% MS2830A, MS2840A 1.0% MS2850A 0.5%	MS269xA 0.1% MS2830A, MS2840A, MS2850A 0.1%	
			500 MHz				
TestSignal 002	64QAM	4 ksps	50 MHz				
			500 MHz				
TestSignal 003	π/4DQPSK	500 ksps	50 MHz				
			500 MHz				
			6000 MHz*		MS269xA 1.0% MS2830A, MS2840A 1.5% MS2850A 1.0%		
TestSignal 004	64QAM	500 ksps	50 MHz		MS269xA 0.5% MS2830A, MS2840A 1.0% MS2850A 0.5%		
			500 MHz				
			6000 MHz*		MS269xA 1.0% MS2830A, MS2840A 1.5% MS2850A 1.0%		
TestSignal 005	π/4DQPSK	5 Msps	50 MHz				
			6000 MHz*				
TestSignal 006	64QAM	5 Msps	50 MHz				
			6000 MHz*				
TestSignal 007	256QAM	5 Msps	50 MHz				
			6000 MHz*				
TestSignal 0011	MSK	5 Msps	50 MHz				
			6000 MHz*				

*: 6000 MHz : MS2690A/MS2691A/MS2692A
3500 MHz : MS2830A, MS2840A, MS2850A

Table 5.2.2-2 Residual Vector Error (MS2840A/MS2850A)

Signal Name	Modulation Method	Symbol Rate	Frequency	Measured Value [% (rms)]	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 012	2048QAM	500 ksps	50 MHz*		MS2840A, MS2850A, 1.0%	MS2840A, MS2850A, 0.1%	
			800 MHz*				
			3500 MHz				
TestSignal 013	2048QAM	5 Msps	50 MHz*		MS2840A, MS2850A, 1.0%		
			800 MHz*				
			3500 MHz				
TestSignal 015	32APSK	500 ksps	50 MHz*		MS2840A, MS2850A, 1.0%		
			800 MHz*				
			3500 MHz				
TestSignal 016	32APSK	5 Msps	50 MHz*		MS2840A, MS2850A, 1.0%		
			800 MHz*				
			3500 MHz				

*: 50 MHz: MS2840A
800 MHz: MS2850A

Table 5.2.2-3 Residual Vector Error (MS2850A)

Signal Name	Modulation Method	Symbol Rate	Frequency	Measured Value [% (rms)]	Max. Value	Uncer-tainty	Pass /Fail
TestSignal 014	2048QAM	50 Msps	800 MHz		MS2850A, 1.0%	MS2850A, 0.1%	
			3500 MHz				
TestSignal 017	32APSK	50 Msps	800 MHz		MS2850A, 1.5%	MS2850A, 0.1%	
			3500 MHz				

5.2.3 Testing Methods - Symbol Rate Error

(1) Test target standards

- Symbol rate error

(2) Measuring instrument for tests

- Vector signal generator: MG3710A + MX370102A
- Power meter
- 3-dB attenuator

(3) Setup

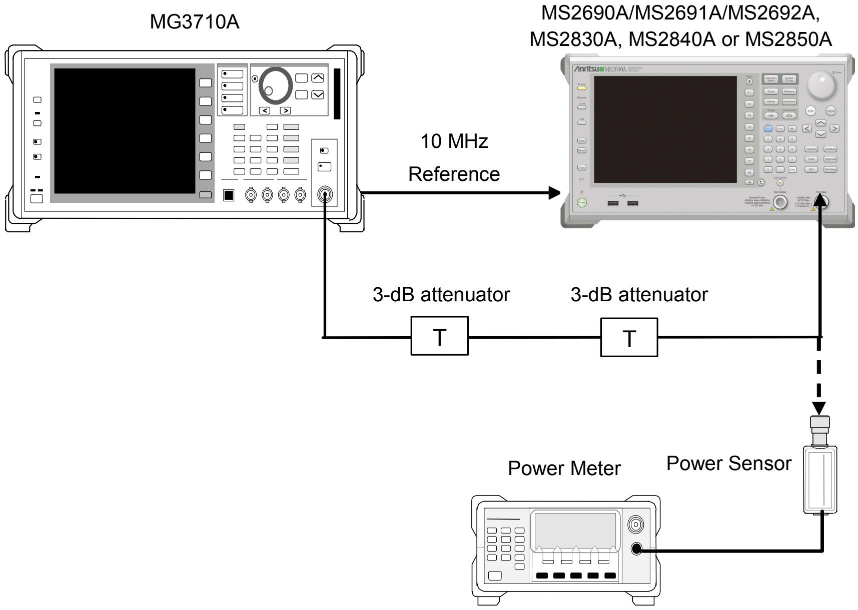


Figure 5.2.3-1 Setup

(4) Test Procedure

Use the default values (value following preset execution) for parameters whose values are not indicated in the following procedure.

<Procedure>

1. Set the MG3710A as follows:
   - Frequency: 30.0 MHz
   - Level: –15 dBm
   - Base Band Pattern: TestSignal008
   - Mod On/Off: On
   - Output: On
2. Set as follows for the MS2690A/MS2691A/MS2692A.
   - Center Frequency: 30.0 MHz
   - Input Level: –15 dBm
   - Reference Signal: Auto
   - Trace
     - Storage Mode: Average
     - Storage Count: 10
   - Common Setting
     - Measuring Object: Frame-Formatted
     - Modulation: 2FSK
     - Auto: Off
     - Modulation Index: 1
     - Symbol Rate: 100 ksps
     - Measurement Filter: None+None
     - Reference Filter: Gaussian+None
     - Roll Off: 0.50
     - Slots per Frame: 2
     - Measurement Slot: Slot0:ON, Slot1:OFF
     - Slot Length: 168 symbols
     - Measurement Offset: 0 symbol
     - Measurement Interval: 160 symbols
     - Sync Word Search: ON
     - Burst Search: ON
     - 1st Word Search Slot: Slot 0
     - 2nd Word: Disable
     - Sync Word Length: 8
     - Sync Word (Hex): E5
     - Sync Word Offset: 32 symbols
     - Deviation Calculation: Post-Measurement Filtering

3. Select the Modulation Analysis screen.
4. Input the output signal from the MG3710A to the power meter and adjust this output level so that the power reading is –15 dBm + Correction value (–3.09 dB) ± 0.1 dB.
5. Input the output signal from the MG3710A to the MX269017A.
6. Press Single to perform measurement.
7. Confirm that the measured Symbol Rate Error results satisfy the specifications.
8. Set the frequency of the MG3710A and MS2690A/MS2691A/MS2692A to 2 GHz, and repeat Steps 4 through 7.
9. Set the frequency of the MG3710A and MS2690A/MS2691A/MS2692A to 6 GHz (MS269xA) or 3.5 GHz (MS2830A, MS2840A, MS2850A), and repeat Steps 4 through 7.

(5) Test results

Table 5.2.3-1 Symbol Rate Error

Signal name	Modulation scheme	Symbol Rate	Frequency	Min. value	Deviation (Hz)	Max. value	Uncertainty	Pass /Fail
TestSignal 008	2FSK	100 ksps	30 MHz	–1 ppm		+1 ppm	±0.1 ppm	
			2 GHz					
			6 GHz*					

*: 6 GHz : MS2690A/MS2691A/MS2692A
3.5 GHz : MS2830A, MS2840A, MS2850A

Chapter 6 Other Functions

This chapter describes other functions of this application.

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	Hides Warm-up Message display.
F7	Preselector	Opens the Preselector function menu. Only available for MS2691A/MS2692A, MS2830A-044/045, MS2840A-044/046 or MS2850A-047/046. ☞3.2.2 “Preselector function menu”

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 Default Value List

Frequency	
Carrier Frequency	1.000 GHz
RF Spectrum	Off
Frequency Band Mode	Normal
(When MS2691A/MS2692A-003, MS2830A-041/043/044/045 MS2840A-041/044/046, or MS2850A-047/046 is installed)	
Signal Level Too Low Display	On
Micro Wave Preselector Bypass	On
(When MS2692A-067/167 or MS2830A-007/067/167, MS2840A-067/167, or MS2850A-067/167 is installed)	
Amplitude	
Input Level	–10.00 dBm
Pre-Amp	Off
Offset	Off
Offset Value	0.00 dB
Common Setting	
Preset Dialog Parameter	No Standard
Measuring Object	Frame Formatted
Modulation Type	BPSK
Symbol Rate	100 sps
Span Up (Frame Formatted)	Off
Capture OSR	4
Capture Interval	1 Frame
APSK Ring Ratio R2/R1	3.150
APSK Ring Ratio R3/R1	5.270
Measurement Filter	Root Nyquist
2nd Measurement Filter	None
Reference Filter	Nyquist
2nd Reference Filter	None
Roll Off / BT	1.00
2nd Roll Off / BT	1.00
Slots per Frame	1 slot
Slot length	10 symbol
Measurement Offset	0 symbol
Measurement Interval	10 symbol
Sync Word Search	OFF
Burst Search	OFF
1st Word Search Slot	Slot 0
1st Word Sync Word Length	1 symbol
1st Word Sync Word	0
1st Word Sync Word Offset	0 symbol

	2nd Word Search	Disable
	2nd Word Search Slot	Slot 0
	2nd Word Sync Word Length	1 symbol
	2nd Word Sync Word	0
	2nd Word Sync Word Offset	0 symbol
	Origin Offset Cancel	On
	Origin Offset Reference	Offset
	Droop Cancel	On
	EVM Reference	Constellation Max
	Equalizer Adaptive	Off
	Equalizer Convergence	1e-04
	Equalizer Filter Length	61
	Deviation rms Reference	Ideal average
	Deviation Calculation	Post-Measurement Filtering
	Method of Symbol Rate Error	Frame To Frame
	H-CPM Decode Method	Type1
	Burst Gap Size	20
	Off Slot Power Range	Slot Length
	Rise / Fall Time Off Detect Level	–50.00 dBm
Modulation Analysis		
	Re-measurement mode	Off
	Re-measurement Threshold	5%
	Signal Level Too Low Display	On
Power vs Time		
	Type	Gaussian
	Bandwidth	400 Hz
	Roll-off Factor	1.00
	Wide Dynamic Range	Off
Capture		
	Capture Time	Auto
	Capture Interval	1Frame
Trace (Modulation Analysis)		
	Select Trace	Trace 1
	Trace Mode of Trace 1	Numeric
	Trace Mode of Trace 2	Constellation
	Trace Mode of Trace 3	EVM vs Symbol
	Trace Mode of Trace 4	Magnitude Error vs Symbol
	Trace Mode of Trace 5	Signal Monitor
	Trace Mode of Trace 6	I and Q vs Symbol
	Trace Mode of Trace 7	Eye Diagram

Trace Mode of Trace 8	Trellis
Target Slot Number	0
Storage	
Mode	Off
Count	10
Zoom In/Zoom Out	Zoom Out
Next View	Trace 1 - 4
Result Select	EVM
Numeric Only	Off

Custom Numeric Setting	
Result1	Tx Power dBm
Result2	Frequency Error Hz
Result3	Mod. Fidelity (rms)
Result4	Deviation Average
Result5	Specific Word(Hex)
Result6	BER
Result7	Symbol Rate Error
Bar Graph Result1	Tx Power dBm
Min	–50
Max	0
Unit	dBm
Bar Graph Result2	Mod. Fidelity (rms)
Min	0
Max	10
Unit	%

Specific Word Setting	
Slot Number	0
Top Position	1 bit
Word Width	8 bit

BER Setting	
BER	Off
Slot Number	0

Trace (Power vs Time)			
	Trace Mode		Slot
	Slot		0
	Scale		
		Vertical	
		Log Scale Division	10 dB/Div
		Log Scale Line	10
		Horizontal	
		<Rise> Range (+/–)	10 symbol
		<Rise> Offset	0 symbol
		<Fall> Range (+/–)	10 symbol
		<Fall> Offset	0 symbol
	Storage		
		Mode	Off
		Count	10
		Average Type	Pwr
	Unit		dB
	Display Item		All
Power vs Time Mask Setup			
Marker			
	Marker Number 1		0
	Marker Number 2		0
	Maker Link		Off
Trigger			
	Trigger Switch		Off
	Trigger Source		External
	Trigger Slope		Rise
	Wide IF Video Trigger Level		–20 dBm
	Frame Trigger Period AUTO		On
	Frame Trigger Period		100 ms
	Trigger Delay		0 s
Accessory			
	Title		On, “Vector Modulation Analysis”

Appendix B Symbol Mapping

The following lists the initial symbol data (symbol mapping) values that correspond to the symbol allocation values for each modulation method and describes the file specification method for changing the symbol mapping.

B.1 Symbol Mapping Defaults

■ BPSK

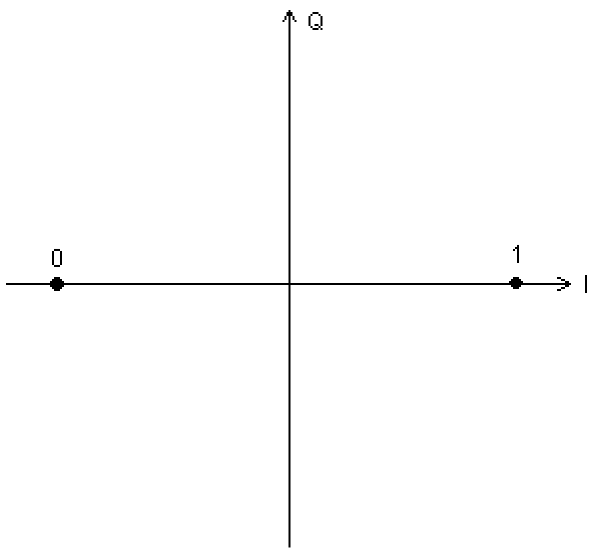


Figure B.1-1 BPSK Symbol Allocation

Table B.1-1 BPSK Symbol data

Allocation	Symbol data
0	0
1	1

■ DBPSK

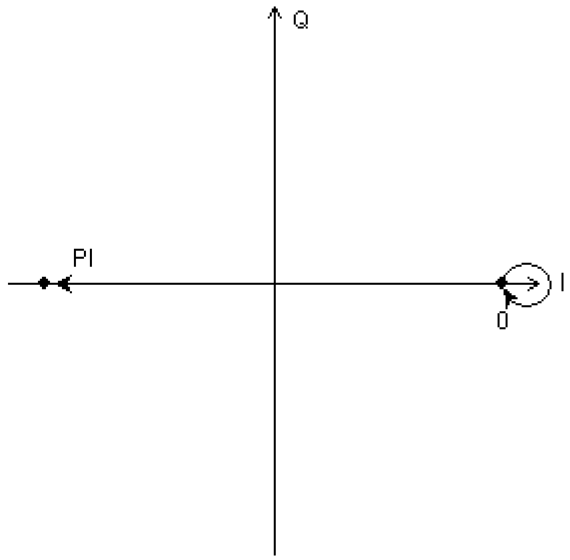


Figure B.1-2 DBPSK Symbol Allocation

Table B.1-2 DBPSK Symbol data

differential	Symbol data
PI	0
1	1

■ π/2 DBPSK

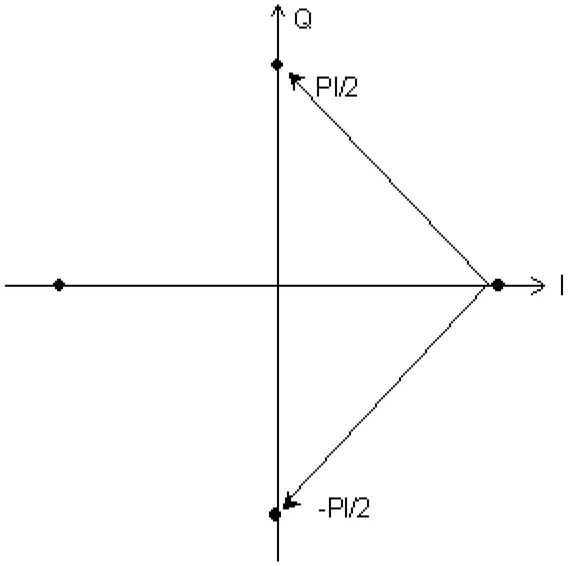


Figure B.1-3 π/2 DBPSK Symbol Allocation

Table B.1-3 π/2 DBPSK Symbol data

differential	Symbol data
+PI/2	0
–PI/2	1

■ QPSK

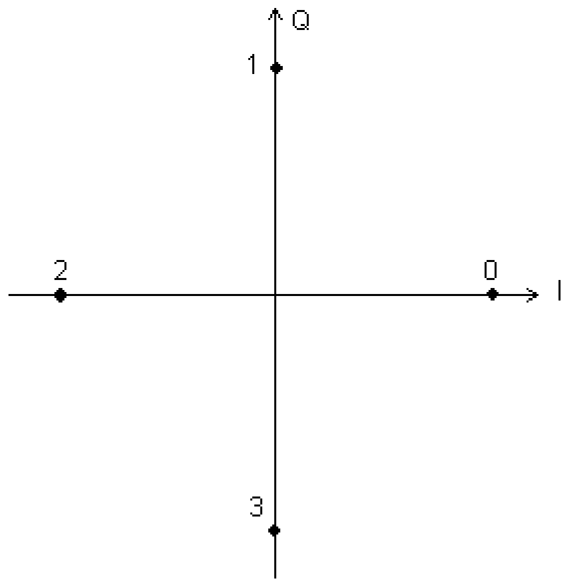


Figure B.1-4   QPSK Symbol Allocation

Table B.1-4   QPSK Symbol data

Allocation	Symbol data
0	11
1	01
2	00
3	10

■ O-QPSK

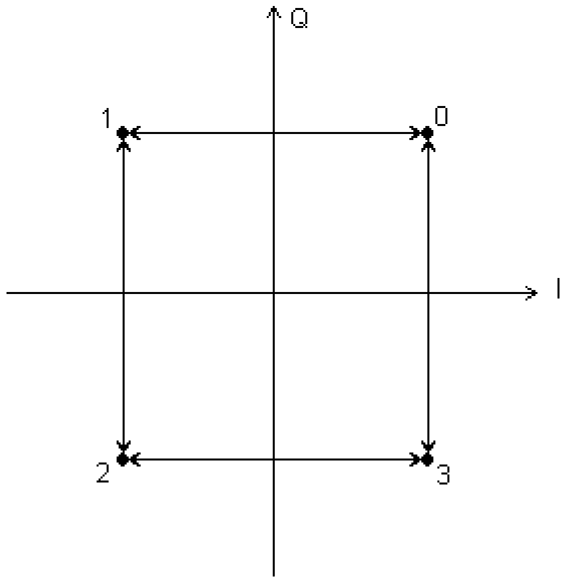


Figure B.1-5 O-QPSK Symbol Allocation

Table B.1-5 O-QPSK Symbol data

Allocation	Symbol data
0	11
1	01
2	00
3	10

■ DQPSK

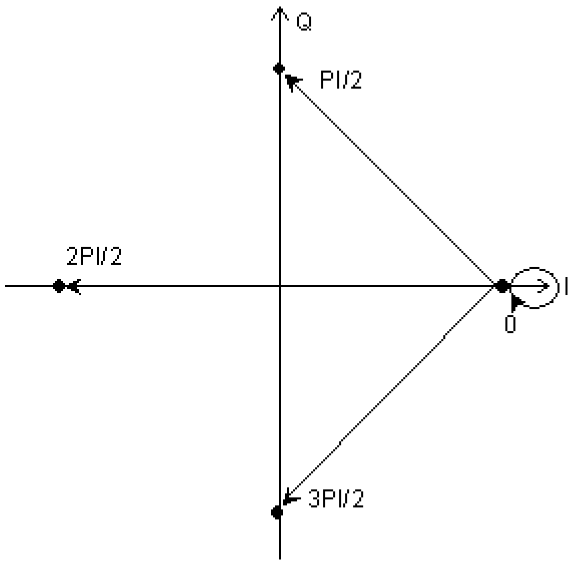


Figure B.1-6 DQPSK Symbol Allocation

Table B.1-6 DQPSK Symbol data

differential	**Symbol data**
PI/2	00
2PI/2	01
3PI/2	10
0	11

■ π/4DQPSK

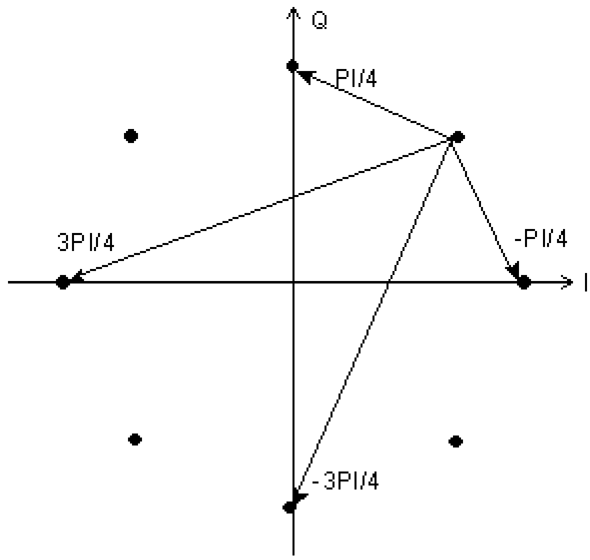


Figure B.1-7 π/4DQPSK Symbol Allocation

Table B.1-7 π/4QPSK Symbol data

Differential	Symbol data
$+\pi/4$	00
$+3\pi/4$	01
$-3\pi/4$	11
$-\pi/4$	10

■ 8PSK

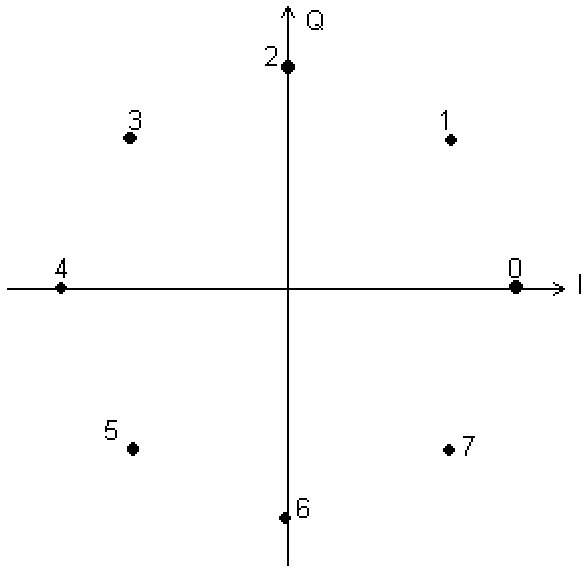


Figure B.1-8 8PSK Symbol Allocation

Table B.1-8 8PSK Symbol data

Allocation	Symbol data
0	111
1	110
2	010
3	011
4	001
5	000
6	100
7	101

■ D8PSK

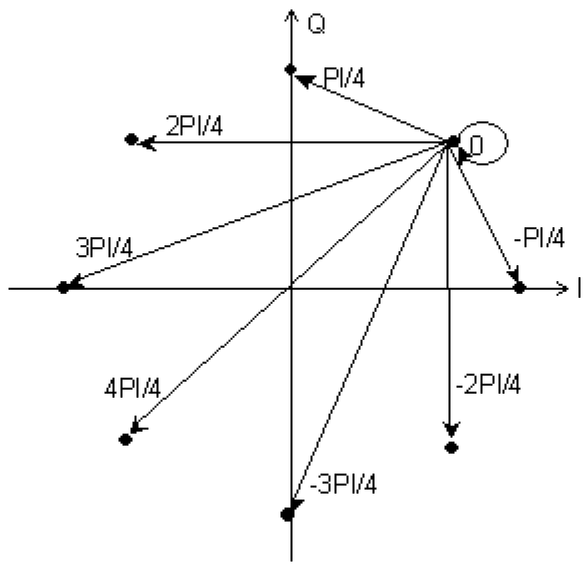


Figure B.1-9 D8PSK Symbol Allocation

Table B.1-9 D8PSK Symbol data

differential	Symbol data
PI/4	110
2PI/4	010
3PI/4	011
4PI/4	001
–3PI/4	000
–2PI/4	100
–PI/4	101
0	111

■ 16QAM

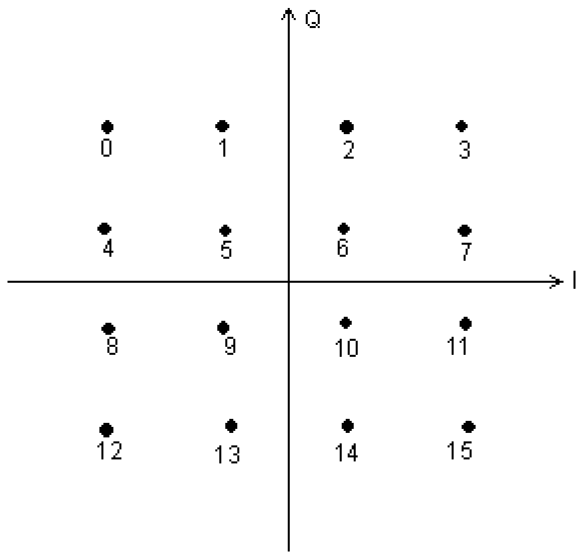


Figure B.1-10 16QAM Symbol Allocation

Table B.1-10 16QAM Symbol data

Allocation	Symbol data	Allocation	Symbol data
0	0111	8	0010
1	0101	9	0000
2	1101	10	1000
3	1111	11	1010
4	0110	12	0011
5	0100	13	0001
6	1100	14	1001
7	1110	15	1011

■ 32QAM

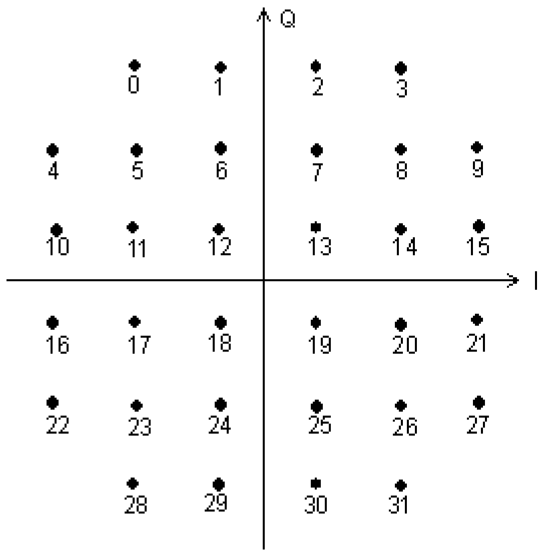


Figure B.1-11 32QAM Symbol Allocation

Table B.1-11 32QAM Symbol data

Allocation	Symbol data	Allocation	Symbol data
0	11101	16	00110
1	01010	17	10011
2	11010	18	00000
3	01101	19	10000
4	00111	20	00011
5	10100	21	10110
6	00001	22	01111
7	10001	23	11100
8	00100	24	01001
9	10111	25	11001
10	01110	26	01100
11	11011	27	11111
12	01000	28	10101
13	11000	29	00010
14	01011	30	10010
15	11110	31	00101

■ 64QAM

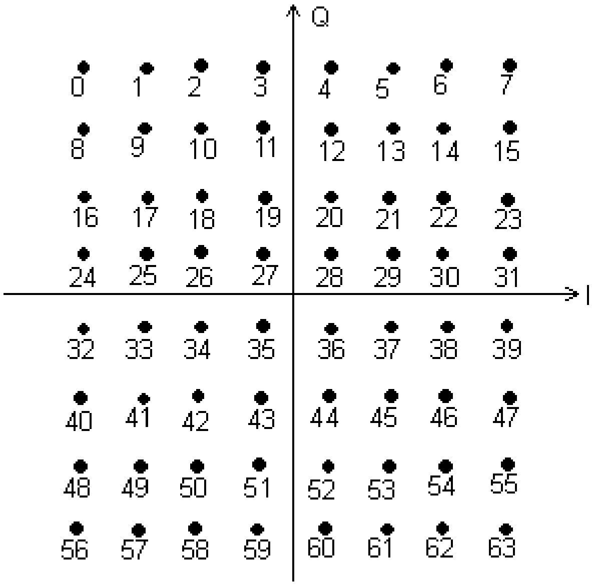


Figure B.1-12 64QAM Symbol Allocation

Table B.1-12 64 QAM Symbol data

Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data
0	100010	16	100111	32	110111	48	110010
1	100000	17	100101	33	110101	49	110000
2	101000	18	101101	34	111101	50	111000
3	101010	19	101111	35	111111	51	111010
4	001000	20	001101	36	011101	52	011000
5	001010	21	001111	37	011111	53	011010
6	000010	22	000111	38	010111	54	010010
7	000000	23	000101	39	010101	55	010000
8	100011	24	100110	40	110110	56	110011
9	100001	25	100100	41	110100	57	110001
10	101001	26	101100	42	111100	58	111001
11	101011	27	101110	43	111110	59	111011
12	001001	28	001100	44	011100	60	011001
13	001011	29	001110	45	011110	61	011011
14	000011	30	000110	46	010110	62	010011
15	000001	31	000100	47	010100	63	010001

■ 128QAM

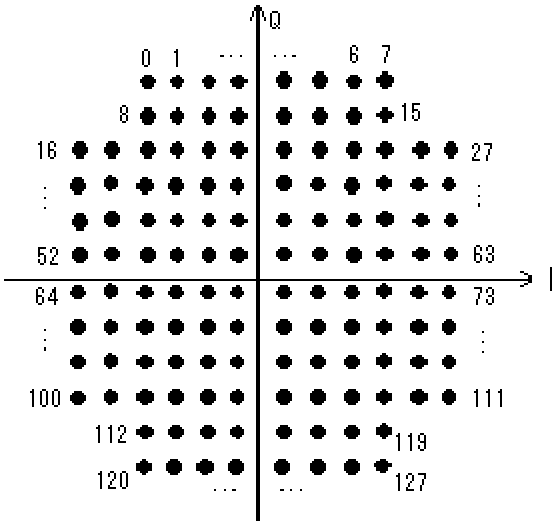


Figure B.1-13　128QAM Symbol Allocation

Table B.1-13 128QAM Symbol data

Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data
0	1011101	32	1000111	64	1101101	96	0110111
1	1011111	33	1000101	65	1101100	97	0110101
2	1001111	34	0010010	66	1100100	98	0101001
3	1001101	35	0010011	67	1100101	99	0101011
4	0011010	36	0010111	68	1100001	100	1111101
5	0011011	37	0010110	69	1100000	101	1111100
6	0001011	38	0011110	70	0100000	102	1110100
7	0001010	39	0011111	71	0100010	103	1110101
8	1011100	40	1011011	72	0110010	104	1110001
9	1011110	41	1011001	73	0110000	105	1110000
10	1001110	42	1010001	74	0111000	106	0100100
11	1001100	43	1010011	75	0111010	107	0100110
12	0011000	44	1000011	76	1101111	108	0110110
13	0011001	45	1000001	77	1101110	109	0110100
14	0001001	46	0000010	78	1100110	110	0101000
15	0001000	47	0000011	79	1100111	111	0101010
16	1001010	48	0000111	80	1100011	112	1101000
17	1001000	49	0000110	81	1100010	113	1101001
18	1010100	50	0001110	82	0100001	114	1111001
19	1010110	51	0001111	83	0100011	115	1111000
20	1000110	52	1011010	84	0110011	116	0101100
21	1000100	53	1011000	85	0110001	117	0101110
22	0010000	54	1010000	86	0111001	118	0111110
23	0010001	55	1010010	87	0111011	119	0111100
24	0010101	56	1000010	88	1111111	120	1101010
25	0010100	57	1000000	89	1111110	121	1101011
26	0011100	58	0000000	90	1110110	122	1111011
27	0011101	59	0000001	91	1110111	123	1111010
28	1001011	60	0000101	92	1110011	124	0101101
29	1001001	61	0000100	93	1110010	125	0101111
30	1010101	62	0001100	94	0100101	126	0111111
31	1010111	63	0001101	95	0100111	127	0111101

■ 256QAM

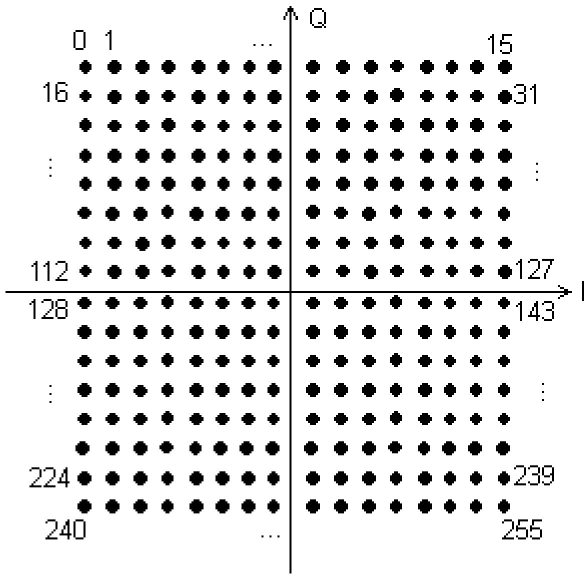


Figure B.1-14 256QAM Symbol Allocation

Table B.1-14 256QAM Symbol data (1/2)

Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data
0	10001000	32	10001101	64	10011101	96	10011000
1	10001010	33	10001111	65	10011111	97	10011010
2	10000010	34	10000111	66	10010111	98	10010010
3	10000000	35	10000101	67	10010101	99	10010000
4	10100010	36	10100111	68	10110111	100	10110010
5	10100000	37	10100101	69	10110101	101	10110000
6	10101000	38	10101101	70	10111101	102	10111000
7	10101010	39	10101111	71	10111111	103	10111010
8	00100010	40	00100111	72	00110111	104	00110010
9	00100000	41	00100101	73	00110101	105	00110000
10	00101000	42	00101101	74	00111101	106	00111000
11	00101010	43	00101111	75	00111111	107	00111010
12	00001000	44	00001101	76	00011101	108	00011000
13	00001010	45	00001111	77	00011111	109	00011010
14	00000010	46	00000111	78	00010111	110	00010010
15	00000000	47	00000101	79	00010101	111	00010000
16	10001001	48	10001100	80	10011100	112	10011001
17	10001011	49	10001110	81	10011110	113	10011011
18	10000011	50	10000110	82	10010110	114	10010011
19	10000001	51	10000100	83	10010100	115	10010001
20	10100011	52	10100110	84	10110110	116	10110011
21	10100001	53	10100100	85	10110100	117	10110001
22	10101001	54	10101100	86	10111100	118	10111001
23	10101011	55	10101110	87	10111110	119	10111011
24	00100011	56	00100110	88	00110110	120	00110011
25	00100001	57	00100100	89	00110100	121	00110001
26	00101001	58	00101100	90	00111100	122	00111001
27	00101011	59	00101110	91	00111110	123	00111011
28	00001001	60	00001100	92	00011100	124	00011001
29	00001011	61	00001110	93	00011110	125	00011011
30	00000011	62	00000110	94	00010110	126	00010011
31	00000001	63	00000100	95	00010100	127	00010001

Table B.1-14 256QAM Symbol data (2/2)

Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data	Allocation	Symbol data
128	11011101	160	11011000	192	11001000	224	11001101
129	11011111	161	11011010	193	11001010	225	11001111
130	11010111	162	11010010	194	11000010	226	11000111
131	11010101	163	11010000	195	11000000	227	11000101
132	11110111	164	11110010	196	11100010	228	11100111
133	11110101	165	11110000	197	11100000	229	11100101
134	11111101	166	11111000	198	11101000	230	11101101
135	11111111	167	11111010	199	11101010	231	11101111
136	01110111	168	01110010	200	01100010	232	01100111
137	01110101	169	01110000	201	01100000	233	01100101
138	01111101	170	01111000	202	01101000	234	01101101
139	01111111	171	01111010	203	01101010	235	01101111
140	01011101	172	01011000	204	01001000	236	01001101
141	01011111	173	01011010	205	01001010	237	01001111
142	01010111	174	01010010	206	01000010	238	01000111
143	01010101	175	01010000	207	01000000	239	01000101
144	11011100	176	11011001	208	11001001	240	11001100
145	11011110	177	11011011	209	11001011	241	11001110
146	11010110	178	11010011	210	11000011	242	11000110
147	11010100	179	11010001	211	11000001	243	11000100
148	11110110	180	11110011	212	11100011	244	11100110
149	11110100	181	11110001	213	11100001	245	11100100
150	11111100	182	11111001	214	11101001	246	11101100
151	11111110	183	11111011	215	11101011	247	11101110
152	01110110	184	01110011	216	01100011	248	01100110
153	01110100	185	01110001	217	01100001	249	01100100
154	01111100	186	01111001	218	01101001	250	01101100
155	01111110	187	01111011	219	01101011	251	01101110
156	01011100	188	01011001	220	01001001	252	01001100
157	01011110	189	01011011	221	01001011	253	01001110
158	01010110	190	01010011	222	01000011	254	01000110
159	01010100	191	01010001	223	01000001	255	01000100

■ 512QAM

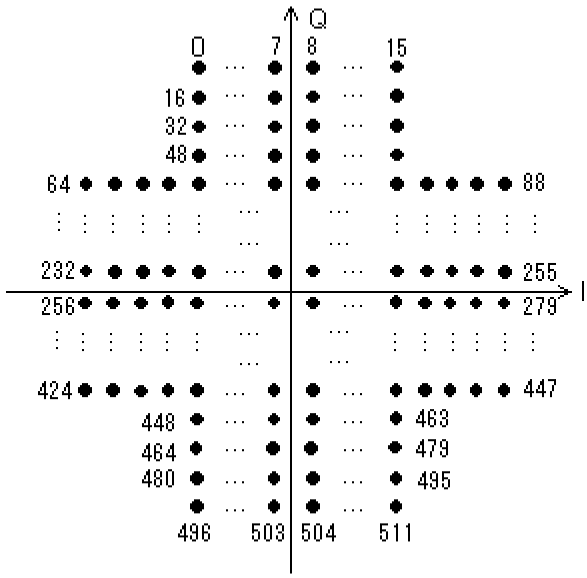


Figure B.1-15 512QAM Symbol Allocation

Table B.1-15 512QAM Symbol data

Allocation	Symbol data
0	000000000
1	000000001
2	000000010
…	…
509	111111101
510	111111110
511	111111111

■ 1024QAM

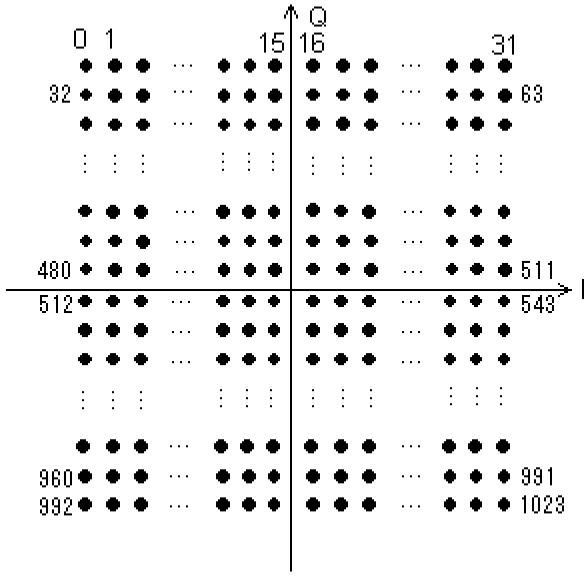


Figure B.1-16 1024QAM Symbol Allocation

Table B.1-16 1024QAM Symbol data

Allocation	Symbol data
0	0000000000
1	0000000001
2	0000000010
…	…
1021	1111111101
1022	1111111110
1023	1111111111

■ 2048QAM

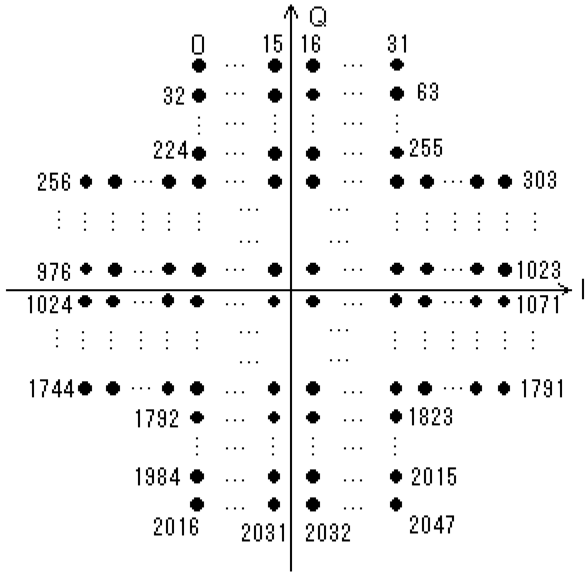


Figure B.1-17　2048QAM Symbol Allocation

Table B.1-17　2048QAM Symbol data

Allocation	Symbol data
0	00000000000
1	00000000001
2	00000000010
…	…
2045	11111111101
2046	11111111110
2047	11111111111

■ 2FSK

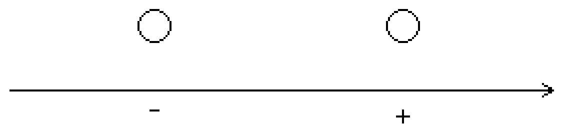


Figure B.1-18 2FSK Symbol Allocation

Table B.1-18 2FSK Symbol data

Direction	Symbol data
+	1
–	0

■ 4FSK/H-CPM

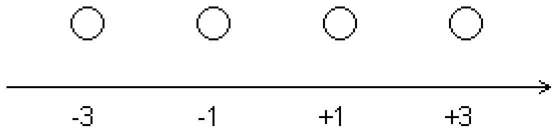


Figure B.1-19 4FSK/H-CPM Symbol Allocation

Table B.1-19 4FSK/H-CPM Symbol data

Direction	Symbol data
+3	01
+1	00
–1	10
–3	11

■ 2ASK

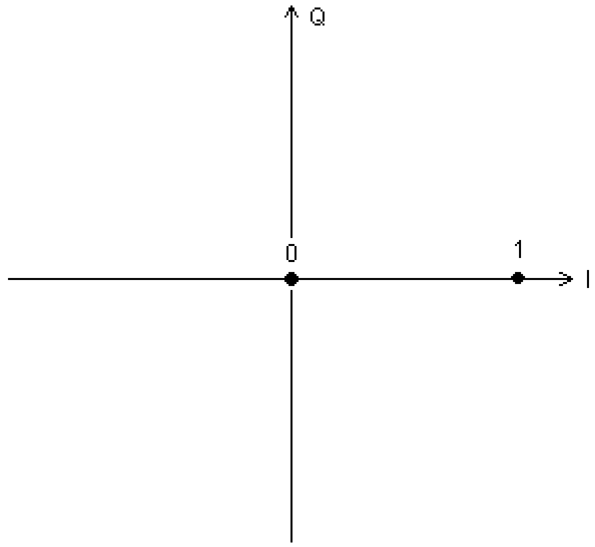


Figure B.1-20　2ASK Symbol Allocation

Table B.1-20　2ASK Symbol data

Allocation	Symbol data
0	0
1	1

■ 4ASK

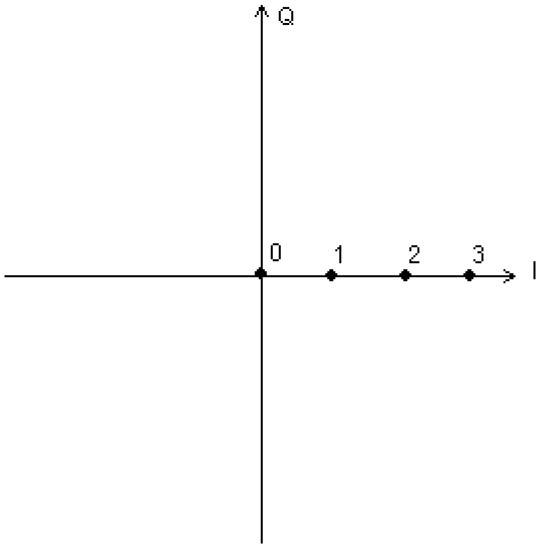


Figure B.1-21 4ASK Symbol Allocation

Table B.1-21 4ASK Symbol data

Allocation	Symbol data
0	00
1	01
2	11
3	10

■ MSK

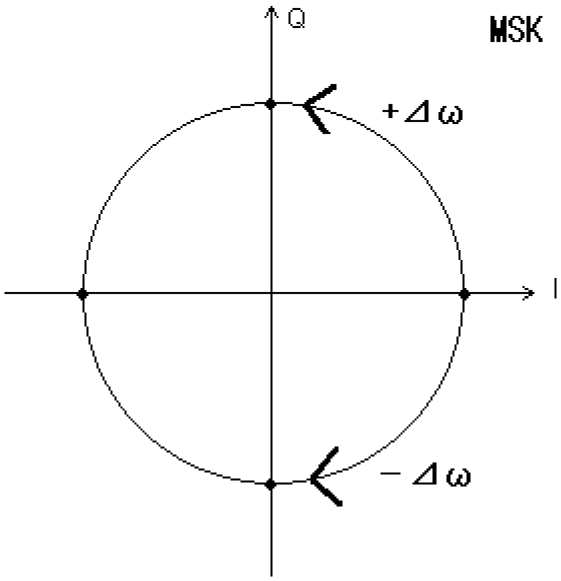


Figure B.1-22 MSK Symbol Allocation

Table B.1-22 MSK Symbol data

Direction	Symbol data
+	1
–	0

■ 16APSK

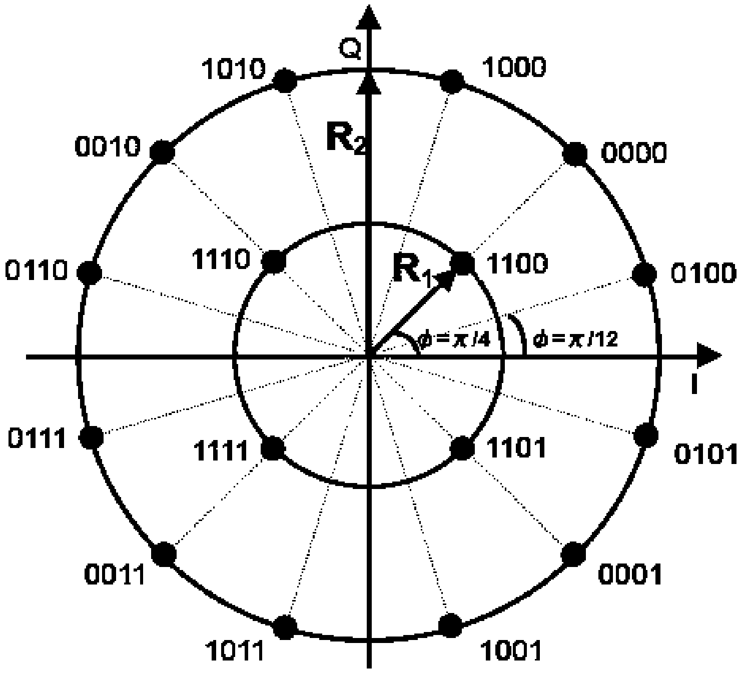


Figure B.1-23   16APSK Symbol Allocation

Table B.1-23   16APSK Symbol data

Allocation	Symbol data
0	0111
1	0101
2	1101
3	1111
4	0110
5	0100
6	1100
7	1110
8	0010
9	0000
10	1000
11	1010
12	0011
13	0001
14	1001
15	1011

■ 32APSK

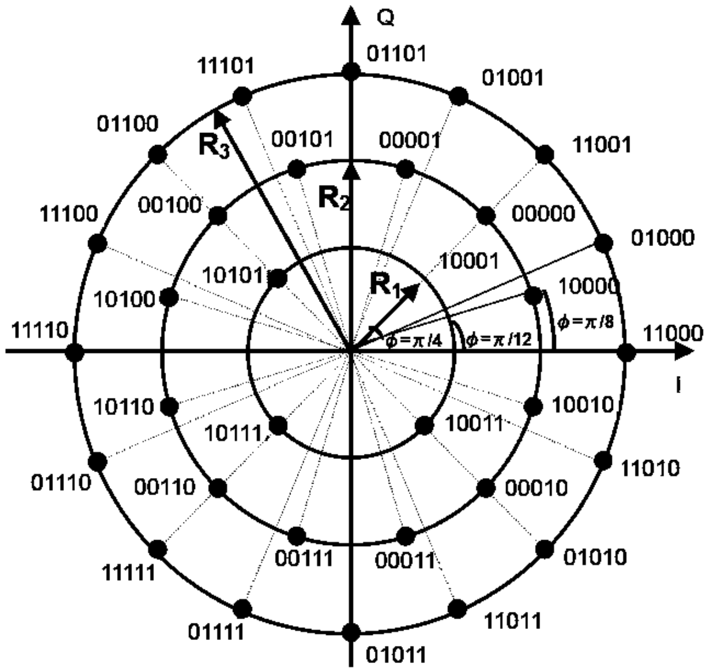


Figure B.1-24 32APSK Symbol Allocation

Table B.1-24 32APSK Symbol data

Allocation	Symbol data	Allocation	Symbol data
0	11101	16	00110
1	01010	17	10011
2	11010	18	00000
3	01101	19	10000
4	00111	20	00011
5	10100	21	10110
6	00001	22	01111
7	10001	23	11100
8	00100	24	01001
9	10111	25	11001
10	01110	26	01100
11	11011	27	11111
12	01000	28	10101
13	11000	29	00010
14	01011	30	10010
15	11110	31	00101

B.2 Specifying Configuration File for Mapping Edit

The following describes how to specify the configuration file used to edit the mapping with this application.

Create this file in the text format. Any file name and extension can be specified.

Observe the following rules when writing a configuration file:

1. On each line, specify the symbol data bit sequence in binary (by using 0s and 1s).
2. Specify the symbol data for allocation 0 on the first line. Specify the symbol data for allocation 1 on the second line. Continue to specify symbol data for allocations until the number of symbols is reached.
3. The number of symbols depends on the specified modulation type, and the number of symbols must match the number of lines.

Example:

Specifying the mapping editing file for the modulation type 16QAM

To specify settings such that the symbol data values correspond to the symbol allocation values as shown in Table B.2-1, specify the configuration file as shown in the same table.

Table B.2-1 Settings for Allocation and Symbol data

Allocation	Symbol data	Allocation	Symbol data
0	1000	8	1101
1	1010	9	1111
2	0010	10	0111
3	0000	11	0101
4	1001	12	1100
5	1011	13	1110
6	0011	14	0110
7	0001	15	0100

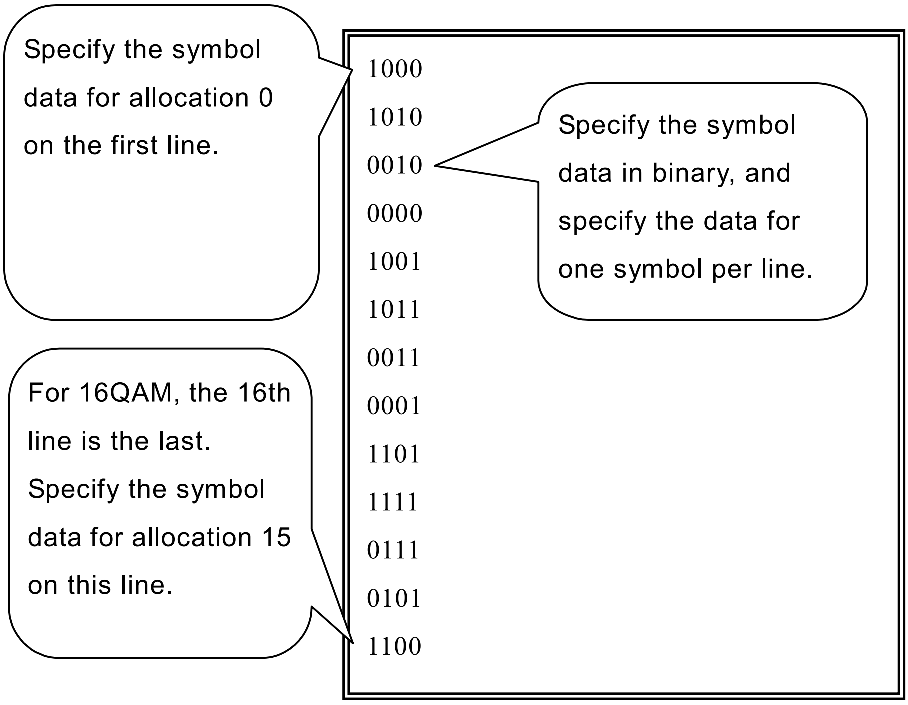


Figure B.2-1 Example of Specifying Mapping Editing Configuration File

Appendix C Predefined Settings List

The following Common Setting Parameter values are specified if the Preset Dialog Parameter function was used.

Table C-1 Parameter setting list (1/4)

Parameter	Table
RCR39_PI4DQPSK_TCH_UL	C-2
RCR39_PI4DQPSK_TCH_DL	C-2
T61_SCPC_v1_0_SC	C-3
T61_SCPC_v1_1_40ms_SC	C-3
T61_SCPC_v1_1_20ms_SC	C-4
T61_FDMA_PSC_UL	C-4
T61_FDMA_PSC_DL	C-5
T86_CCH_UL	C-5
T86_CCH_DL	C-6
T86_TCH_UL	C-6
T86_TCH_DL	C-7
T98_PI4DQPSK_SC	C-7
T98_4FSK_SC	C-8
BPSK-20kbps	C-8
GFSK-100kbps	C-9
O-QPSK-250ksps	C-10
O-QPSK-250ksps_2	C-10
T102_PART1	C-11
T102_PART2	C-11

Table C-1 Parameter setting list (2/4)

Parameter	Table
P25_C4FM	C-12
P25_CQPSK	C-12
P25_LSM	C-13
P25_WCQPSK	C-13
P25_IB_Burst_STD_Type1	C-14
P25_IB_Burst_STD_Type2	C-14
P25_IB_LCH0_STD_Type1	C-15
P25_IB_LCH0_STD_Type2	C-15
P25_IB_LCH0_Symmetrical_Type1	C-16
P25_IB_LCH0_Symmetrical_Type2	C-16
P25_IB_LCH1_STD_Type1	C-17
P25_IB_LCH1_STD_Type2	C-17
P25_OB_STD	C-18
P25_OB_STD_BER	C-18
DMR_BS_sourced_Voice	C-19
DMR_BS_sourced_Data	C-19
DMR_MS_sourced_Voice	C-20
DMR_MS_sourced_Data	C-20
DMR_MS_sourced_RC	C-21
NXDN_2_4ksps	C-21
NXDN_4_8ksps	C-22
T86_SYNC_UL	C-23
T86_SYNC_DL	C-23
DMR_BS_sourced_Voice_2	C-24
DMR_BS_sourced_Data_2	C-24
DMR_MS_sourced_Voice_2	C-25
DMR_MS_sourced_Data_2	C-25
DMR_Normal_Burst	C-26
DMR_RC_Burst	C-26

Table C-1 Parameter setting list (3/4)

Parameter	Table
dPMR446_80ms	C-27
dPMR446_HeaderBurst	C-27
dPMR446_320ms_FS2	C-28
dPMR_BCH_STD	C-29
dPMR_BCH_110ms_FS1	C-30
dPMR_BCH_Uplink_FS1	C-30
dPMR_TCH_STD	C-31
dPMR_TCH_Payload80ms_FS2	C-32
dPMR_TCH_PacketHead_FS4	C-32
TETRA_DL_NORMAL_CONT	C-33
TETRA_DL_NORMAL_DISCONT	C-33
TETRA_UL_NORMAL	C-34
[DVB]-[DVB-S]	
DVB-S_BW26M	C-35
DVB-S_BW54M	
[DVB]-[DVB-S2]	
DVB-S2_16APSK_R2_3	C-36
DVB-S2_16APSK_R3_4	
DVB-S2_16APSK_R4_5	
DVB-S2_16APSK_R5_6	
DVB-S2_16APSK_R8_9	
DVB-S2_16APSK_R9_10	
DVB-S2_32APSK_R3_4	
DVB-S2_32APSK_R4_5	
DVB-S2_32APSK_R5_6	
DVB-S2_32APSK_R8_9	
DVB-S2_32APSK_R9_10	
[DVB]-[DVB-DSNG]	
DSNG_BW_3M_QPSK	C-37
DSNG_BW_3M_8PSK	
DSNG_BW_3M_16QAM	
DSNG_BW_36M_16QAM	
DSNG_BW_72M_QPSK	
[ARIB_STD-B26]-[DVB-DSNG]	
DSNG_MODE1	C-38
DSNG_MODE2	
DSNG_MODE3-1	
DSNG_MODE3-2	
DSNG_MODE4	

Table C-1 Parameter setting list (4/4)

Parameter	Table
[ARIB_STD-B26]-[DVB-S2]	
DVB-S2_QPSK	C-38
DVB-S2_16APSK_R2_3	C-36
DVB-S2_16APSK_R3_4	
DVB-S2_16APSK_R4_5	
DVB-S2_16APSK_R5_6	
DVB-S2_16APSK_R8_9	
DVB-S2_16APSK_R9_10	
DVB-S2_32APSK_R3_4	
DVB-S2_32APSK_R4_5	
DVB-S2_32APSK_R5_6	
DVB-S2_32APSK_R8_9	
DVB-S2_32APSK_R9_10	
STD-28_DL_SB	C-39
STD-28_DL_TCH	
STD-28_UL_SB	
STD-28_UL_TCH	
RCR39-T79_MS-TCH	C-40
RCR39-T79_MS-CCH	
RCR39-T79_MS-SYNC	
RCR39-T79_DC-CH	
RCR39-T79_DC-SYNC	

Table C-2 Predefined Settings List

	RCR39_PI4DQPSK_TCH_UL	RCR39_PI4DQPSK_TCH_DL
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	16000 sps	16000 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.50	0.50
2nd Roll Off	1.00	1.00
Slots per Frame	4 slot	4 slot
Slot length	160 symbol	160 symbol
Measurement Offset	3 symbol	3 symbol
Measurement Interval	153 symbol	157 symbol
Sync Word Search	ON	ON
Burst Search	ON	OFF
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	785B4	87A4B
1st Word Sync Word Offset	78 symbol	60 symbol
2nd Word Search	Enable	Enable
2nd Word Search Slot	Slot 0	Slot 0
2nd Word Sync Word Length	10 symbol	10 symbol
2nd Word Sync Word	CE450	31BAF
2nd Word Sync Word Offset	78 symbol	60 symbol

Table C-3 Predefined Settings List

	T61_SCPC_v1_0_SC	T61_SCPC_v1_1_40ms_SC
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	4800 sps	4800 sps
Span Up	Off	Off
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	1 slot	4 slot
Slot length	192 symbol	192 symbol
Measurement Offset	15 symbol	4 symbol
Measurement Interval	177 symbol	182 symbol
Sync Word Search	ON	ON
Burst Search	OFF	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	1E56F	1E56F
1st Word Sync Word Offset	92 symbol	4 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Mask Table	–	T61 Service Channel 20,40 ms

Table C-4 Predefined Settings List

	T61_SCPC_v1_1_20ms_SC	T61_FDMA_PSC_UL
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	4800 sps	4800 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	8 slot	1 slot
Slot length	96 symbol	192 symbol
Measurement Offset	4 symbol	15 symbol
Measurement Interval	86 symbol	177 symbol
Sync Word Search	ON	ON
Burst Search	ON	OFF
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	31BAF	E1A90
1st Word Sync Word Offset	4 symbol	92 symbol
2nd Word Search	Disable	Enable
2nd Word Search Slot	–	Slot 0
2nd Word Sync Word Length	–	10 symbol
2nd Word Sync Word	–	62DC9
2nd Word Sync Word Offset	–	92 symbol
Mask Table	T61 Service Channel 20, 40 ms	–

Table C-5 Predefined Settings List

	T61_FDMA_PSC_DL	T86_CCH_UL
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	16QAM
Symbol Rate	4800 sps	11250 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	1 slot	6 slot
Slot length	192 symbol	150 symbol
Measurement Offset	15 symbol	4 symbol
Measurement Interval	177 symbol	141 symbol
Sync Word Search	ON	ON
Burst Search	OFF	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	1E56F	000A0AA00A
1st Word Sync Word Offset	92 symbol	69 symbol
2nd Word Search	Enable	Disable
2nd Word Search Slot	Slot 0	–
2nd Word Sync Word Length	10 symbol	–
2nd Word Sync Word	9D236	–
2nd Word Sync Word Offset	92 symbol	–
Mask Table	–	STD-T86 UL,DL Burst

Table C-6 Predefined Settings List

	T86_CCH_DL	T86_TCH_UL
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	16QAM	16QAM
Symbol Rate	11250 sps	11250 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	6 slot	6 slot
Slot length	150 symbol	150 symbol
Measurement Offset	4 symbol	4 symbol
Measurement Interval	141 symbol	141 symbol
Sync Word Search	ON	ON
Burst Search	ON	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	000A0A00A0	00A000000A
1st Word Sync Word Offset	69 symbol	69 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Mask Table	STD-T86 UL,DL Burst	STD-T86 UL,DL Burst

Table C-7 Predefined Settings List

	T86_TCH_DL	T98_PI4DQPSK_SC
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	16QAM	PI/4DQPSK
Symbol Rate	11250 sps	4800 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	6 slot	1 slot
Slot length	150 symbol	192 symbol
Measurement Offset	4 symbol	15 symbol
Measurement Interval	141 symbol	177 symbol
Sync Word Search	ON	ON
Burst Search	ON	OFF
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	00A000AAAA	1E56F
1st Word Sync Word Offset	69 symbol	92 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Mask Table	STD-T86 UL,DL Burst	–

Table C-8 Predefined Settings List

	T98_4FSK_SC	BPSK-20kbps
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	BPSK
Auto Deviation	–	–
Symbol Rate	2400 sps	300 ksps
Span Up	On	On
Measurement Filter	ARIB STD-T98	None
2nd Measurement Filter	None	None
Reference Filter	ARIB STD-T98	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	1.00
2nd Roll Off	1.00	1.00
Slots per Frame	1 slot	2 slot
Slot length	192 symbol	1080 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	192 symbol	1000 symbol
Sync Word Search	ON	ON
Burst Search	OFF	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	120 symbol
1st Word Sync Word	CDF59	0A67EB2029985330A67EB23D640533
1st Word Sync Word Offset	0 symbol	480 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Pre-Measurement Filtering	–

Table C-9 Predefined Settings List

	GFSK-100kbps
Measuring Object	Frame Formatted
Modulation Type	2FSK
Auto Deviation	OFF
Modulation Index	1
Symbol Rate	100 ksps
Span Up	On
Measurement Filter	None
2nd Measurement Filter	None
Reference Filter	Gaussian
2nd Reference Filter	None
Roll Off	0.50
2nd Roll Off	1.00
Slots per Frame	2
Slot length	168 symbol
Measurement Offset	0 symbol
Measurement Interval	160 symbol
Sync Word Search	ON
Burst Search	ON
1st Word Search Slot	Slot 0
1st Word Sync Word Length	8 symbol
1st Word Sync Word	E5
1st Word Sync Word Offset	32 symbol
2nd Word Search	Disable
2nd Word Search Slot	–
2nd Word Sync Word Length	–
2nd Word Sync Word	–
2nd Word Sync Word Offset	–
Deviation Calculation	Post-Measurement Filtering

Table C-10 Predefined Settings List

	O-QPSK-250ksps	O-QPSK-250ksps_2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	O-QPSK	O-QPSK
Auto Deviation	—	—
Modulation Index	—	—
Symbol Rate	1 Msps	1 Msps
Span Up	On	On
Measurement Filter	None	None
2nd Measurement Filter	None	None
Reference Filter	Half-sine	Half-sine
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.00	1.00
Slots per Frame	2	2
Slot length	1128 symbol	1128 symbol
Measurement Offset	2 symbol	2 symbol
Measurement Interval	1000 symbol	1000 symbol
Sync Word Search	Off	Off
Burst Search	ON	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	32 symbol	32 symbol
1st Word Sync Word	9C3522ED7B8C9607	9C3522ED7B8C9607
1st Word Sync Word Offset	128 symbol	128 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	—	—
2nd Word Sync Word Length	—	—
2nd Word Sync Word	—	—
2nd Word Sync Word Offset	—	—
Deviation Calculation	—	—
Origin Offset Cancel	On	Off
Origin Offset Reference	Offset	Offset

Table C-11 Predefined Settings List

	T102_PART1	T102_PART2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	ON	ON
Modulation Index	–	–
Symbol Rate	2.4 ksps	2.4 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	ARIB STD-T98
2nd Measurement Filter	Inverse Gaussian	None
Reference Filter	Nyquist	ARIB STD-T98
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	0.769	1.00
Slots per Frame	1	1
Slot length	192 symbol	192 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	192 symbol	192 symbol
Sync Word Search	OFF	OFF
Burst Search	OFF	OFF
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	CDF59	CDF59
1st Word Sync Word Offset	72 symbol	0 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Pre-Measurement Filtering	Pre-Measurement Filtering

Table C-12 Predefined Settings List

	P25_C4FM	P25_CQPSK
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	PI/4 DQPSK
Auto Deviation	Off	–
Modulation Index	–	–
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	None	None
2nd Measurement Filter	Rect	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.00
Slots per Frame	1	1
Slot length	864 symbol	864 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	864 symbol	864 symbol
Sync Word Search	Off	Off
Burst Search	Off	Off
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	–

Table C-13 Predefined Settings List

	P25_LSM	P25_WCQPSK
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4 DQPSK	PI/4 DQPSK
Auto Deviation	Off	–
Modulation Index	–	–
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	None	None
2nd Measurement Filter	None	None
Reference Filter	User Defined	User Defined
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.00
Slots per Frame	1	1
Slot length	864 symbol	864 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	864 symbol	864 symbol
Sync Word Search	Off	Off
Burst Search	Off	Off
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	–	–

Table C-14 Predefined Settings List

	P25_IB_Burst_STD_Type1	P25_IB_Burst_STD_Type2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	H-CPM	H-CPM
Auto Deviation	Off	Off
Modulation Index	–	–
Maximum Frequency Deviation	3000	3000
Symbol Rate	6 ksps	6 ksps
Span Up	–	–
Measurement Filter	H-CPM_P25	H-CPM_P25
2nd Measurement Filter	None	None
Reference Filter	H-CPM_P25	H-CPM_P25
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.000
Slots per Frame	3	3
Slot length	180 symbol	180 symbol
Measurement Offset	4 symbol	14 symbol
Measurement Interval	164 symbol	140 symbol
Sync Word Search	Off	Off
Burst Search	On	On
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Deviation rms Reference	Ideal average	Ideal average
H-CPM Decode Method	Type1	Type2

Table C-15 Predefined Settings List

	P25_IB_LCH0_STD_Type1	P25_IB_LCH0_STD_Type2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	H-CPM	H-CPM
Auto Deviation	Off	Off
Modulation Index	—	—
Maximum Frequency Deviation	3000	3000
Symbol Rate	6 ksps	6 ksps
Span Up	—	—
Measurement Filter	H-CPM_P25	H-CPM_P25
2nd Measurement Filter	None	None
Reference Filter	H-CPM_P25	H-CPM_P25
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.000
Slots per Frame	12	12
Slot length	180 symbol	180 symbol
Measurement Offset	8 symbol	20 symbol
Measurement Interval	164 symbol	140 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot10	Slot10
1st Word Sync Word Length	18 Symbol	18 Symbol
1st Word Sync Word	577D577FF	577D577FF
1st Word Sync Word Offset	10 Symbol	10 Symbol
2nd Word Search	On	On
2nd Word Search Slot	Slot10	Slot10
2nd Word Sync Word Length	18 Symbol	18 Symbol
2nd Word Sync Word	576D577EF	576D577EF
2nd Word Sync Word Offset	10 Symbol	10 Symbol
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Deviation rms Reference	Ideal average	Ideal average
H-CPM Decode Method	Type1	Type2

Table C-16 Predefined Settings List

	P25_IB_LCH0_ Symmetrical_Type1	P25_IB_LCH0_ Symmetrical_Type2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	H-CPM	H-CPM
Auto Deviation	Off	Off
Modulation Index	–	–
Maximum Frequency Deviation	3000	3000
Symbol Rate	6 ksps	6 ksps
Span Up	–	–
Measurement Filter	H-CPM_P25	H-CPM_P25
2nd Measurement Filter	None	None
Reference Filter	H-CPM_P25	H-CPM_P25
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.000
Slots per Frame	12	12
Slot length	180 symbol	180 symbol
Measurement Offset	8 symbol	20 symbol
Measurement Interval	164 symbol	140 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot11	Slot11
1st Word Sync Word Length	18 Symbol	18 Symbol
1st Word Sync Word	577D577FF	577D577FF
1st Word Sync Word Offset	10 Symbol	10 Symbol
2nd Word Search	On	On
2nd Word Search Slot	Slot10	Slot10
2nd Word Sync Word Length	18 Symbol	18 Symbol
2nd Word Sync Word	576D577EF	576D577EF
2nd Word Sync Word Offset	10 Symbol	10 Symbol
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Deviation rms Reference	Ideal average	Ideal average
H-CPM Decode Method	Type1	Type2
Mask Table	P25 Phase2 H-CPM Meas164	–
Off Slot Power Range (Start to Stop)	User (1.125 to 178.875 symbol)	–
Rise / Fall Time Off Detect Level	–57.00 dBm	–

Table C-17 Predefined Settings List

	P25_IB_LCH1_STD_Type1	P25_IB_LCH1_STD_Type2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	H-CPM	H-CPM
Auto Deviation	Off	Off
Modulation Index	–	–
Maximum Frequency Deviation	3000	3000
Symbol Rate	6 ksps	6 ksps
Span Up	–	–
Measurement Filter	H-CPM_P25	H-CPM_P25
2nd Measurement Filter	None	None
Reference Filter	H-CPM_P25	H-CPM_P25
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.000
Slots per Frame	12	12
Slot length	180 symbol	180 symbol
Measurement Offset	8 symbol	20 symbol
Measurement Interval	164 symbol	140 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot11	Slot11
1st Word Sync Word Length	18 Symbol	18 Symbol
1st Word Sync Word	577D577FF	577D577FF
1st Word Sync Word Offset	10 Symbol	10 Symbol
2nd Word Search	On	On
2nd Word Search Slot	Slot11	Slot11
2nd Word Sync Word Length	18 Symbol	18 Symbol
2nd Word Sync Word	576D577EF	576D577EF
2nd Word Sync Word Offset	10 Symbol	10 Symbol
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Deviation rms Reference	Ideal average	Ideal average
H-CPM Decode Method	Type1	Type2

Table C-18 Predefined Settings List

	P25_OB_STD	P25_OB_STD_BER
Measuring Object	No Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	Off	Off
Modulation Index	–	–
Maximum Frequency Deviation	2250	2250
Symbol Rate	6 ksps	6 ksps
Span Up	–	–
Measurement Filter	Rect	Rect
2nd Measurement Filter	None	None
Reference Filter	Rect	Rect
2nd Reference Filter	None	None
Roll Off	1.00	1.00
2nd Roll Off	1.000	1.000
Slots per Frame	–	4
Slot length	–	2160 symbol
Measurement Offset	–	0 symbol
Measurement Interval	180 symbol	2160 symbol
Sync Word Search	–	On
Burst Search	–	Off
1st Word Search Slot	–	Slot0
1st Word Sync Word Length	–	20 Symbol
1st Word Sync Word	–	184229D461
1st Word Sync Word Offset	–	0 Symbol
2nd Word Search	–	On
2nd Word Search Slot	–	Slot0
2nd Word Sync Word Length	–	20 Symbol
2nd Word Sync Word	–	184239D460
2nd Word Sync Word Offset	–	0 Symbol
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Deviation rms Reference	Ideal average	Ideal average

Table C-19 Predefined Settings List

	DMR_BSsourced_Voice	DMR_BSsourced_Data
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Modulation Index	–	–
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	1	1
Slot length	144 symbol	144 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	144 symbol	144 symbol
Sync Word Search	On	On
Burst Search	Off	Off
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24 symbol	24 symbol
1st Word Sync Word	755FD7DF75F7	DFF57D75DF5D
1st Word Sync Word Offset	60 symbol	60 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-20 Predefined Settings List

	DMR_MSsourced_Voice	DMR_MSsourced_Data
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Modulation Index	–	–
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	1	1
Slot length	144 symbol	144 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	132 symbol	132 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24 symbol	24 symbol
1st Word Sync Word	7F7D5DD57DFD	D5D7F77FD757
1st Word Sync Word Offset	54 symbol	54 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-21 Predefined Settings List

	DMR_MSsourced_RC	NXDN_2_4ksps
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Modulation Index	–	–
Symbol Rate	4.8 ksps	2.4 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	Inverse Rect
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	1	1
Slot length	144 symbol	192 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	48 symbol	192 symbol
Sync Word Search	On	On
Burst Search	On	Off
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24 symbol	10 symbol
1st Word Sync Word	77D55F7DFD77	CDF59
1st Word Sync Word Offset	12 symbol	0 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Pre-Measurement Filtering

Table C-22 Predefined Settings List

	NXDN_4_8ksps
Measuring Object	Frame Formatted
Modulation Type	4FSK
Auto Deviation	On
Modulation Index	–
Symbol Rate	4.8 ksps
Span Up	On
Measurement Filter	Root Nyquist
2nd Measurement Filter	Inverse Rect
Reference Filter	Nyquist
2nd Reference Filter	None
Roll Off	0.20
2nd Roll Off	1.000
Slots per Frame	1
Slot length	192 symbol
Measurement Offset	0 symbol
Measurement Interval	192 symbol
Sync Word Search	On
Burst Search	Off
1st Word Search Slot	Slot 0
1st Word Sync Word Length	10 symbol
1st Word Sync Word	CDF59
1st Word Sync Word Offset	0 symbol
2nd Word Search	Disable
2nd Word Search Slot	–
2nd Word Sync Word Length	–
2nd Word Sync Word	–
2nd Word Sync Word Offset	–
Deviation Calculation	Pre-Measurement Filtering

Table C-23 Predefined Settings List

	T86_SYNC_UL	T86_SYNC_DL
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	16QAM	16QAM
Symbol Rate	11250 sps	11250 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.00	1.00
Slots per Frame	6 slot	6 slot
Measurement Slot	Slot 0: On, Slot1-5: Off	Slot 0: On, Slot1-5: Off
Slot length	150 symbol	150 symbol
Measurement Offset	4 symbol	4 symbol
Measurement Interval	141 symbol	141 symbol
Sync Word Search	ON	ON
Burst Search	ON	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol	10 symbol
1st Word Sync Word	0000AAA0AA	0000AA0A0A
1st Word Sync Word Offset	69 symbol	69 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Mask Table	STD-T86 UL,DL Burst	STD-T86 UL,DL Burst

Table C-24 Predefined Settings List

	DMR_BSsourced_Voice_2	DMR_BSsourced_Data_2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	Off	Off
Max Deviation	1944	1944
Modulation Index	—	—
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	12	12
Measurement Slot	Slot 0: On, Slot1-11: Off	Slot 0: On, Slot1-11: Off
Slot length	144 symbol	144 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	144 symbol	144 symbol
Sync Word Search	On	On
Burst Search	Off	Off
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24 symbol	24 symbol
1st Word Sync Word	755FD7DF75F7	DFF57D75DF5D
1st Word Sync Word Offset	60 symbol	60 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	—	—
2nd Word Sync Word Length	—	—
2nd Word Sync Word	—	—
2nd Word Sync Word Offset	—	—
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-25 Predefined Settings List

	DMR_MSsourced_Voice_2	DMR_MSsourced_Data_2
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	Off	Off
Max Deviation	1944	1944
Modulation Index	—	—
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	12	12
Measurement Slot	ON: Slot 0,2,4..10	ON: Slot 0,2,4..10
Slot length	144 symbol	144 symbol
Measurement Offset	0 symbol	0 symbol
Measurement Interval	132 symbol	132 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24 symbol	24 symbol
1st Word Sync Word	7F7D5DD57DFD	D5D7F77FD757
1st Word Sync Word Offset	54 symbol	54 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	—	—
2nd Word Sync Word Length	—	—
2nd Word Sync Word	—	—
2nd Word Sync Word Offset	—	—
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-26 Predefined Settings List

	DMR_Normal_Burst	DMR_RC_Burst
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	Off	Off
Max Deviation	1944	1944
Modulation Index	–	–
Symbol Rate	4.8 ksps	4.8 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	2	2
Measurement Slot	Slot0: On, Slot1: Off	Slot0: On, Slot1: Off
Slot length	144 symbol	144 symbol
Measurement Offset	5 symbol	0 symbol
Measurement Interval	132 symbol	48 symbol
Sync Word Search	Off	Off
Burst Search	On	On
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering
Mask Table	DMR Normal Burst	DMR RC Burst

Table C-27 Predefined Settings List

	dPMR446_80ms	dPMR446_HeaderBurst
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Max Deviation	–	–
Modulation Index	–	–
Symbol Rate	2.4 ksps	2.4 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	Inverse Rect	Inverse Rect
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	1	2
Measurement Slot	Slot0: On	Slot0: On, Slot1: Off
Slot length	192 symbol	192 symbol
Measurement Offset	0 symbol	12 symbol
Measurement Interval	192 symbol	160 symbol
Sync Word Search	Off	Off
Burst Search	On	On
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-28　Predefined Settings List

	dPMR446_320ms_FS2	–
Measuring Object	Frame Formatted	–
Modulation Type	4FSK	–
Auto Deviation	On	–
Max Deviation	–	–
Modulation Index	–	–
Symbol Rate	2.4 ksps	–
Span Up	On	–
Measurement Filter	Root Nyquist	–
2nd Measurement Filter	Inverse Rect	–
Reference Filter	Nyquist	–
2nd Reference Filter	None	–
Roll Off	0.20	–
2nd Roll Off	1.000	–
Slots per Frame	2	–
Measurement Slot	Slot0: On, Slot1: Off	–
Slot length	384 symbol	–
Measurement Offset	0 symbol	–
Measurement Interval	384 symbol	–
Sync Word Search	On	–
Burst Search	On	–
1st Word Search Slot	Slot0	–
1st Word Sync Word Length	12 Symbol	–
1st Word Sync Word	5FF77D	–
1st Word Sync Word Offset	0	–
2nd Word Search	Disable	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	–

Table C-29 Predefined Settings List

	dPMR_BCH_STD	—
Measuring Object	Frame Formatted	—
Modulation Type	4FSK	—
Auto Deviation	On	—
Max Deviation	—	—
Modulation Index	—	—
Symbol Rate	2.4 ksps	—
Span Up	On	—
Measurement Filter	Root Nyquist	—
2nd Measurement Filter	Inverse Rect	—
Reference Filter	Nyquist	—
2nd Reference Filter	None	—
Roll Off	0.20	—
2nd Roll Off	1.000	—
Slots per Frame	4	—
Measurement Slot	Slot0: On, Slot1-3: Off	—
Slot length	192 symbol	—
Measurement Offset	10 symbol	—
Measurement Interval	160 symbol	—
Sync Word Search	Off	—
Burst Search	On	—
1st Word Search Slot	—	—
1st Word Sync Word Length	—	—
1st Word Sync Word	—	—
1st Word Sync Word Offset	—	—
2nd Word Search	—	—
2nd Word Search Slot	—	—
2nd Word Sync Word Length	—	—
2nd Word Sync Word	—	—
2nd Word Sync Word Offset	—	—
Deviation Calculation	Post-Measurement Filtering	—

Table C-30 Predefined Settings List

	dPMR_BCH_110ms_FS1	dPMR_BCH_Uplink_FS1
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Max Deviation	–	–
Modulation Index	–	–
Symbol Rate	2.4 ksps	2.4 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	Inverse Rect	Inverse Rect
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	2	4
Measurement Slot	Slot0: On, Slot1: Off	Slot0: On, Slot1-3: Off
Slot length	264 symbol	192 symbol
Measurement Offset	0 symbol	8 symbol
Measurement Interval	264 symbol	184 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	24	24
1st Word Sync Word	57FF5F75D577	57FF5F75D577
1st Word Sync Word Offset	108	36
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-31 Predefined Settings List

	dPMR_TCH_STD	–
Measuring Object	Frame Formatted	–
Modulation Type	4FSK	–
Auto Deviation	On	–
Max Deviation	–	–
Modulation Index	–	–
Symbol Rate	2.4 ksps	–
Span Up	On	–
Measurement Filter	Root Nyquist	–
2nd Measurement Filter	Inverse Rect	–
Reference Filter	Nyquist	–
2nd Reference Filter	None	–
Roll Off	0.20	–
2nd Roll Off	1.000	–
Slots per Frame	4	–
Measurement Slot	Slot0: On, Slot1-3: Off	–
Slot length	192 symbol	–
Measurement Offset	12 symbol	–
Measurement Interval	164 symbol	–
Sync Word Search	Off	–
Burst Search	On	–
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Deviation Calculation	Post-Measurement Filtering	–

Table C-32 Predefined Settings List

	dPMR_TCH_Payload80ms_FS2	dPMR_TCH_PacketHead_FS4
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	4FSK	4FSK
Auto Deviation	On	On
Max Deviation	—	—
Modulation Index	—	—
Symbol Rate	2.4 ksps	2.4 ksps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	Inverse Rect	Inverse Rect
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.20	0.20
2nd Roll Off	1.000	1.000
Slots per Frame	4	4
Measurement Slot	Slot0: On, Slot1-3: Off	Slot0: On, Slot1-3: Off
Slot length	192 symbol	192 symbol
Measurement Offset	0 symbol	8 symbol
Measurement Interval	192 symbol	184 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	12	24
1st Word Sync Word	5FF77D	FD55F5DF7FDD
1st Word Sync Word Offset	0	36
2nd Word Search	Disable	Disable
2nd Word Search Slot	—	—
2nd Word Sync Word Length	—	—
2nd Word Sync Word	—	—
2nd Word Sync Word Offset	—	—
Deviation Calculation	Post-Measurement Filtering	Post-Measurement Filtering

Table C-33 Predefined Settings List

	TETRA_DL_NORMAL_CONT	TETRA_DL_NORMAL_DISCONT
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	18000 sps	18000 sps
Span Up	On	On
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.35	0.35
2nd Roll Off	1.00	1.00
Slots per Frame	4 slot	4 slot
Measurement Slot	Slot0: On, Slot1-3: Off	Slot0: On, Slot1-3: Off
Slot length	255 symbol	255 symbol
Measurement Offset	0 symbol	5 symbol
Measurement Interval	255 symbol	246 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	11 symbol	11 symbol
1st Word Sync Word	343A74	343A74
1st Word Sync Word Offset	122 symbol	122 symbol
2nd Word Search	Disable	Disable
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	On
Droop Cancel	On	On
Method of Symbol Rate Error	Slot	Slot
Mask Table	–	TETRA DL Normal Discont

Table C-34 Predefined Settings List

	TETRA_UL_NORMAL	–
Measuring Object	Frame Formatted	–
Modulation Type	PI/4DQPSK	–
Symbol Rate	18000 sps	–
Span Up	On	–
Measurement Filter	Root Nyquist	–
2nd Measurement Filter	None	–
Reference Filter	Nyquist	–
2nd Reference Filter	None	–
Roll Off	0.35	–
2nd Roll Off	1.00	–
Slots per Frame	4 slot	–
Measurement Slot	Slot0: On, Slot1-3: Off	–
Slot length	255 symbol	–
Measurement Offset	17 symbol	–
Measurement Interval	231 symbol	–
Sync Word Search	On	–
Burst Search	On	–
1st Word Search Slot	Slot 0	–
1st Word Sync Word Length	11 symbol	–
1st Word Sync Word	343A74	–
1st Word Sync Word Offset	127 symbol	–
2nd Word Search	Disable	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	–
Droop Cancel	On	–
Method of Symbol Rate Error	Slot	–
Mask Table	TETRA UL Normal	–

Table C-35 Predefined Settings List

	DVB-S_BW26M DVB-S_BW54M	–
Measuring Object	Non-Formatted	–
Modulation Type	QPSK	–
Symbol Rate	20.3 Msps(BW26M) 40.2 Msps(BW54M)	–
Capture OSR	4	–
Capture Interval	1 Frame	–
APSK Ring Ratio (R2/R1)	–	–
APSK Ring Ratio (R3/R1)	–	–
Measurement Filter	Root Nyquist	–
2nd Measurement Filter	None	–
Reference Filter	Nyquist	–
2nd Reference Filter	None	–
Roll Off	0.35	–
2nd Roll Off	1.00	–
Slots per Frame	–	–
Measurement Slot	–	–
Slot length	–	–
Measurement Offset	–	–
Measurement Interval	1000 symbol	–
Sync Word Search	–	–
Burst Search	–	–
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	–
Droop Cancel	On	–
Method of Symbol Rate Error	Slot	–

Table C-36 Predefined Settings List

	DVB-S2_16APSK_Rxxx	DVB-S2_32APSK_Rxxx
Measuring Object	Non-Formatted	Non-Formatted
Modulation Type	16APSK	32APSK
Symbol Rate	25 Msps	25 Msps
Capture OSR	4	4
Capture Interval	1 Frame	1 Frame
APSK Ring Ratio (R2/R1)	3.150 (R2_3) 2.850 (R3_4) 2.750 (R4_5) 2.700 (R5_6) 2.600 (R8_9) 2.570 (R9_10)	2.840 (R3_4) 2.720 (R4_5) 2.640 (R5_6) 2.540 (R8_9) 2.530 (R9_10)
APSK Ring Ratio (R3/R1)	–	5.270 (R3_4) 4.870 (R4_5) 4.640 (R5_6) 4.330 (R8_9) 4.300 (R9_10)
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.35	0.35
2nd Roll Off	–	–
Slots per Frame	–	–
Measurement Slot	–	–
Slot length	–	–
Measurement Offset	–	–
Measurement Interval	1000 symbol	1000 symbol
Sync Word Search	–	–
Burst Search	–	–
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	On
Droop Cancel	On	On
Method of Symbol Rate Error	Slot	Slot

Table C-37 Predefined Settings List

	DSNG _BW_3M_xxxx	DSNG _BW_36M_16QAM	DSNG _BW_72M_QPSK
Measuring Object	Non-Formatted	Non-Formatted	Non-Formatted
Modulation Type	QPSK (_QPSK) 8PSK (_8PSK) 16QAM (_16QAM)	16QAM	QPSK
Symbol Rate	2.222 Msps	26.666 Msps	53.333 Msps
Capture OSR	4	4	4
Capture Interval	1 Frame	1 Frame	1 Frame
APSK Ring Ratio (R2/R1)	–	–	–
APSK Ring Ratio (R3/R1)	–	–	–
Measurement Filter	Root Nyquist	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None	None
Reference Filter	Nyquist	Nyquist	Nyquist
2nd Reference Filter	None	None	None
Roll Off	0.35	0.35	0.35
2nd Roll Off	–	–	–
Slots per Frame	–	–	–
Measurement Slot	–	–	–
Slot length	–	–	–
Measurement Offset	–	–	–
Measurement Interval	1000 symbol	1000 symbol	1000 symbol
Sync Word Search	–	–	–
Burst Search	–	–	–
1st Word Search Slot	–	–	–
1st Word Sync Word Length	–	–	–
1st Word Sync Word	–	–	–
1st Word Sync Word Offset	–	–	–
2nd Word Search	–	–	–
2nd Word Search Slot	–	–	–
2nd Word Sync Word Length	–	–	–
2nd Word Sync Word	–	–	–
2nd Word Sync Word Offset	–	–	–
Origin Offset Cancel	On	On	On
Droop Cancel	On	On	On
Method of Symbol Rate Error	Slot	Slot	Slot

Table C-38 Predefined Settings List

	DSNG_MODExxx	DVB-S2_QPSK
Measuring Object	Non-Formatted	Non-Formatted
Modulation Type	QPSK	QPSK
Symbol Rate	29.8240 Msps(Mode1) 22.3680 Msps(Mode2) 24.7680 Msps(Mode3-1) 22.3680 Msps(Mode3-2) 12.2226 Msps(Mode4)	25 Msps
Capture OSR	4	4
Capture Interval	1 Frame	1 Frame
APSK Ring Ratio (R2/R1)	–	–
APSK Ring Ratio (R3/R1)	–	–
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.35	0.35
2nd Roll Off	–	–
Slots per Frame	–	–
Measurement Slot	–	–
Slot length	–	–
Measurement Offset	–	–
Measurement Interval	1000 symbol	1000 symbol
Sync Word Search	–	–
Burst Search	–	–
1st Word Search Slot	–	–
1st Word Sync Word Length	–	–
1st Word Sync Word	–	–
1st Word Sync Word Offset	–	–
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	On
Droop Cancel	On	On
Method of Symbol Rate Error	Slot	Slot

Table C-39 Predefined Settings List

	STD-28_xx_SB	STD-28_xx_TCH
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	192 ksps	192 ksps
Capture OSR	4	4
Capture Interval	10 Frame	10 Frame
APSK Ring Ratio (R2/R1)	–	–
APSK Ring Ratio (R3/R1)	–	–
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.50	0.50
2nd Roll Off	–	–
Slots per Frame	8 slot	8 slot
Measurement Slot	Slot0: On, Slot1-7: Off	Slot0: On, Slot1-7: Off
Slot length	120 symbol	120 symbol
Measurement Offset	2 symbol	2 symbol
Measurement Interval	110 symbol	110 symbol
Sync Word Search	On	On
Burst Search	On	On
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	16 symbol	8 symbol
1st Word Sync Word	50EF2993 (DL) 6B899AF0 (UL)	3D4C (DL) E149 (UL)
1st Word Sync Word Offset	34 symbol	6 symbol
2nd Word Search	–	–
2nd Word Search Slot	–	–
2nd Word Sync Word Length	–	–
2nd Word Sync Word	–	–
2nd Word Sync Word Offset	–	–
Origin Offset Cancel	On	On
Droop Cancel	On	On
Method of Symbol Rate Error	Frame To Frame	Frame To Frame
Burst Gap Size	20 symbol	20 symbol
Mask Table	STD28 UP,DN TCH,SYNC	STD28 UP,DN TCH,SYNC
Rise / Fall Time Off Detect Level	–40.96 dBm	–40.96 dBm

Table C-40 Predefined Settings List

	RCR39_T79 _MS-xxx	RCR39-T79 _DC-xx
Measuring Object	Frame Formatted	Frame Formatted
Modulation Type	PI/4DQPSK	PI/4DQPSK
Symbol Rate	16000 sps	16000 sps
Span Up	—	—
Measurement Filter	Root Nyquist	Root Nyquist
2nd Measurement Filter	None	None
Reference Filter	Nyquist	Nyquist
2nd Reference Filter	None	None
Roll Off	0.50	0.50
2nd Roll Off	1.000	1.000
Slots per Frame	4 slot	4 slot
Measurement Slot	Slot0: On, Slot1-3: Off	Slot0: On, Slot1-3: Off
Slot length	160 symbol	160 symbol
Measurement Offset	3 symbol (TCH) 21 symbol (CCH) 46 symbol (SYNC)	7 symbol (CH) 46 symbol (SYNC)
Measurement Interval	153 symbol (TCH) 127 symbol (CCH) 94 symbol (SYNC)	145 symbol (CH) 106 symbol (SYNC)
Sync Word Search	ON	ON
Burst Search	ON	ON
1st Word Search Slot	Slot 0	Slot 0
1st Word Sync Word Length	10 symbol (TCH) 10 symbol (CCH) 16 symbol (SYNC)	10 symbol (CH) 16 symbol (SYNC)
1st Word Sync Word	785B4 (TCH) 785B4 (CCH) D06B2F94 (SYNC)	5164C (CH) 2F94D06B (SYNC)
1st Word Sync Word Offset	78 symbol (TCH) 78 symbol (CCH) 72 symbol (SYNC)	78 symbol (CH) 72 symbol (SYNC)
2nd Word Search	Enable	Enable
2nd Word Search Slot	Slot 0	Slot 0
2nd Word Sync Word Length	10 symbol (TCH) 10 symbol (CCH) 16 symbol (SYNC)	10 symbol (CH) 16 symbol (SYNC)

Table C-40 PredefinedSettings List (Cont'd)

	RCR39_T79 _MS-xxx	RCR39-T79 _DC-xx
2nd Word Sync Word	CE450 (TCH) CE450 (CCH) E2B11D4E (SYNC)	4D9DE (CH) 1D4EE2B1 (SYNC)
2nd Word Sync Word Offset	78 symbol (TCH) 78 symbol (CCH) 72 symbol (SYNC)	78 symbol (CH) 72 symbol (SYNC)
Burst Gap Size	20 symbol (TCH) 40 symbol (CCH) 40 symbol (SYNC)	20 symbol (CH) 60 symbol (SYNC)
Mask Table	STD39,T79,T85 MS TCH (TCH) STD39,T79,T85 MS CCH,SYNC (CCH) STD39,T79,T85 MS CCH,SYNC (SYNC)	STD39,T79 Direct Channel (CH) STD39,T79 Direct Sync Channel (SYNC)

Appendix D User Defined Filter

This section explains the User Defined Filter definition and the filter definition file description method.

D.1 User Defined Filter Definition

The User Defined Filter is defined as shown below.

When the Measuring Object is Frame Formatted or Non-Formatted.

- There must be a FIR filter coefficient string expressing the 8 times oversampling time response (as real number) for the symbol rate.
- The filter coefficient tap number must be an odd number in the range 1 to 501.
- The filter coefficient center must match the symbol timing.

When the Measuring Object is SCBT.

- The FIR filter coefficient must be expressed by time response (as real number) at sampling rate of 5 MHz.
- The filter coefficient tap number must be an odd number in the range 1 to 10001.
- The delay of the filter that removes adjacent waves must be "(Filter coefficient tap number – 1) /2".
- Because the analysis software does not adjust the gain of filter coefficient, the gain adjustment must be made to the filter coefficient.

D.2 User Defined Filter Definition File Description Method

This section explains the User Defined Filter definition file.

The definition file is created in text format. Any file name and extension can be specified.

Observe the following rules when writing a configuration file:

1. The filter coefficient string is described sequentially as one real number declaration per line.
2. The line count must match the tap count. When the last line is just an LF code, it is not included in the line count.

Example:

Definition file description for 9 tap FIR filter

When the filter coefficient string is set as shown in Table D.2-1, the setting file is described as shown in Table D.2-1.

Table D.2-1 9 Tap FIR Filter Coefficient String

Allocation	Filter Coefficient	Allocation	Filter Coefficient
0	6.055e–3	5	2.619e–1
1	–1.339e–2	6	–5.052e–2
2	–5.052e–2	7	–1.339e–2
3	2.619e–1	8	6.055e–3
4	6.000e–1		

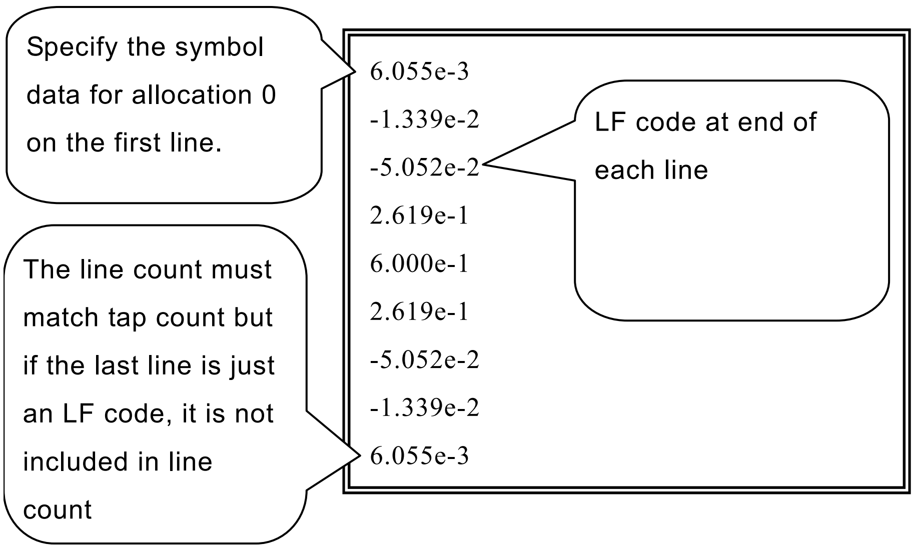


Figure D.2-1 Mapping Edit Setting File Description Example

Appendix E BER Pattern

This appendix explains the test patterns prepared for BER pattern in BER setting.

Test Patterns for APCO Project25 Phase1

The BER patterns in Table E-1 are test patterns defined by TIA-102.CAAA-C. (Except P25_PN9)

Table E-1 BER Pattern

Pattern name	Description
P25_Tone	Standard Tone Test Pattern
P25_Silence	Standard Silence Test Pattern
P25_Interference	Standard Interference Test Pattern
P25_Busy	Standard Busy Test Pattern
P25_Idle	Standard Idle Test Pattern
P25_Calibration	Calibration Test Pattern
P25_AutoFreqControl	Automatic Frequency Control Test Pattern
P25_PN9	PN9

Refer to TIA-102.CAAA-C for Detail.

Test Patterns for APCO Project25 Phase2

The BER patterns in Table E-2 are test patterns defined by TIA-102.CCAA.

Table E-2 BER Pattern

Pattern name	Description
P25_Phase2_STTP-OB1031_Frame0	Outbound Standard Tone Test Pattern Super Frame 1
P25_Phase2_STTP-OB1031_Frame1	Outbound Standard Tone Test Pattern Super Frame 2
P25_Phase2_STTP-OB1031_Frame2	Outbound Standard Tone Test Pattern Super Frame 3
P25_Phase2_STTP-OB1031_Frame3	Outbound Standard Tone Test Pattern Super Frame 4
P25_Phase2_STTP-IB1031-0_Slot01	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 1
P25_Phase2_STTP-IB1031-0_Slot03	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 3
P25_Phase2_STTP-IB1031-0_Slot05	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 5
P25_Phase2_STTP-IB1031-0_Slot07	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 7
P25_Phase2_STTP-IB1031-0_Slot09	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 9
P25_Phase2_STTP-IB1031-0_Slot10	Inbound Standard Tone Test Pattern Channel 0 TimeSlot 10
P25_Phase2_STTP-IB1031-1_Slot00	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 0
P25_Phase2_STTP-IB1031-1_Slot02	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 2
P25_Phase2_STTP-IB1031-1_Slot04	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 4
P25_Phase2_STTP-IB1031-1_Slot06	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 6
P25_Phase2_STTP-IB1031-1_Slot08	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 8
P25_Phase2_STTP-IB1031-1_Slot11	Inbound Standard Tone Test Pattern Channel 1 TimeSlot 11

Refer to TIA-102.CCAA for Detail.

Appendix F Power vs Time Mask

This appendix explains the preset masks provided for Power vs Time measurement.

Mask Setting for DMR

Table F-1 lists the DMR masks that comply with the ETSI TS 102 361-1 V2.1.1 (2012-04).

Before performing measurement complying with the ETSI TS 102 361-1 V2.1.1 (2012-04), set the filter type and bandwidth to Gaussian and 100 kHz, respectively.

For details of setting values, refer to Table F-2 and F-3.

Table F-1 Mask Setting for DMR

Mask name	Description	Setting
DMR Normal burst	DMR Normal burst	Table F-2
DMR RC burst	DMR RC burst	Table F-3

Table F-2 DMR Normal burst

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	6	–1.61	–99.99	–57.00	OFF
	7	–1.61	–99.99	–57.00	ABS or REL
	8	–1.61	4.00	–57.00	REL
	9	–0.10	4.00		REL
	10	–0.10	1.00		REL
Fall Upper	0	0.11	1.00		REL
	1	0.11	4.00		REL
	2	1.60	4.00	–57.00	ABS or REL
	3	1.60	–99.99	–57.00	OFF
Rise Lower	8	–0.10			OFF
	9	–0.10	–3.00	–57.00	ABS or REL
	10	–0.10	–3.00		REL
Fall Lower	0	0.11	–3.00		ABS or REL
	1	0.11	–3.00	–57.00	OFF
	2	0.11		–57.00	OFF

Table F-3 DMR RC burst

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	6	–2.61	–99.99	–57.00	OFF
	7	–2.61	–99.99	–57.00	ABS or REL
	8	–2.61	4.00	–57.00	REL
	9	–0.10	4.00		REL
	10	–0.10	1.00		REL
Fall Upper	0	0.11	1.00		REL
	1	0.11	4.00		REL
	2	2.60	4.00	–57.00	ABS or REL
	3	2.60	–99.99	–57.00	OFF
Rise Lower	8	–0.10			OFF
	9	–0.10	–1.00	–57.00	ABS or REL
	10	–0.10	–1.00		REL
Fall Lower	0	0.11	–1.00		ABS or REL
	1	0.11	–1.00	–57.00	OFF
	2	0.11		–57.00	OFF

Mask Setting for P25 Phase2

Table F-4 lists the APCO-P25 Phase2 masks that comply with the TIA-102.CCAA and TIA-102.CCAB.

Before performing measurement complying with the TIA-102.CCAA and TIA-102.CCAB, set the filter type and bandwidth to Gaussian and 100 kHz, respectively.

For details of setting values, refer to Table F-5 and F-6.

Table F-4 Mask Setting for APCO-P25 Phase2

Mask name	Description	Setting
P25 Phase2 H-CPM Meas164	For MeasInterval = 164	Table F-5
P25 Phase2 H-CPM Meas168	For MeasInterval = 168	Table F-6

Table F-5 P25 Phase2 H-CPM Meas164

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	7	–1.61	–99.99	–57.00	ABS or REL
	8	–1.61	4.00	–57.00	REL
	9	–0.42	4.00		REL
	10	–0.42	1.00		REL
Fall Upper	0	0.42	1.00		REL
	1	0.42	4.00		REL
	2	1.61	4.00	–57.00	ABS or REL
	3	1.61	–99.99	–57.00	OFF
Rise Lower	9	–0.42	–3.00		ABS or REL
	10	–0.42	–3.00	–57.00	REL
Fall Lower	0	0.42	–3.00		REL
	1	0.42	–3.00	–57.00	OFF

Appendix

Appendix F

Table F-6 P25 Phase2 H-CPM Meas168

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	7	–1.28	–99.99	–57.00	ABS or REL
	8	–1.28	4.00	–57.00	REL
	9	–0.09	4.00		REL
	10	–0.09	1.00		REL
Fall Upper	0	0.09	1.00		REL
	1	0.09	4.00		REL
	2	1.28	4.00	–57.00	ABS or REL
	3	1.28	–99.99	–57.00	OFF
Rise Lower	9	–0.09	–3.00		ABS or REL
	10	–0.09	–3.00	–57.00	REL
Fall Lower	0	0.09	–3.00		REL
	1	0.09	–3.00	–57.00	OFF

Mask Setting for TETRA

Table F-7 lists the TETRA masks that comply with the ETSI TS 100 392-2 V3.6.1 (2013-05).

Before performing measurement complying with the ETSI TS 100 392-2 V3.6.1 (2013-05), set the filter type, Roll-off Factor, and bandwidth to Root Nyquist, 0.35, and 18 kHz, respectively.

For details of setting values, refer to Table F-8 and F-9.

Table F-7 Mask Setting for TETRA

Mask Name	Description	Setting
TETRA UL Normal	Tetra Uplink Burst	Table F-8
TETRA DL Normal Discont	Tetra Downlink Burst	Table F-9

Table F-8 TETRA UL Normal

	No.	Time [x100μs]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	7	–10.00	–70.00	–36.00	ABS or REL
	8	–8.89	–70.00	–36.00	REL
	9	–8.89	6.00		REL
	10	0	6.00		OFF
Fall Upper	0	0	3.00		REL
	1	8.33	3.00		REL
	2	8.33	–70.00	–36.00	ABS or REL
	3	10.00	–70.00	–36.00	OFF

Table F-9 TETRA DL Normal Discont

	No.	Time [x100μs]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	7	–5.00	–40.00		REL
	8	–3.89	–40.00		REL
	9	–3.89	6.00		REL
	10	0	6.00		OFF
Fall Upper	0	0	3.00		REL
	1	3.89	3.00		REL
	2	3.89	–40.00		REL
	3	5.00	–40.00		OFF

Mask Setting for ARIB RCR STD-39-T79-T85

Table F-10 lists the ARIB RCR STD-39-T79-T85 masks that comply with the ARIB RCR STD-39 Rev4.1 Part2, ARIB STD-T79 Rev3.0, and ARIB STD-T85 Rev1.2.

Before performing measurement complying with the each standards, set the filter type and bandwidth to Gaussian and 30 kHz, respectively.

For details of setting values, refer to Table F-11, F-12, F-13, and F-14.

Table F-10 Mask Setting for ARIB_ RCR39-T79

Mask name	Description	Setting
STD39,T79,T85 MS TCH	RCR39-T79_MS-TCH	Table F-11
STD39,T79,T85 MS CCH,SYNC	RCR39-T79_MS-CCH, RCR39-T79_MS-SYNC	Table F-12
STD39,T79 Direct Channel	RCR39-T79_DC-CH	Table F-13
STD39,T79 Direct Sync Channel	RCR39-T79_DC-SYNC	Table F-14

Table F-11 STD39,T79,T85 MS TCH

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–6.25	–99.99	–50.00	ABS or REL
	1	–2.50	–99.99	–50.00	ABS or REL
	2	–2.50	–60.00	–99.99	REL
	3	–1.87	–60.00	–99.99	REL
	4	–1.87	4.00	–99.99	REL
	5	0.00	4.00	–99.99	REL
	6	0.00	4.00	–99.99	REL
	7	0.00	4.00	–99.99	REL
	8	0.00	4.00	–99.99	REL
	9	0.00	4.00	–99.99	REL
	10	0.00	4.00	–99.99	REL

Table F-11 STD39,T79,T85 MS TCH (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Fall Upper	0	0.00	4.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	4.00	–99.99	REL
	6	1.87	4.00	–99.99	REL
	7	1.87	–60.00	–99.99	REL
	8	2.50	–60.00	–99.99	ABS or REL
	9	2.50	–99.99	–50.00	ABS or REL
	10	15.00	–99.99	–50.00	
Rise Lower	0	0.00	–99.99	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–14.00	–99.99	REL
Fall Lower	0	0.00	–14.00	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–99.99	–99.99	

Table F-12 STD39,T79,T85 MS CCH,SYNC

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–18.75	–99.99	–50.00	ABS or REL
	1	–13.75	–99.99	–50.00	ABS or REL
	2	–13.75	–60.00	–99.99	REL
	3	–13.13	–60.00	–99.99	REL
	4	–13.13	5.00	–99.99	REL
	5	–1.88	5.00	–99.99	REL
	6	–1.88	4.00	–99.99	REL
	7	–1.88	4.00	–99.99	REL
	8	–1.88	4.00	–99.99	REL
	9	–1.88	4.00	–99.99	REL
	10	–1.88	4.00	–99.99	REL
Fall Upper	0	0.00	4.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	4.00	–99.99	REL
	6	1.88	4.00	–99.99	REL
	7	1.88	–60.00	–99.99	REL
	8	2.50	–60.00	–99.99	ABS or REL
	9	2.50	–99.99	–50.00	ABS or REL
	10	15.00	–99.99	–50.00	
Rise Lower	0	0.00	–99.99	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–14.00	–99.99	REL

Table F-12 STD39,T79,T85 MS CCH,SYNC (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Fall Lower	0	0.00	–14.00	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–99.99	–99.99	

Table F-13   STD39,T79 Direct Channel

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–6.25	–99.99	–50.00	ABS or REL
	1	–2.50	–99.99	–50.00	ABS or REL
	2	–2.50	–60.00	–99.99	REL
	3	–1.87	–60.00	–99.99	REL
	4	–1.87	4.00	–99.99	REL
	5	0.00	4.00	–99.99	REL
	6	0.00	4.00	–99.99	REL
	7	0.00	4.00	–99.99	REL
	8	0.00	4.00	–99.99	REL
	9	0.00	4.00	–99.99	REL
	10	0.00	4.00	–99.99	REL
Fall Upper	0	0.00	4.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	4.00	–99.99	REL
	6	3.75	4.00	–99.99	REL
	7	3.75	–60.00	–99.99	REL
	8	4.38	–60.00	–99.99	ABS or REL
	9	4.38	–99.99	–50.00	ABS or REL
	10	15.00	–99.99	–50.00	
Rise Lower	0	0.00	–99.99	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–14.00	–99.99	REL

Table F-13 STD39,T79 Direct Channel (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Fall Lower	0	0.00	–14.00	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–99.99	–99.99	

Table F-14 STD39,T79 Direct Sync Channel

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–31.25	–99.99	–50.00	ABS or REL
	1	–26.88	–99.99	–50.00	ABS or REL
	2	–26.88	–60.00	–99.99	REL
	3	–26.25	–60.00	–99.99	REL
	4	–26.25	5.00	–99.99	REL
	5	–1.88	5.00	–99.99	REL
	6	–1.88	4.00	–99.99	REL
	7	–1.88	4.00	–99.99	REL
	8	–1.88	4.00	–99.99	REL
	9	–1.88	4.00	–99.99	REL
	10	–1.88	4.00	–99.99	REL
Fall Upper	0	0.00	4.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	4.00	–99.99	REL
	6	1.88	4.00	–99.99	REL
	7	1.88	–60.00	–99.99	REL
	8	2.50	–60.00	–99.99	ABS or REL
	9	2.50	–99.99	–50.00	ABS or REL
	10	15.00	–99.99	–50.00	
Rise Lower	0	0.00	–99.99	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–14.00	–99.99	REL

Table F-14   STD39,T79 Direct Sync Channel (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Fall Lower	0	0.00	–14.00	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–99.99	–99.99	

Appendix

Appendix F

Mask Setting for ARIB RCR STD-28

Table F-15 lists the ARIB RCR STD-28 masks that comply with the ARIB RCR STD-28 Rev6.0.

Before performing measurement complying with the ARIB RCR STD-28 Rev6.0, set the filter type and bandwidth to Gaussian and 300 kHz, respectively.

For details of setting values, refer to Table F-16.

Table F-15 Mask Setting for ARIB_RCR_STD-28

Mask name	Description	Setting
STD28 UP.DN TCH,SYNC	STD-28_DL_SB STD-28_DL_TCH STD-28_UL_SB STD-28_UL_TCH	Table F-16

Table F-16 STD28 UP.DN TCH,SYNC

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–4.17	–99.99	–37.00	ABS or REL
	1	–1.30	–99.99	–37.00	ABS or REL
	2	–1.30	4.00	–99.99	REL
	3	0.00	4.00	–99.99	REL
	4	0.00	4.00	–99.99	REL
	5	0.00	4.00	–99.99	REL
	6	0.00	4.00	–99.99	REL
	7	0.00	4.00	–99.99	REL
	8	0.00	4.00	–99.99	REL
	9	0.00	4.00	–99.99	REL
	10	0.00	4.00	–99.99	REL
Fall Upper	0	0.00	4.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	0.00	–99.99	OFF
	6	0.00	0.00	–99.99	OFF
	7	0.00	4.00	–99.99	REL
	8	1.30	4.00	–99.99	ABS or REL
	9	1.30	–99.99	–37.00	ABS or REL
	10	10.00	–99.99	–37.00	

Table F-16   STD28 UP.DN TCH,SYNC (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Lower	0	0.00	–99.99	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–14.00	–99.99	REL
Fall Lower	0	0.00	–14.00	–99.99	REL
	1	0.00	–14.00	–99.99	REL
	2	0.00	–14.00	–99.99	REL
	3	0.00	–14.00	–99.99	REL
	4	0.00	–14.00	–99.99	REL
	5	0.00	–14.00	–99.99	REL
	6	0.00	–14.00	–99.99	REL
	7	0.00	–14.00	–99.99	REL
	8	0.00	–14.00	–99.99	REL
	9	0.00	–14.00	–99.99	REL
	10	0.00	–99.99	–99.99	

Mask Setting for ARIB STD-T61

Table F-17 lists the ARIB STD-T61 masks that comply with the ARIB STD-T61 Rev1.2 Part1 (SCPC).

Before performing measurement complying with the ARIB STD-T61 Rev1.2 Part1 (SCPC), set the filter type and bandwidth to Gaussian and 10 kHz, respectively.

For details of setting values, refer to Table F-18.

Table F-17   Mask Setting for ARIB_T61

Mask name	Description	Setting
T61 Service Channel 20,40ms	T61_SCPC_v1_1_40ms_SC T61_SCPC_v1_1_20ms_SC	Table F-18

Table F-18   T61 Service Channel 20,40ms

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–2.08	–99.99	–50.00	ABS or REL
	1	–1.15	–99.99	–50.00	ABS or REL
	2	–1.15	–60.00	–99.99	REL
	3	–0.94	–60.00	–99.99	REL
	4	–0.94	6.00	–99.99	REL
	5	0.00	6.00	–99.99	REL
	6	0.00	6.00	–99.99	REL
	7	0.00	6.00	–99.99	REL
	8	0.00	6.00	–99.99	REL
	9	0.00	6.00	–99.99	REL
	10	0.00	6.00	–99.99	REL
Fall Upper	0	0.00	6.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	6.00	–99.99	REL
	6	0.94	6.00	–99.99	REL
	7	0.94	–60.00	–99.99	REL
	8	1.15	–60.00	–99.99	ABS or REL
	9	1.15	–99.99	–50.00	ABS or REL
	10	5.31	–99.99	–50.00	

Mask Setting for ARIB STD-T86

Table F-19 lists the ARIB STD-T86 masks that comply with the ARIB STD-T86 Rev3.0.

Before performing measurement complying with the ARIB STD-T86 Rev3.0, set the filter type and bandwidth to Gaussian and 30 kHz, respectively.

For details of setting values, refer to Table F-20.

Table F-19 Mask Setting for ARIB_T86

Mask name	Description	Setting
STD-T86 UL,DL Burst	T86_CCH_UL T86_CCH_DL T86_TCH_UL T86_TCH_DL T86_SYNC_UL T86_SYNC_DL	Table F-20

Table F-20 STD-T86 UL,DL Burst

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Rise Upper	0	–8.89	–99.99	–50.00	ABS or REL
	1	–3.56	–99.99	–50.00	ABS or REL
	2	–3.56	10.00	–99.99	REL
	3	–0.00	10.00	–99.99	REL
	4	–0.00	10.00	–99.99	REL
	5	0.00	10.00	–99.99	REL
	6	0.00	10.00	–99.99	REL
	7	0.00	10.00	–99.99	REL
	8	0.00	10.00	–99.99	REL
	9	0.00	10.00	–99.99	REL
	10	0.00	10.00	–99.99	REL

Table F-20 STD-T86 UL,DL Burst (Cont'd)

	No.	Time [ms]	REL [dB]	ABS [dBm]	Fail Logic
Fall Upper	0	0.00	10.00	–99.99	OFF
	1	0.00	0.00	–99.99	OFF
	2	0.00	0.00	–99.99	OFF
	3	0.00	0.00	–99.99	OFF
	4	0.00	0.00	–99.99	OFF
	5	0.00	0.00	–99.99	OFF
	6	0.00	0.00	–99.99	OFF
	7	0.00	10.00	–99.99	REL
	8	4.44	10.00	–99.99	ABS or REL
	9	4.44	–99.99	–50.00	ABS or REL
	10	10.00	–99.99	–50.00	

This section describes the filter function.

G.1 Gaussian/Gaussian2 Filter

The impulse response is expressed as the formula below when the filter is set to Gaussian.

$$h(t) = \frac{\exp\left(\frac{-t^2}{2\delta^2 T^2}\right)}{\sqrt{(2\pi)}\,.\delta T} * rect\left(\frac{t}{T}\right)$$

It is under the condition below. (T is symbol cycle)

$$rect\left(\frac{t}{T}\right) = \frac{1}{T} \quad for|t| < \frac{T}{2}, \qquad rect\left(\frac{t}{T}\right) = 0 \quad otherwise$$

The impulse response is expressed as the formula below when the filter is set to Gaussian2.

$$h(t) = \frac{\exp\left(\frac{-t^2}{2\delta^2 T^2}\right)}{\sqrt{(2\pi)}\ .\ \delta T}$$

Here δ is a constant expressed as the formula below.

$$\delta = \frac{\sqrt{\ln(2)}}{2\pi BT}$$

T : *Inverse of Symbol Rate*

The following figure shows the comparison of amplitude characteristics between the filter types (Gaussian and Gaussian2).

(Horizontal axis: Frequency normalized to the symbol rate, BT = 0.5, Over Sampling = 8)

In comparison with Gaussian2, Gaussian has the narrower passband, and its amplitude becomes 0 at an integer multiples of the Symbol Rate frequency, due to the influence of rect(t/T).

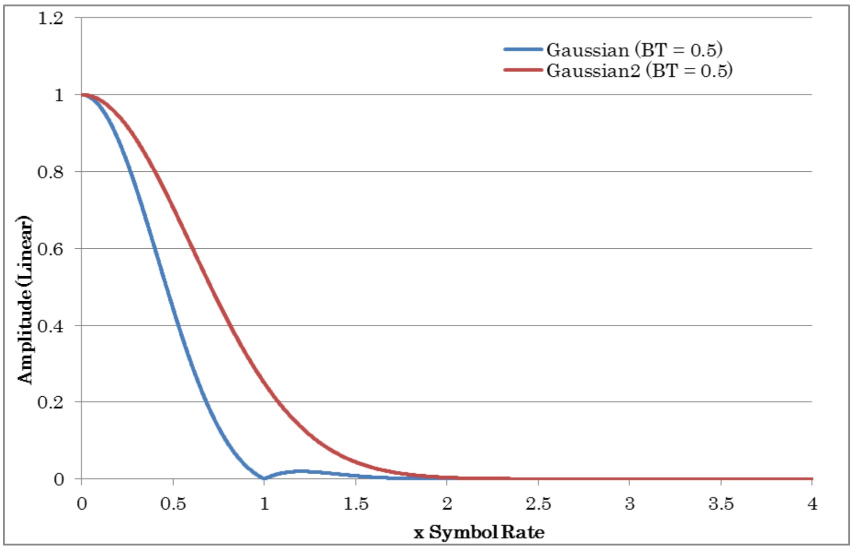


Figure G.1-1 Amplitude characteristics of Gaussian and Gaussian2 filters

Appendix H　Power vs Time Measurement Interval

This section describes the Power vs Time measurement interval.

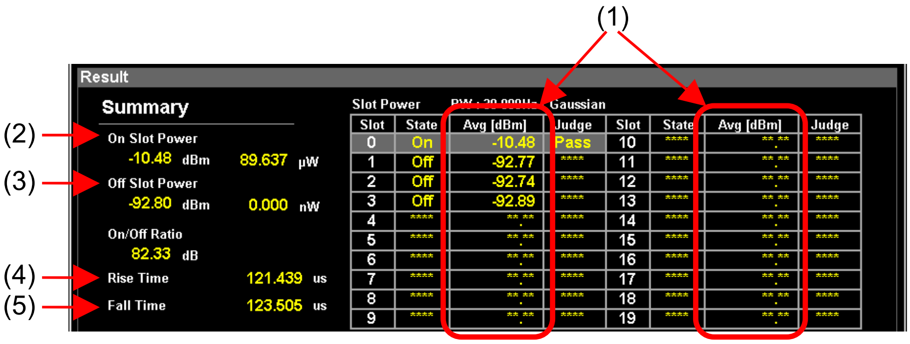


Figure H-1　Power vs Time Result

In the Power vs Time measurement, the values indicated by arrows in Figure H-1 are measured in different measurement intervals.

(1) Slot Avg Power

Displays the average power of each slot measured in the following symbol interval regardless of their On/Off states.

- Measurement Start Point　First symbol of slot + Measurement Offset
- Measurement End Point　Measurement start point + Measurement Interval

For details, refer to “Slot Avg Power” in Figure H-2.

(2) On Slot Power

Displays the average power of the “On” slots measured in the following symbol interval.

- Measurement Start Point　First symbol of slot + Measurement Offset
- Measurement End Point　Measurement start point + Measurement Interval

For details, refer to “On Slot Power” in Figure H-2.

(3) Off Slot Power

The measurement interval of Off Slot Power varies depending on the setting of Off Slot Power Range.

Off Slot Power Range: Meas. Interval
Displays the average power of the "Off" slots measured in the following symbol interval.

- Measurement Start Point First symbol of slot
  + Measurement Offset
- Measurement End Point Measurement Start Point
  + Measurement Interval

For details, refer to "Off Slot Power (Meas. Interval)" in Figure H-2.

Off Slot Power Range: Slot Length
Displays the average power of the "Off" slots measured in the following symbol interval.

- Measurement Start Point First symbol of slot
- Measurement End Point Last symbol of slot

For details, refer to "Off Slot Power (Slot Length)" in Figure H-2.

Off Slot Power Range: User
When one or more slots are judged as "Off", the measurement is performed in the range of symbols that the user defines for **Off Slot Power User Start / Stop**. The averaged measurement value of these slots is displayed.

For details, refer to "Off Slot Power (User)" in Figure H-2.

When all slots are judged as "On", they are all measurement target. The measurement is performed in the range of symbols that the user defines for **Off Slot Power User Start / Stop,** and the averaged measurement value of these slots is displayed.

(4) Rise Time

At the rising time of the slots that are judged as "On", the average time in a symbol interval is displayed.

- Measurement Start Point First symbol of slot
  + Measurement Offset
- Measurement End Point First symbol that falls below the set level of Rise / Fall Off Detect Level.

For details, refer to "Rise Time" in Figure H-3.

(5) Fall Time

At the falling time of the slots that are judged as "On", the average time in a symbol interval is displayed.

- Measurement Start Point: Rise Time Measurement Start Point + Measurement Interval
- Measurement End Point: First symbol that falls below the set value of Rise / Fall Off Detect Level.

For details, refer to "Fall Time" in Figure H-3.

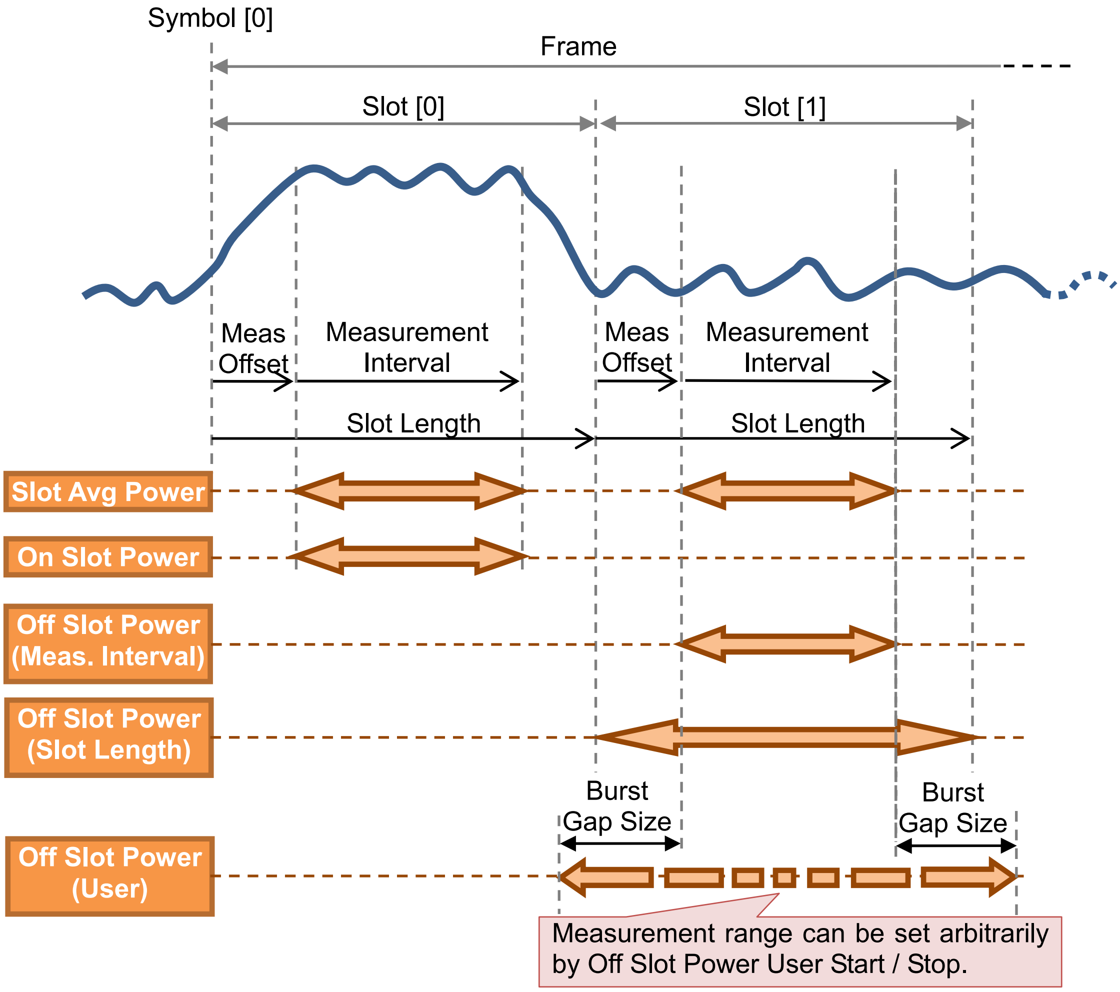


Figure H-2 Power vs Time Slot Power Measurement Interval (When Slot [0] is On Slot and Slot [1] is Off Slot)

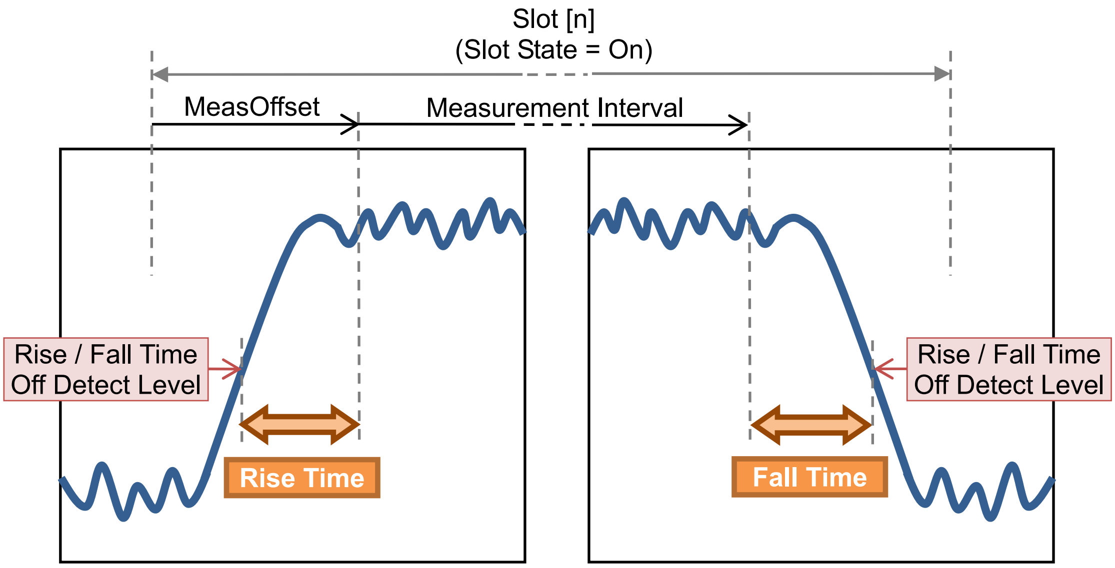


Figure H-3 Power vs Time Rise / Fall Time Measurement Interval

Appendix I　Wide Dynamic Range

This section describes the Wide Dynamic Range function.

Wide Dynamic Range widens the dynamic range and allows the leakage power measurement when the carrier is Off. When Wide Dynamic Range is set, the measurement is performed using different mechanical attenuator settings when burst signal is On and when it is Off, and the power waveforms are combined as measurement results.

For how to set Wide Dynamic Range, refer to 3.5.2.19 “Wide Dynamic Range”.

For how to remote control Wide Dynamic Range, refer to 1.2.5 “Power vs Time” in the *MX269017A Vector Modulation Analysis Software Operation Manual Remote Control*.

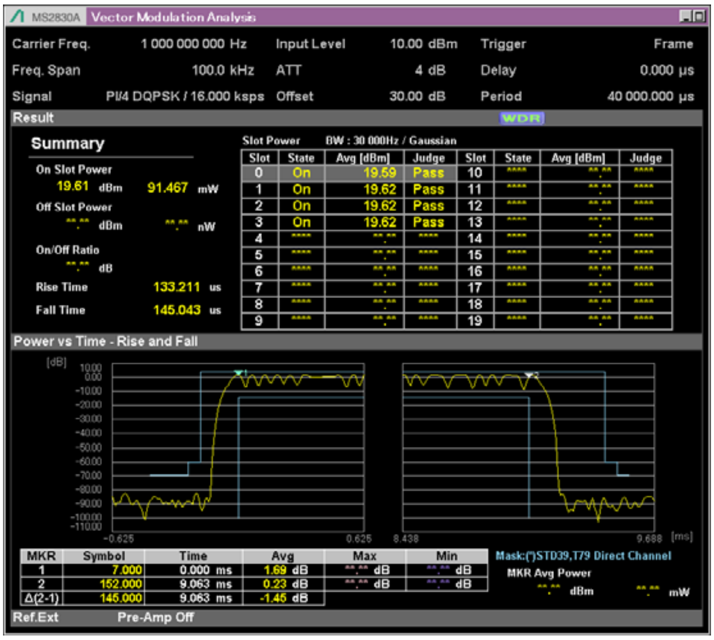


Figure I-1　Screen of Wide Dynamic Range Measurement

I.1 Restrictions

To use the Wide Dynamic Range function, the following restrictions apply.

■ Compatible models

- Wide Dynamic Range works with MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A.

  However, Wide Dynamic Range is usable only on the units which have an "M" or "M2" label on the rear panel when MS2830A-040/041 is installed.

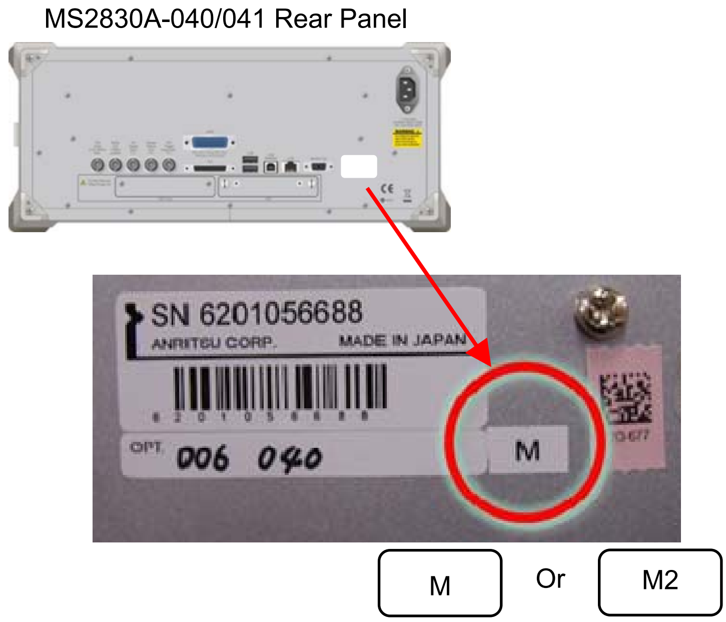


Figure I.1-1 Label Position (Rear Panel)

■ Input level limit

- Install the attenuator outside to make sure the signal peak power is +24 dBm or under. If the signal over +24 dBm is input, the input circuit of the signal analyzer may be damaged.

■ Trigger signal

- Trigger Source is set to Frame while Wide Dynamic Range is running.
- Other trigger sources cannot be selected.

■ Input signal condition

- The measurement using Wide Dynamic Range cannot be performed unless the signal has periodicity.
- The period can be set by Frame Trigger Period.

☞ 3.7 Setting Trigger

- One burst signal cannot be measured.

■ Measurement Mode (Single/Continuous)

- Measurement Mode is set to Single while Wide Dynamic Range is running.

☞ 3.1.3 Performing measurement

■ Function execution restriction (Attenuator Mode)

- Select “Mechanical Atten Only” when Attenuator Mode can be selected in System Settings (System Config > System Setting).*

  *: Wide Dynamic Range is not available when Attenuator Mode is set to “Electronic Atten Combined”.

- Do not change Attenuator Mode to “Electronic Atten Combined’ while using Wide Dynamic Range.

Figure I.1-2 System Settings screen

■ Attenuator switching

- The mechanical attenuator is switched between different settings when burst signal is On and when it is Off while Wide Dynamic Range is running.
- By setting Capture Interval to 10 frames, the number of attenuator switching times can be reduced.

■ Pre-amplifier

- The pre-amplifier is off while Wide Dynamic Range is running.

Appendix J　Subcarrier MAP/Pilot IQ MAP File

This document defines the Subcarrier MAP and Pilot IQ MAP that are used in SCBT and explains how to write the files.

J.1 Definition of Subcarrier MAP

The Subcarrier MAP is defined as shown below.

- The vertical direction represents OFDM symbols and the horizontal direction represents subcarriers.
- Elements are separated by commas (,).
- The subcarrier number matches the following value calculated from FFT size, Lower Guard Subcarrier, and Upper Guard Subcarrier set in the Common Setting Dialog box. An error occurs if the value does not match the value calculated by the formula below.
  FFT Size – Lower Guard Subcarrier – Uppler Guard Subcarrier
- The OFDM symbols can be set up to 256. Also, at least one symbol or more needs to be specified.
- Elements are set by integers that have the following meanings.
  0: Null subcarrier
  1: Pilot subcarrier
  2: Data subcarrier (target of EVM calculation)
  3: Data subcarrier of non-measurement target (Excluded from EVM calculation)

J.2 How to Write Subcarrier MAP File

This section explains how to write a Subcarrier MAP file.

The Subcarrier MAP file is created in text format. Any file name and extension can be specified. However, a word string that exceeds 255 characters in full path including extension cannot be specified.

The figure below shows an example of a Subcarrier MAP file.
For how to write each element, refer to J.1 "Definition of Subcarrier MAP".

```
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
2,2,2,1,2,2,2,2,2,2,1,2,2,2
```

Figure J.2-1 Example of Subcarrier MAP File

This example file has 12 subcarriers and 14 OFDM symbols. The 4th and 11th OFDM symbols are pilots and other elements are data subcarriers that are the targets of EVM calculation.

J.3 Definition of Pilot IQ MAP

The Pilot IQ is defined as shown below.

- The vertical direction represents OFDM symbols and the horizontal direction represents subcarriers.
- Elements are separated by commas (,).
- The numbers of OFDM symbols and subcarriers need to match those in the Subcarrier MAP.
- Define the I/Q data of pilot subcarriers in the same positions as the pilot subcarriers in the Subcarrier MAP. Set 0 for all the elements other than the pilot subcarriers.
- Enclose the I/Q data of pilot subcarriers in the parenthesis, separated by commas. Also, enclose the whole data by double quotes (“ ”).

  “(I data, Q data)”
- In analysis, use the set values as they are without internal normalization.
- Effective digit number is 6.

J.4 How to Write Pilot IQ File

This section explains how to write a Pilot IQ file.

The Pilot IQ file is created in text format. Any file name and extension can be specified. However, a word string that exceeds 255 characters in full path including extension cannot be specified.

The figure below shows an example of a Pilot IQ file.
For how to write elements, refer to J.3 "Definition of Pilot IQ".

```
0,0,0,"(1,0)",0,0,0,0,0,0,"(1,0)",0,0,0
0,0,0,"(-0.339709,0.940531)",0,0,0,0,0,0,"(0.339709,-0.940531)",0,0,0
0,0,0,"(-0.869689,-0.4936)",0,0,0,0,0,0,"(-0.869689,-0.4936)",0,0,0
0,0,0,"(0.487173,-0.873306)",0,0,0,0,0,0,"(-0.487173,0.873306)",0,0,0
0,0,0,"(0.947815,0.31882)",0,0,0,0,0,0,"(0.947815,0.31882)",0,0,0
0,0,0,"(0.0368648,0.99932)",0,0,0,0,0,0,"(-0.0368648,-0.99932)",0,0,0
0,0,0,"(-0.839072,0.54402)",0,0,0,0,0,0,"(-0.839072,0.54402)",0,0,0
0,0,0,"(-0.96099,-0.276582)",0,0,0,0,0,0,"(0.96099,0.276582)",0,0,0
0,0,0,"(-0.574583,-0.818446)",0,0,0,0,0,0,"(-0.574583,-0.818446)",0,0,0
0,0,0,"(-0.110394,-0.993888)",0,0,0,0,0,0,"(0.110394,0.993888)",0,0,0
0,0,0,"(0.353544,-0.977218)",0,0,0,0,0,0,"(0.212238,-0.977218)",0,0,0
0,0,0,"(0.212238,-0.935418)",0,0,0,0,0,0,"(-0.353544,0.935418)",0,0,0
```

Figure J.4-1 Example of Pilot IQ File

This example file has 12 subcarriers and 14 OFDM symbols. The 4th and 11th OFDM symbols are pilots, so the I/Q data of pilots subcarriers are written in their places. 0 is set for all the elements other than pilot subcarriers.

References are to page numbers.

Symbol and Numbers

1

2

A

B

C

D

E

Index

Index

S

T

U

V

W

Z