# MX285051A-031/MX269051A-031

# NR FDD sub-6GHz Downlink

# MX285051A-081/MX269051A-081

# NR FDD sub-6GHz Uplink

# Operation Manual

# Operation

## Third 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 MS2850A Signal Analyzer Operation Manual (Mainframe Operation) or MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation), and MX285051A/MX269051A 5G Standard Measurement Software (Base License) Operation Manual. Please also refer to them before using the equipment.**
- **Keep this manual with the equipment.**

# ANRITSU CORPORATION

# 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.

# Equipment Certificate

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

# Anritsu Warranty

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

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

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

# Anritsu Corporation Contact

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

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## Article 3.  Limitation of Liability

1. If a fault (bug) is discovered in this Software, failing this Software to operate as described in the operation manual or specifications even though you have used this Software as described in the manual, Anritsu shall at its own discretion, fix the bug, or replace the software, or suggest a workaround, free-of-charge, provided, however, that the faults caused by the following items and any of your lost or damaged data whatsoever shall be excluded from repair and the warranty.

   i)   If this Software is deemed to be used for purposes not described in the operation manual or specifications.

   ii)  If this Software has been used in conjunction with other non-Anritsu-approved software.

   iii) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.

   iv)  For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, or any devices other than this Equipment, etc.

2. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs or replacement by Anritsu engineers necessitated by the above faults shall be borne by you.
3. The warranty period for faults listed in Section 1 of this Article shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair or replacement, whichever is longer.

### Article 4.  Export Restrictions

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

### Article 5.  Change of Terms

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

### Article 6.  Termination

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

2. You and Anritsu may terminate this EULA by a written notice to the other party 30 days in advance.

### Article 7.  Damages

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

### Article 8.  Responsibility after Termination

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

### Article 9.  Negotiation for Dispute Resolution

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

### Article 10. Governing Law and Court of Jurisdiction

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

### Revision History:
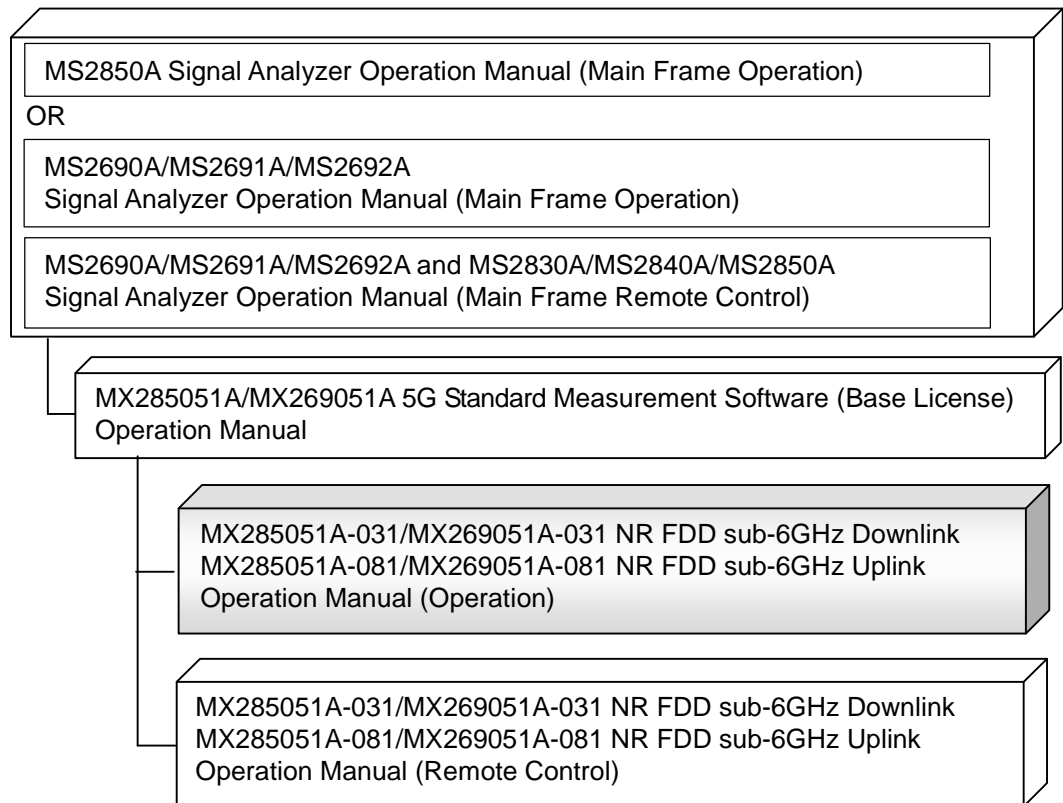
February 29th, 2020

## Cautions Against Computer Virus Infection

- Copying files and data

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

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

- Adding software

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

- Network connections

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

- Protection against malware (malicious software such as viruses).

  This equipment runs on Windows Operating System.

  To connect this equipment to network, the following is advised.

  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

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# About This Manual

■ **Composition of Operation Manuals**

The operation manuals for the
MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink
and MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink
are comprised as shown in the figure below.

MS2850A Signal Analyzer Operation Manual (Main Frame Operation)

OR

MS2690A/MS2691A/MS2692A
Signal Analyzer Operation Manual (Main Frame Operation)

MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A
Signal Analyzer Operation Manual (Main Frame Remote Control)

MX285051A/MX269051A 5G Standard Measurement Software (Base License)
Operation Manual

MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink
MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink
Operation Manual (Operation)

MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink
MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink
Operation Manual (Remote Control)

- 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.

- 5G Standard Measurement Software (Base License) Operation Manual

This manual describes operating methods of the 5G Standard Measurement Software (Base License).

- MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink
  MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink
  Operation Manual (Operation) <This document>

This manual describes basic operating methods, and functions.
As for signal analyzer hardware and its basic functions and operation outline, refer to *MS2850A Signal Analyzer Operation Manual (Mainframe Operation) or MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)*.

- MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink
  MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink
  Operation Manual (Remote Control)

This manual describes remote control.
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

In this document, ⬛ indicates a panel key.

Throughout this document, the use of MS2850A is assumed unless otherwise specified. If using MX269051A-031 or MX269051A-081 with MS2690A/MS2691A/MS2692A, change MS2850A to read MS2690A/MS2691A/MS2692A.

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Appendix

# Chapter 1   Overview

This chapter provides an overview and the product configuration of the MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink, and MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink.

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Overview

# 1.1  Product Overview

The MS2850A or MS269xA 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 MS2850A or MS269xA 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 MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink, and MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink (hereinafter, referred to as "MX285051A-031/081 and MX269051A-031/081") are software options for measuring RF characteristics according to 5G NR Standard defined by 3GPP.

The MX285051A-031/081 and MX269051A-031/081 provides the following measurement features.

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

The MX285051A/MX269051A 5G Standard Measurement Software (Base License) is required to use the MX285051A-031/081 and MX269051A-031/081.

# 1.2 Product Configuration

## 1.2.1 Standard configuration

Table 1.2.1-1 to Table 1.2.1-6 list the standard configuration of the MX285051A-031/081 and MX269051A-031/081.

**Table 1.2.1-1 MX285051A-031 NR FDD sub-6GHz Downlink Standard configuration**

| Item | Model | Product Name | Q'ty | Remarks |
|---|---|---|---|---|
| Application | MX285051A-031 | NR FDD sub-6GHz Downlink | 1 | |
| Accessory | — | Installation CD-ROM | 1 | Application software, operation manual CD-ROM |

**Table 1.2.1-2 MX285051A-081 NR FDD sub-6GHz Uplink Standard configuration**

| Item | Model | Product Name | Q'ty | Remarks |
|---|---|---|---|---|
| Application | MX285051A-081 | NR FDD sub-6GHz Uplink | 1 | |
| Accessory | — | Installation CD-ROM | 1 | Application software, operation manual CD-ROM |

**Table 1.2.1-3 MX269051A-031 NR FDD sub-6GHz Downlink Standard configuration**

| Item | Model | Product Name | Q'ty | Remarks |
|---|---|---|---|---|
| Application | MX269051A-031 | NR FDD sub-6GHz Downlink | 1 | |
| Accessory | — | Installation CD-ROM | 1 | Application software, operation manual CD-ROM |

**Table 1.2.1-4 MX269051A-081 NR FDD sub-6GHz Uplink Standard configuration**

| Item | Model | Product Name | Q'ty | Remarks |
|---|---|---|---|---|
| Application | MX269051A-081 | NR FDD sub-6GHz Uplink | 1 | |
| Accessory | — | Installation CD-ROM | 1 | Application software, operation manual CD-ROM |

## 1.2.2   Optional Accessories

Table 1.2.2-1 lists the optional accessories for the MX285051A-031/081 and MX269051A-031/081.

**Table 1.2.2-1   Optional Accessories**

| Model | Product Name | Remarks |
|---|---|---|
| W4035AE | MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink Operation Manual (Operation) | English, printed version |
| W4036AE | MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink Operation Manual (Remote Control) | English, printed version |

# 1.3 Specifications

Table 1.3-1 shows the specifications for the MX285051A-031/081 and MX269051A-031/081.

Nominal values do not guarantee the performance as specifications.

Pre-Amp: Available when the option MS2850A-068/168 or
MS269xA-008/108 is installed.

**Table 1.3-1   Specifications**

| Item | Specification |
|---|---|
| MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink | |
| Target signal | Downlink signals defined by TS 38.211.<br>Subcarrier Spacing is 15 kHz, 30 kHz, or 60 kHz. |
| Channel bandwidth | ・For Subcarrier Spacing = 15 kHz,<br>5 MHz(25), 10 MHz(52), 15 MHz(79), 20 MHz(106), 25 MHz(133),<br>30 MHz(160)*1, 40 MHz(216)*1, 50 MHz(270) *1<br>・For Subcarrier Spacing = 30 kHz,<br>5 MHz(11), 10 MHz(24), 15 MHz(38), 20 MHz(51), 25 MHz(65),<br>30 MHz(78)*1, 40 MHz(106)*1, 50 MHz(133)*1, 60 MHz(162)*2,<br>70 MHz(189)*2, 80 MHz(217)*2, 90 MHz(245)*2, 100 MHz(273)*2<br>・For Subcarrier Spacing = 60 kHz,<br>10 MHz(11), 15 MHz(18), 20 MHz(24), 25 MHz(31),<br>30 MHz(38)*1, 40 MHz(51)*1, 50 MHz(65)*1, 60 MHz(79)*2,<br>70 MHz(93)*2, 80 MHz(107)*2, 90 MHz(121)*2, 100 MHz(135)*2<br>　*1:　For MX269051A, this is available when MS269xA-077/177 is installed.<br>　*2:　For MX269051A, this is available when MS269xA-078/178 is installed.<br>Numbers in parentheses indicate the numbers of resource blocks. |
| Number of carriers | MX285051A-031:　　　　1 to 2<br>MX269051A-031:　　　　1 |
| Capture time | 1, 2 Frame |
| Setting frequency range | MX285051A-031<br>MS2850A-047:　　　100 MHz to 32 GHz<br>MS2850A-046:　　　100 MHz to 44.5 GHz<br>MX269051A-031 |
| Measurement frequency range | MX285051A-031　　　400 MHz to 6 GHz<br>MX269051A-031　　　400 MHz to 6 GHz |

For the "Setting frequency range" row (MX269051A-031):

| Option | 077/177 | 078/178 | 067/167 | Setting frequency range |
|---|---|---|---|---|
| MS2690A | ✓/X | ✓/X | | 100 MHz to 6 GHz |
| MS2691A | X | X | | 100 MHz to 13.5 GHz |
| | ✓ | ✓/X | | 100 MHz to 6 GHz |
| MS2692A | X | X | ✓/X | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | ✓ | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | X | 100 MHz to 6 GHz |

✓ :　Installed
X :　Not installed
✓/X :　Installed or Not installed

**Table 1.3-1   Specifications (Cont'd)**

| Item | Specification |
|---|---|
| MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink (Cont'd) | |
| Measurement level range | MX285051A-031<br>−10 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)<br>−30 to +10 dBm (at Pre-Amp On)<br>MX269051A-031<br>−10 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)<br>−25 to +10 dBm (at Pre-Amp On) |
| Carrier frequency accuracy | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Measurement signal: EVM = 1% (rms) of Downlink signal<br>・ Measurement time: 1 Frame<br>・ Either of the following single carrier signals output at the same frequency as the center frequency of the measuring instrument:<br>MX285051A-031:<br>　Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz, 60 kHz)<br>　or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>　400 MHz ≤ frequency < 800 MHz:<br>　Bandwidth 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz)<br>MX269051A-031:<br>　Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>　or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>± (accuracy of reference frequency × carrier frequency + 10 Hz) |
| Residual EVM | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Measurement signal: Downlink signal<br>・ Measurement time: 1 Frame<br>・ Either of the following single carrier signals output at the same frequency as the center frequency of the measuring instrument:<br>MX285051A-031:<br>　Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz, 60 kHz)<br>　or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>　400 MHz ≤ frequency < 800 MHz:<br>　Bandwidth 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz)<br>MX269051A-031:<br>　Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>　or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>≤ 1.0% (rms) |

**Table 1.3-1   Specifications (Cont'd)**

| Item | Specification |
|---|---|
| MX285051A-031/MX269051A-031 NR FDD sub-6GHz Downlink (Cont'd) | |
| Transmitter power accuracy | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Input attenuator ≥ 10 dB<br>・ Input signal:  Within the range of measurement level and equal to input level or under<br>・ Single carrier signal output at the same frequency as the center frequency of the measuring instrument<br>MX285051A-031:<br><br>_(see table below)_<br><br>MX269051A-031:<br><br>_(see table below)_<br><br>Transmitter power accuracy is calculated from an RSS (root summed square) error of the absolute amplitude accuracy and the in-band frequency characteristics*.<br>*:     MX285051A<br>        400 MHz ≤ freq. < 800 MHz, Bandwidth is Center freq. ± 15 MHz.<br>        800 MHz ≤ freq. < 6 GHz, Bandwidth is Center freq. ± 50 MHz. |
| Waveform display | MX285051A-031/MX269051A-031<br>When measuring the single carrier:<br>・ Constellation            ・ EVM vs Subcarrier<br>・ EVM vs Symbol            ・ Spectral Flatness<br>・ Power vs Resource Block  ・ EVM vs Resource Block<br>MX285051A-031<br>When measuring the multi carrier:<br>・ Power vs Resource Block  ・ EVM vs Resource Block |

MX285051A-031:

| Frequency range | Pre-Amp Off, or not installed | Pre-Amp On |
|---|---|---|
| 400 MHz ≤ freq. < 800 MHz | ±0.72 dB (Nominal) | ±1.14 dB (Nominal) |
| 800 MHz ≤ freq. < 4 GHz | ±0.74 dB (Nominal) | ±1.27 dB (Nominal) |
| 4 GHz ≤ freq. < 4.2 GHz | ±1.48 dB (Nominal) | ±2.11 dB (Nominal) |
| 4.2 GHz ≤ freq. ≤ 6 GHz | ±1.45 dB (Nominal) | ±1.94 dB (Nominal) |

MX269051A-031:

| Frequency range | Pre-Amp Off, or not installed | Pre-Amp On |
|---|---|---|
| 400 MHz ≤ freq. < 6 GHz | ±1.91 dB (Nominal) | ±2.20 dB (Nominal) |

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Overview

**Table 1.3-1 Specifications (Cont'd)**

| Item | Specification |
|---|---|
| | MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink |
| Target signal | Uplink signals defined by TS 38.211.<br>Subcarrier Spacing is 15 kHz, 30 kHz, or 60 kHz. |
| Channel bandwidth | ・For Subcarrier Spacing = 15 kHz,<br>  5 MHz(25), 10 MHz(52), 15 MHz(79), 20 MHz(106), 25 MHz(133),<br>  30 MHz(160)*1, 40 MHz(216)*1, 50 MHz(270)*1<br>・For Subcarrier Spacing = 30 kHz,<br>  5 MHz(11), 10 MHz(24), 15 MHz(38), 20 MHz(51), 25 MHz(65),<br>  30 MHz(78)*1, 40 MHz(106)*1, 50 MHz(133)*1, 60 MHz(162)*2,<br>  70 MHz(189)*2, 80 MHz(217)*2, 90 MHz(245)*2, 100 MHz(273)*2<br>・For Subcarrier Spacing = 60 kHz,<br>  10 MHz(11), 15 MHz(18), 20 MHz(24), 25 MHz(31),<br>  30 MHz(38)*1, 40 MHz(51)*1, 50 MHz(65)*1, 60 MHz(79)*2,<br>  70 MHz(93)*2, 80 MHz(107)*2, 90 MHz(121)*2, 100 MHz(135)*2<br>  *1:  For MX269051A, this is available when MS269xA-077/177 is installed.<br>  *2:  For MX269051A, this is available when MS269xA-078/178 is installed.<br>Numbers in parentheses indicate the numbers of resource blocks. |
| Capture time | 1, 2 Frame |
| Setting frequency range | MX285051A-081<br>MS2850A-047:       100 MHz to 32 GHz<br>MS2850A-046:       100 MHz to 44.5 GHz<br>MX269051A-081 |

Setting frequency range table (for MX269051A-081):

| Option | 077/177 | 078/178 | 067/167 | Setting frequency range |
|---|---|---|---|---|
| MS2690A | ✓/X | ✓/X | | 100 MHz to 6 GHz |
| MS2691A | X | X | | 100 MHz to 13.5 GHz |
| | ✓ | ✓/X | | 100 MHz to 6 GHz |
| MS2692A | X | X | ✓/X | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | ✓ | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | X | 100 MHz to 6 GHz |

✓ :    Installed
X :    Not installed
✓/X :  Installed or Not installed

| Item | Specification |
|---|---|
| Measurement frequency range | MX285051A-081       400 MHz to 6 GHz<br>MX269051A-081       400 MHz to 6 GHz |
| Measurement level range | MX285051A-081<br>−10 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)<br>−30 to +10 dBm (at Pre-Amp On)<br>MX269051A-081<br>−10 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.)<br>−25 to +10 dBm (at Pre-Amp On) |

**Table 1.3-1 Specifications (Cont'd)**

| Item | Specification |
|---|---|
| MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink (Cont'd) | |
| Carrier frequency accuracy | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Measurement signal: EVM = 1% (rms) of Uplink signal<br>・ Measurement time: 1 Frame<br>・ Either of the following single carrier signals output at the same frequency as the center frequency of the measuring instrument:<br>MX285051A-081:<br>    Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>    or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>    $400\ \text{MHz} \leq \text{frequency} < 800\ \text{MHz}$:<br>    Bandwidth 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz)<br>MX269051A-081:<br>    Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>    or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>$\pm$ (accuracy of reference frequency $\times$ carrier frequency + 10 Hz) |
| Residual EVM | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Measurement signal: Uplink signal<br>・ Measurement time: 1 Frame<br>・ Either of the following single carrier signals output at the same frequency as the center frequency of the measuring instrument:<br>MX285051A-081:<br>    Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>    or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>    $400\ \text{MHz} \leq \text{frequency} < 800\ \text{MHz}$:<br>    Bandwidth 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz)<br>MX269051A-081:<br>    Bandwidth 100 MHz (Subcarrier Spacing: 30 kHz)<br>    or Bandwidth 50 MHz (Subcarrier Spacing: 15 kHz)<br>$\leq 1.0\%$ (rms) |

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Overview

**Table 1.3-1   Specifications (Cont'd)**

| Item | Specification |
|---|---|
| MX285051A-081/MX269051A-081 NR FDD sub-6GHz Uplink (Cont'd) | |
| Transmitter power accuracy | When measuring in the following conditions at 18 to 28°C, after CAL execution,<br>・ Input attenuator ≥ 10 dB<br>・ Input signal: Within the range of measurement level and equal to input level or under<br>・ Single carrier signal output at the same frequency as the center frequency of the measuring instrument<br>MX285051A-081:<br><br>MX269051A-081:<br><br>Transmitter power accuracy is calculated from an RSS (root summed square) error of the absolute amplitude accuracy and the in-band frequency characteristics*.<br>*:　　MX285051A<br>　　　400 MHz ≤ freq. < 800 MHz, Bandwidth is Center freq. ± 15 MHz.<br>　　　800 MHz ≤ freq. < 6 GHz, Bandwidth is Center freq. ± 50 MHz. |
| Waveform display | When measuring the single carrier:<br>・ Constellation　　　　　・ EVM vs Subcarrier<br>・ EVM vs Symbol　　　　　・ Spectral Flatness<br>・ Power vs Resource Block　・ EVM vs Resource Block |

MX285051A-081:

| Frequency range | Pre-Amp Off, or not installed | Pre-Amp On |
|---|---|---|
| 400 MHz ≤ freq. < 800 MHz | ±0.72 dB (Nominal) | ±1.14 dB (Nominal) |
| 800 MHz ≤ freq. < 4 GHz | ±0.74 dB (Nominal) | ±1.27 dB (Nominal) |
| 4 GHz ≤ freq. < 4.2 GHz | ±1.48 dB (Nominal) | ±2.11 dB (Nominal) |
| 4.2 GHz ≤ freq. ≤ 6 GHz | ±1.45 dB (Nominal) | ±1.94 dB (Nominal) |

MX269051A-081:

| Frequency range | Pre-Amp Off, or not installed | Pre-Amp On |
|---|---|---|
| 400 MHz ≤ freq. < 6 GHz | ±1.91 dB (Nominal) | ±2.20 dB (Nominal) |

**Table 1.3-1   Specifications (Cont'd)**

| Item | Specification |
|---|---|
| Common items for MX285051A-031/081 and MX269051A-031/081 | |
| Digitize Function | |
| Function | Capable of outputting captured waveform data to internal storage or external storage. |
| Waveform Data | Format:       I, Q (32 bit floating point binary format) <br><br> Level:        Assumes as $\sqrt{I^2 + Q^2}$ =1 for 0 dBm input <br><br> Level accuracy:   Same as the absolute amplitude accuracy and in-band frequency characteristics of the signal analyzer. |
| Replay Function | |
| Function | Analyzes traces of saved waveform data <br> Format: I, Q (32 bit floating point binary format) <br> Sampling rate: <br> MS2850A <br> When measuring the single carrier: <br>   Channel bandwidth ≤ 100 MHz: <br>   Without MS2850A-033/133:       162.5 MHz <br>   With MS2850A-033/133:           162.5 MHz <br> When measuring the multi carriers: <br>   When MX285051A-031:               325 MHz <br> MS269xA <br> When measuring the single carrier: <br>   Channel bandwidth ≤ 100 MHz: <br>   Without MS269xA-077/177:         50 MHz <br>   Only with MS269xA-077/177:     100 MHz <br>   With MS269xA-078/178:           200 MHz |

1

Overview

This chapter describes the preparations required for using the application you are using.

Refer to *MS2850A Signal Analyzer Operation Manual (Mainframe Operation)* for common features, the panel keys, connectors used to connect external devices and general points of caution of the MS2850A not included in this manual.

**2**

Preparation

# 2.1 Signal Path Setup

As shown in Figure 2.1-1, connect the mainframe and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector.

## ⚠ CAUTION

**Do not input a signal that has an excessive level to MS2850A.**



**Figure 2.1-1    Signal path setup example**

Set the 5 MHz/10 MHz/13 MHz reference signal from external sources, as required.
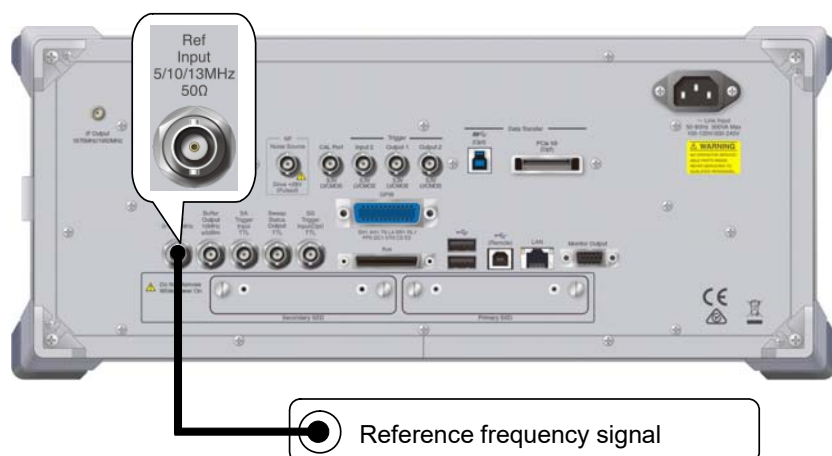


**Figure 2.1-2    External signal input**

# 2.2   Application Startup and Selection

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

## 2.2.1   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.

## 2.2.2   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.

# 2.3 Initialization and Calibration

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

## 2.3.1 Initialization

After selecting this application, first perform initialization. Initialization
should be performed in order to return the settable parameters to their
default settings.

The initialization procedure is as follows.

■ Procedure

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

## 2.3.2 Calibration

Perform calibration before 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 ⬭ to display the Application Cal function menu.
2.  Press [F1] (SIGANA All).

For details on calibration functionality only executable with the
MS2850A, refer to *MS2850A Signal Analyzer Operation Manual
(Mainframe Operation)*.

# Chapter 3 Measurement

This chapter describes the measurement function, the parameter contents and setting methods for the MX285051A-031/081 and MX269051A-031/081.

**3**

Measurement

# 3.1  Basic Operation

## 3.1.1   Screen layout

This section describes the screen layout for the MX285051A-031/081 and MX269051A-031/081.
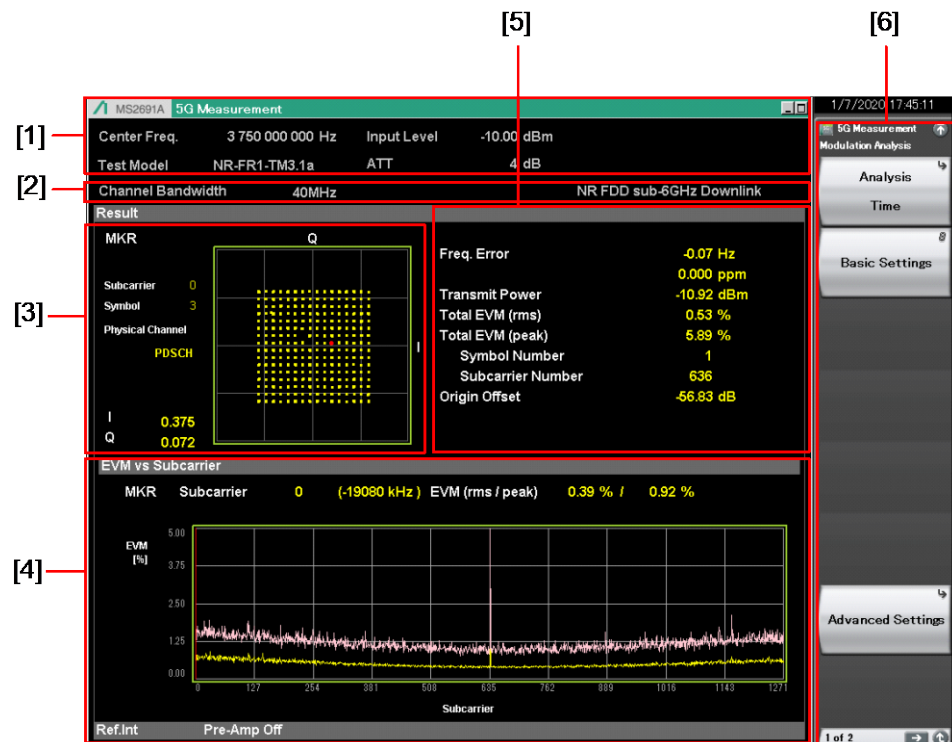


**Figure 3.1.1-1    Screen Layout**

[1]   Measurement parameter

Displays the set parameters.

[2]   Status message

Displays the status of signals.

[3]   Constellation

Displays a constellation of the selected symbol.

[4]   Graph window (Summary window)

Displays a graph of the measurement results.

[5]   Result window

Displays measurement results.

[6]   Function menu

Displays the functions executable with the function keys.

## 3.1.2 Function menu

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

**Table 3.1.2-1 Main function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | 5G Measurement | Press **5G Measurement** to display. |
| F1 | Frequency | Sets the frequency.<br>Refer to 3.2 "Frequency Function Menu" |
| F2 | Amplitude | Sets the level and attenuator.<br>Refer to 3.3 "Amplitude Function Menu" |
| F3 | Standard | Selects the measurement signal.<br>Refer to 3.5 "5G Standard Setting" |
| F4 | Measure | Sets measurement items.<br>Refer to 3.6 "NR FDD sub-6GHz Downlink"<br>3.7 "NR FDD sub-6GHz Uplink" |
| F5 | Marker | Sets a marker.<br>Refer to 3.8 "Setting Maker" |
| F6 | Trigger | Sets a trigger.<br>Refer to 3.9 "Setting Trigger" |
| F7 | Capture | Configures settings for IQ data capture.<br>Refer to 3.4 "Capture IQ Data Function Menu" |
| F8 | Accessory | Sets other functions.<br>Refer to 6.1 "Selecting Other Functions" |

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### 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, respectively.

Single

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

<Procedure>
1.   Press ⬅ .

Continuous

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

<Procedure>
1.   Press ⬅ .

*Note:*

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

Refer to 4.2 "Replay Function"

# 3.2 Frequency Function Menu

Configure the frequency settings in the Frequency function menu that is displayed by pressing [F1] (Frequency) on the main function menu. Also, press [Frequency] to display the Frequency function menu and open the Center Frequency dialog box.

***Note:***

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

■Center Frequency

Summary      Sets the center frequency.

Setting range

MS2850A     100 MHz to the upper limit of the mainframe

MS269xA     See the following table.

| Option | 077/177 | 078/178 | 067/167 | Setting frequency range |
|--------|---------|---------|---------|------------------------|
| MS2690A | ✓/X | ✓/X | | 100 MHz to 6 GHz |
| MS2691A | X | X | | 100 MHz to 13.5 GHz |
| | ✓ | ✓/X | | 100 MHz to 6 GHz |
| MS2692A | X | X | ✓/X | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | ✓ | 100 MHz to 26.5 GHz |
| | ✓ | ✓/X | X | 100 MHz to 6 GHz |

✓ :        Installed

X :        Not installed

✓/X :      Installed or Not installed

■RF Spectrum

Summary      Sets whether to measure with IQ spectrum reversed.

Options      Norm.    Measures without IQ spectrum reversed.

             Rvs.     Measures with IQ spectrum reversed.

## 3.3  Amplitude Function Menu

Configure the level settings in the Amplitude function menu that is displayed by pressing $\boxed{\text{F2}}$ (Amplitude) on the main function menu. Also, press $\boxed{\text{Amplitude}}$ to display the Amplitude function menu and open the Input Level dialog box.

***Note:***

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

■Input Level

| | |
|---|---|
| Summary | Sets the input level from the target DUT. |
| Range | For Pre-Amp: On: |
| | (–80.00 + Offset Value) to (10.00 + Offset Value) dBm |
| | For Pre-Amp: Off: |
| | (–60.00 + Offset Value) to (30.00 + Offset Value) dBm |

■Attenuator (Auto/Manual)

| | |
|---|---|
| Summary | Selects automatic setting or manual setting of the input attenuator. |
| Options | Auto    The input attenuator is automatically set. |
| | Manual  The input attenuator is manually set. |

■Attenuator

| | |
|---|---|
| Summary | Sets the input attenuator manually. |
| Range | |

**Table 3.3-1   Input attenuator setting range**
**(When Pre-amp is set to Off)**

| Attenuator Manual | |
|---|---|
| **Lower limit** | **Upper limit** |
| Logic*  ($\alpha = 0$, $\beta = 1$, $\gamma = 2$) The minimum value is 0 dB. | 60 dB |

**Table 3.3-2   Input attenuator setting range**
**(When Pre-amp is set to On)**

| Attenuator Manual | |
|---|---|
| **Lower limit** | **Upper limit** |
| Logic*  ($\alpha = 20$, $\beta = 21$, $\gamma = 22$) The minimum value is 20 dB | 60 dB |

*:    The following rules apply:

<1>  If the reference level is 0 or if it is divisible by 2.
       Attenuator (dB) = RL[1] + $\alpha$

<2>  Not <1>, and INT (RL)[2] is an odd number.
       Attenuator (dB) = INT (RL)[2] + $\beta$

<3>  Not <1>, and INT (RL) is an even number.

$$\text{Attenuator (dB)} = \text{INT (RL)}^{*2} + \gamma$$

*1: Reference level (dBm)

*2: Maximum integer not exceeding reference level.

■Pre-Amp

| | |
|---|---|
| Summary | Sets On/Off for the Pre-Amp function. |
| Options | On      Enables the Pre-Amp function. |
| | Off      Disables the Pre-Amp function. |

■Auto Range

Summary      Sets the input level and attenuator value so that the EVM measurement results are optimal according to the input level. On/Off for the Pre-Amp does not change from the setting value.

■Offset

| | |
|---|---|
| Summary | Sets On/Off for the Offset function. |
| Options | On      Enables the offset function. |
| | Off      Disables the offset function. |

■Offset Value

Summary      Sets the level offset coefficient.

Range      −99.99 to 99.99 dB

Setting example

| DUT | Attenuator | | MS2850A or MS269xA |
|---|---|---|---|
| 40 dBm Output | 30 dB | 10 dBm | Input Level     40 dBm<br>Offset Value    30 dB |

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Measurement
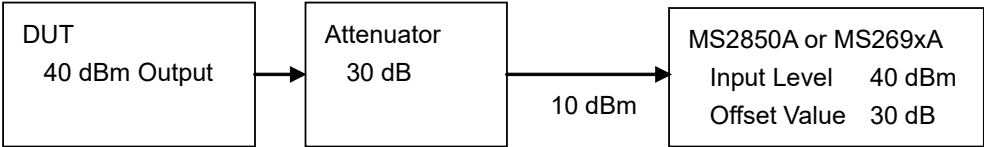
# 3.4 Capture IQ Data Function Menu

Configure the IQ data settings in the Capture function menu that is displayed by pressing [F7] (Capture) on the main function menu.

**Table 3.4-1 Capture function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Capture | Press **Capture** to display. |
| F1 | Capture Time | Switches between the two capture modes of IQ data. Options: Auto, Manual |
| F2 | Capture Time Length | Sets the capture time length of IQ data in frame unit. Range: 1, 2 [frame] |
| F3 | Save Captured Data | Saves the captured IQ data. Refer to Chapter 4 "Digitize Function" |
| F4 | Replay | Replays the captured IQ data. Refer to Chapter 4 "Digitize Function" |
| F5 | Stop Replaying | Stops replaying the captured IQ data. Refer to Chapter 4 "Digitize Function" |

## 3.4.1 Setting capture time

The capture time is calculated by the following formula.

Capture time [ms] = (Capture Time Length [frame] + 1) × 10 [ms] + $\alpha$

$\alpha$: Processing time margin for analysis

## 3.4.2 Averaging IQ data

The following is the method for averaging IQ data.

In the Auto mode, capture of one frame starts at the trigger timing. After the measurement is completed, capture of another frame starts at the next trigger timing. The average and maximum values are calculated from the measurement results at each storage count. The frames of multiple measurements are not necessarily consecutive.
The storage count and the capture count are the same in single measurement. In continuous measurement, the average and maximum values are calculated from the last data of the storage count after measurement has been performed the number of times corresponding to the storage count.

# 3.5  5G Standard Setting

Set the 5G Standard in the Standard function menu that is displayed by pressing ▢ F3 (Standard) on the main function menu.

**Table 3.5-1    Standard function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Standard | Press **Standard** to display. |
| F7 | NR FDD sub-6GHz Downlink | Sets 5G Standard to NR FDD sub-6GHz Downlink. It is available when MX285051A-031/MX269051A-031 is installed. |
| F8 | NR FDD sub-6GHz Uplink | Sets 5G Standard to NR FDD sub-6GHz Uplink. It is available when MX285051A-081/MX269051A-081 is installed. |

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*Measurement*

# 3.6  NR FDD sub-6GHz Downlink

To set the measurement items, press [F4] (Measure) on the main function menu or [Measure] to display the Measure function menu.

**Table 3.6-1   Measure function menu**
**(NR FDD sub-6GHz Downlink)**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Measure | Press **Measure** to display. |
| F1 | Modulation Analysis | Switches the measurement function to Modulation Analysis. It is available when MX285051A-031/MX269051A-031 is installed. |
| F2 | Carrier Aggregation Analysis | Switches the measurement function to Carrier Aggregation Analysis. It is available when MX285051A-031 is installed. |
| F5 | ACP (Swept) | Recalls the ACP function of the Spectrum Analyzer function.<br>Refer to 3.21 "Spectrum Measurement" |
| F7 | Channel Power (Swept) | Recalls the Channel Power function of the Spectrum Analyzer function.<br>Refer to 3.21 "Spectrum Measurement" |
| Page 2 | Measure | Press **Measure** and then [→] to display. |
| F1 | Modulation Analysis | Same as F1 of Page 1 |
| F2 | Carrier Aggregation Analysis | Same as F2 of Page 1 |
| F5 | OBW (Swept) | Recalls the OBW function of the Spectrum Analyzer function.<br>Refer to 3.21 "Spectrum Measurement" |
| F6 | Spectrum Emission Mask (Swept) | Recalls the Spectrum Emission Mask function of the Spectrum Analyzer function.<br>Refer to 3.21 "Spectrum Measurement" |
| F8 | Advanced Settings | Display the Advanced Settings function menu.<br>Refer to 3.21.2 "Advanced Settings" |

## 3.6.1    Modulation Analysis

To set modulation analysis items, press [F1] (Modulation Analysis) on the Measure function menu to display the Modulation Analysis function menu.

The Modulation Analysis function menu consists of two pages that are toggled by pressing [→].

**Table 3.6.1-1    Modulation Analysis function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Modulation Analysis | Press **Modulation Analysis** to display. |
| F1 | Analysis Time | Sets measurement position.<br>Refer to 3.6.1.1 "Analysis Time" |
| F2 | Basic Settings | Sets the basic parameters for such as each channel and signal.<br>Refer to 3.6.1.2 "Basic Settings" |
| F7 | Advanced Settings | Sets the detailed parameters for modulation analysis.<br>Refer to 3.6.1.3 "Advanced Settings" |
| Page 2 | Modulation Analysis | Press **Modulation Analysis** and then [→] to display. |
| F1 | Trace | Sets the trace.<br>Refer to 3.6.1.4, 3.6.1.5, 3.6.1.6 "Trace" |

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Measurement

### 3.6.1.1 Analysis Time

Set the measurement position in the Analysis Time function menu that is displayed by pressing [F1] (Analysis Time) on page 1 of the Modulation Analysis function menu.

**Table 3.6.1.1-1   Analysis Time function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Analysis Time | Press **Analysis Time** to display. |
| F1 | Starting Slot Number | Sets the starting slot number. It is fixed to 0 Slot in the MX285051A-031/MX269051A-031. |
| F2 | Measurement Interval | Sets the analysis slot length. Following values are fixed. For NR FDD sub-6GHz Downlink,    Subcarrier Spacing = 15 kHz: 10 Slots    Subcarrier Spacing = 30 kHz: 20 Slots    Subcarrier Spacing = 60 kHz: 40 Slots |

The following table lists the slots per frame according to the Subcarrier Spacing.

**Table 3.6.1.1-2   Number of Slots per Frame**

| Subcarrier Spacing | Slots/Frame |
|---|---|
| 15 kHz | 10 |
| 30 kHz | 20 |
| 60 kHz | 40 |

### 3.6.1.2    Basic Settings

Set the basic parameters for modulation analysis of such as each channel and signal. The Basic Settings function menu and a dialog box to set the parameters for each channel and signal are displayed by pressing [F2] (Basic Settings) on page 1 of the Modulation Analysis function menu.

**Table 3.6.1.2-1    Basic Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Basic Settings | Press **Basic Settings** to display. |
| F1 | Frame Parameter | Displays a tab to set the parameters for Frame Parameter.<br>                    Refer to Table 3.6.1.2-3 Frame Parameter |
| F2 | SS-Block | Displays a tab to set the parameters for SS-Block.<br>(When Test Model is set to OFF.)<br>                    Refer to Table 3.6.1.2-5 SS-Block |
| F3 | PDCCH/DM-RS | Displays a tab to set the parameters for PDCCH/DM-RS.<br>(When Test Model is set to OFF.)<br>                    Refer to Table 3.6.1.2-6 PDCCH/DM-RS |
| F4 | PDSCH/DM-RS | Displays a tab to set the parameters for PDSCH/DM-RS.<br>(When Test Model is set to OFF.)<br>                    Refer to Table 3.6.1.2-7 PDSCH/DM-RS |
| F6 | Restore Default Values | Restores the parameters in the dialog box to the default values.<br>(When Test Model is set to OFF.) |
| F7 | Set | Sets the parameters specified at the dialog box. |
| F8 | Cancel | Cancels the parameters specified at the dialog box. |

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**Table 3.6.1.2-2   Common Settings**

| Dialog Box | Function |
|---|---|
| Number of Carriers | Sets the number of carriers.<br>Refer to "Number of Carriers" in 3.6.1.3 "Advanced Settings" for the range. |
| Reference Carrier | Sets the reference carrier for analysis.<br>If the reference carrier is changed, the parameters displayed in the dialog box are also changed.<br>Refer to "Reference Carrier" in 3.6.1.3 "Advanced Settings" for the range. |
| Carrier State | Displays whether to enable or disable Component Carrier. |
| Frequency Offset | Displays the frequency offset of Component Carrier.<br>Refer to "Frequency Offset" in 3.6.1.3 "Advanced Settings" for the range. |
| Copy to All CC | Copies the parameter of Reference Carrier to other Component Carriers. However, the frequency offset is not copied. |

**Table 3.6.1.2-3   Frame Parameter**

| Dialog Box | Function |
|---|---|
| Test Model | Selects a Test Model compliant to TS38.141.<br>For NR FDD sub-6GHz Downlink,<br>    OFF, NR-FR1-TM1.1, NR-FR1-TM1.2, NR-FR1-TM2,<br>    NR-FR1-TM2a, NR-FR1-TM3.1, NR-FR1-TM3.1a,<br>    NR-FR1-TM3.2, NR-FR1-TM3.3 |
| Test Model Version | Specifies the version of 3GPP TS 38.141 when the input signal is the test model compliant to 3GPP TS 38.141.<br>Options:  Auto, TS38.141 V15.1.0 (2019-03),<br>                TS38.141 V15.2.0 (2019-06) |
| Subcarrier Spacing | Sets the Subcarrier Spacing.<br>For NR FDD sub-6GHz Downlink,<br>Options:  15 kHz, 30 kHz, 60 kHz |
| Number of RBs | Sets the Resource Block numbers of the target signal.<br>Number of RBs is set to the default value when switching the Standard.<br>For NR FDD sub-6GHz Downlink,<br>Options:  Subcarrier Spacing = 15 kHz:<br>                25, 52, 79, 106, 133, 160, 216, 270<br>                Subcarrier Spacing = 30 kHz:<br>                11, 24, 38, 51, 65, 78, 106, 133, 162, 189, 217,<br>                245, 273<br>                Subcarrier Spacing = 60 kHz:<br>                11, 18, 24, 31, 38, 51, 65, 79, 93, 107, 121, 135 |
| Channel Bandwidth | Displays the Cannel Bandwidth of the target signal set by the Number of RBs. |
| Cell ID | Sets the Cell ID.<br>Range:    0 to 1007 |

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**Table 3.6.1.2-3   Frame Parameter (Cont'd)**

| Dialog Box | Function |
|---|---|
| Synchronization Mode | Sets the synchronized signal.<br>Options:  SS   Sets Synchronization Signal for the synchronized signal.<br>DM-RS for PDSCH<br>Sets Demodulation Reference Signal for PDSCH for the synchronized signal. |
| Phase Compensation | Sets whether to enable or disable Phase Compensation.<br>Phase Compensation sets whether to enable (ON) or disable (OFF) phase compensation during upconversion defined in the 3GPP NR standard (TS 38.211, V15.1.0 or later).<br>Upconversion formula for ON:  $\mathrm{Re}\left\{ s_l^{(p,\mu)}(t) \cdot e^{j2\pi f_0 \left( t - t_{\mathrm{start},l}^{\mu} - N_{\mathrm{CP},l}^{\mu} T_c \right)} \right\}$<br>Upconversion formula for OFF:  $\mathrm{Re}\left\{ s_l^{(p,\mu)}(t) \cdot e^{j2\pi f_0 t} \right\}$<br>For details, refer to 5.4 in TS 38.211 (V15.1.0 or later). |

The following table shows the relation between the Number of RBs setting and the Channel Bandwidth at each Subcarrier Spacing.

**Table 3.6.1.2-4   Relationship Between Number of RBs and Channel Bandwidth**

| Subcarrier Spacing | Number of RBs | Channel Bandwidth |
|---|---|---|
| 15 kHz | 25 | 5 MHz |
| | 52 | 10 MHz |
| | 79 | 15 MHz |
| | 106 | 20 MHz |
| | 133 | 25 MHz |
| | 160*1 | 30 MHz |
| | 216*1 | 40 MHz |
| | 270*1 | 50 MHz |
| 30 kHz | 11 | 5 MHz |
| | 24 | 10 MHz |
| | 38 | 15 MHz |
| | 51 | 20 MHz |
| | 65 | 25 MHz |
| | 78*1 | 30 MHz |
| | 106*1 | 40 MHz |
| | 133*1 | 50 MHz |
| | 162*2 | 60 MHz |
| | 189*2 | 70 MHz |
| | 217*2 | 80 MHz |
| | 245*2 | 90 MHz |
| | 273*2 | 100 MHz |
| 60 kHz | 11 | 10 MHz |
| | 18 | 15 MHz |
| | 24 | 20 MHz |
| | 31 | 25 MHz |
| | 38*1 | 30 MHz |
| | 51*1 | 40 MHz |
| | 65*1 | 50 MHz |
| | 79*2 | 60 MHz |
| | 93*2 | 70 MHz |
| | 107*2 | 80 MHz |
| | 121*2 | 90 MHz |
| | 135*2 | 100 MHz |

*1:   For MS269xA, this is available when MS269xA-077/177 is installed.

*2:   For MS269xA, this is available when MS269xA-078/178 is installed.

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**Table 3.6.1.2-5   SS-Block**

| Dialog Box | Function |
|---|---|
| Enable | Sets whether to enable or disable SS-Block.<br>When set to disable, no measurement result of SS-Block is displayed.<br>Fixed disable in the following condition.<br>　　Number of RBs < 20, Subcarrier Spacing = 60 kHz |
| SS-Block Subcarrier Spacing | This parameter is fixed and cannot be changed.<br>Displays the same value of the Subcarrier Spacing of the Frame Parameter. |
| SS-Block Candidate | Sets the position of the SS-Block in the time direction.<br>For NR FDD sub-6GHz Downlink,<br>Options:  Subcarrier Spacing = 15 kHz:<br>　　　　　　CaseA (L=4), CaseA (L=8)<br>　　　　　Subcarrier Spacing = 30 kHz:<br>　　　　　　CaseB (L=4), CaseB (L=8),<br>　　　　　　CaseC (L=4), CaseC (L=8) |
| Antenna Port | Sets the Antenna Port for SS-Block. It is fixed to 4000. |
| SSB Subcarrier Offset | Sets the Subcarrier Offset in the RB to map the SS-Block.<br>Range:　　0 to 11 |
| SSB RB Offset | Sets the RB Offset to map the SS-Block.<br>Range:　　0 to Number of RBs – 20 (SSB Subcarrier Offset = 0)<br>　　　　　0 to Number of RBs – 20 – 1 (SSB Subcarrier Offset > 0) |
| Delta SSB Center to CF | Displays the offset between the center of SS Block and the center of Carrier Frequency. |
| Periodicity | Sets the SS-Block Periodicity.<br>Options:  10 ms<br>　　　　　 20 ms   (Only when Capture Length is 2 Frames) |
| Analysis Frame Number | Sets the analysis target frame number in SS synchronization.<br>The frame in which SS Block is mapped is numbered 0.<br>Options:  0<br>　　　　　 1　　　 (Only when SS-Block Periodicity is 20 ms) |

**Table 3.6.1.2-5    SS-Block (Cont'd)**

| Dialog Box | Function |
|---|---|
| P-SS Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the Primary Synchronization Signal power. Fixed to Auto. |
| P-SS Power Boosting | Sets the level of the Primary Synchronization Signal. This parameter is fixed and cannot be changed. |
| S-SS Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the Secondary Synchronization Signal power. Fixed to Auto. |
| S-SS Power Boosting | Sets the level of the Secondary Synchronization Signal. This parameter is fixed and cannot be changed. |
| PBCH Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the PBCH power. Fixed to Auto. |
| PBCH Power Boosting | Sets the PBCH level. This parameter is fixed and cannot be changed. |
| SS-Block Transmission | Enables or disables SS-Block by Index. Options:  Enable, Disable |

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**Table 3.6.1.2-6   PDCCH/DM-RS**

| Dialog Box | Function |
|---|---|
| Slot | Selects the Slot number for which the parameter of PDCCH/DM-RS is to be set.<br>For NR FDD sub-6GHz Downlink,<br>Range:    Subcarrier Spacing = 15 kHz: 0 to 9<br>              Subcarrier Spacing = 30 kHz: 0 to 19<br>              Subcarrier Spacing = 60 kHz: 0 to 39 |
| Enable | Enables or disables the PDCCH/DM-RS for the selected Slot.<br>No measurement result of the PDDCH/DM-RS of the disabled Slot is displayed. |
| Antenna Port | Sets the Antenna Port for PDCCH/DM-RS. It is fixed to 2000. |
| PDCCH Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the PDCCH power for DM-RS. Fixed to Auto. |
| PDCCH Power Boosting | Sets the PDCCH level of the DM-RS.<br>This parameter is fixed and cannot be changed. |
| Number of Symbols | This is the number of symbols for PDCCH.<br>This parameter is fixed and cannot be changed. |
| Copy to All Slot | Copies the setting of the selected Slot to all the Slots. |

**Table 3.6.1.2-7 PDSCH/DM-RS**

| Dialog Box | Function |
|---|---|
| Slot | Selects the Slot number for which the parameter of PDSCH/DM-RS is to be set.<br>For NR FDD sub-6GHz Downlink,<br>Range: Subcarrier Spacing = 15 kHz: 0 to 9<br>Subcarrier Spacing = 30 kHz: 0 to 19<br>Subcarrier Spacing = 60 kHz: 0 to 39 |
| Antenna Port | Sets the Antenna Port.<br>Antenna Port settings are common to all Slots.<br>Options: 1000, 1001, 1002, 1003 |
| Modulation Scheme | Selects the modulation scheme for the PDSCH.<br>Options: QPSK, 16QAM, 64QAM, 256QAM, Auto |
| PDSCH Mapping Type | Sets the Mapping Type of PDSCH.<br>Options: typeA, typeB |
| Start Symbol | Sets the Mapping Start Symbol of PDSCH.<br>When the PDSCH Mapping Type is typeA<br>Range: 0 to DMRS typeA pos<br>When the PDSCH Mapping Type is typeB<br>Range: 0 to 12 |
| Number of Symbols | Sets the number of Mapping symbols for PDSCH.<br>Range: 2 to 14 – PDSCH Start Symbol |
| PDSCH Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the PDSCH power for DM-RS.<br>Options: Auto, Manual |
| PDSCH Power Boosting | Sets the PDSCH level of the DM-RS.<br>The following values are set when PDSCH Power Boosting is Auto.<br><br><table><tr><th>DMRS CDM Group without Data</th><th>DMRS Config Type</th><th>PDSCH Level (dB)</th></tr><tr><td>1</td><td>1</td><td>0.000</td></tr><tr><td>2</td><td>1</td><td>−3.000</td></tr></table> |
| DM-RS typeA-pos | Sets the DM-RS typeA-pos.<br>This parameter is settable only when PDSCH Mapping Type is typeA.<br>Options: 2, 3 |
| DM-RS config-type | Sets the DM-RS config type. It is fixed to 1. |
| DM-RS add-pos | Sets the DM-RS add-pos.<br>Options: 0, 1, 2, 3 |

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**Table 3.6.1.2-7    PDSCH/DM-RS (Cont'd)**

| Dialog Box | Function |
|---|---|
| CDM Group Without Data | Sets the DM-RS associated with PDSCH.<br>Options:  1, 2<br>It is fixed to 2 when Antenna Port is 1002 or 1003. |
| PDSCH PT-RS | Enables or disables the PDSCH PT-RS. |
| PT-RS Time Density | Sets the PT-RS Time Density.<br>Options:  1, 2, 4 |
| PT-RS Freq. Density | Sets the PT-RS Freq. Density.<br>Options:  2, 4 |
| PT-RS RE Offset | Sets the PT-RS RE Offset.<br>Options:  00, 01, 10, 11 |
| PDSCH RBs Allocation Auto Detect | Enables or disables the auto detection of the RBs that are allocated to PDSCH.<br>Options:  Enable, Disable |
| PDSCH RBs Allocation Start RB | Sets the Start RB of the RBs that are allocated to PDSCH.<br>Range:    0 to Number Of RBs – 1 |
| PDSCH RBs Allocation Number of RBs | Sets the number of the RBs that are allocated to PDSCH.<br>Range:    1 to Number Of RBs – PDSCH Allocation Start RB |
| Copy to All Slot | Copies the setting of selected Slot to all the Slots. |

### 3.6.1.3   Advanced Settings

Set the advanced parameters for modulation analysis. The Advanced Settings function menu is displayed by pressing [F7] (Advanced Settings) on page 1 of the Modulation Analysis function menu.

**Table 3.6.1.3-1   Advanced Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Advanced Settings | Press **Advanced Settings** to display. |
| F1 | Equalizer Use data | Selects whether or not to include resource elements other than Reference Signal at calculation of the transmission path loss. Options:<br>On    Includes resource elements other than Reference Signal at calculation of the transmission path loss.<br>Off    Does not include resource elements other than Reference Signal at calculation of the transmission path loss. |
| F2 | Amplitude Tracking | Selects On/Off for Amplitude Tracking.<br>Options:  On, Off |
| F3 | Phase Tracking | Selects On/Off for Phase Tracking.<br>Options:  On, Off |
| F4 | Timing Tracking | Selects On/Off for Timing Tracking.<br>Options:  On, Off |
| F6 | Number of Carriers | Sets the number of carriers.<br>Range:    1 to 2 |
| F7 | Reference Carrier | Sets the reference carrier for analysis.<br>Range:    0 to (Number of Carriers – 1) |
| F8 | Frequency Offset | Displays the frequency offset of Component Carrier.<br>Resolution:  1 Hz<br>Range:        ±(Frequency Span / 2)<br>                Refer to Table 3.6.1.3-2 for Frequency Span. |

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**Table 3.6.1.3-1    Advanced Settings function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 2 | Advanced Settings | Press **Advanced Settings** and then ⊡ to display. |
| F1 | Multicarrier Filter | When measuring the multicarrier signal, sets whether to filter the reference carrier.<br>Options: On, Off<br>It is fixed to On when Number of Carriers > 1. |
| F2 | EVM Window | Turns On or Off the EVM Window.<br>Options: On  Displays the worst among the EVM High and EVM Low values as the measurement result. However, the EVM Mid result is displayed in graph.<br>Off  Displays the EVM Mid.<br>Refer to Figure 3.6.1.3-1 "EVM Window" |
| F3 | DC Cancellation | When performing the EVM measurement, select On/Off of this function that eliminates influences due to carrier leakage.<br>Options: On, Off |
| F4 | Phase Compensation Frequency Center | Selects whether to perform the phase compensation at the same frequency as the center frequency.<br>Options: On, Off |
| F5 | Phase Compensation Frequency Value | Sets the frequency for the phase compensation.<br>This function is available when Phase Compensation Frequency Center is Off.<br>When measuring multicarrier signals, the frequency for performing the phase compensation for each carrier is calculated using the following formula.<br>PhaseCompensationFrequencyValue + FrequencyOffset#n<br>n: Carrier Number (n = 0 to Number of Carriers – 1)<br>Resolution: 1 Hz<br>Range:  Same as Center Frequency |



**Figure 3.6.1.3-1    EVM Window**

**Table 3.6.1.3-2   How to Determine Frequency Span**

**("sub6" = NR FDD sub-6GHz, "DL" = Downlink, "UL" = Uplink)**

**(✓: Installed, X: Not installed, –: Option, n/a: Not applicable)**

| Model Name | Standard | | MS2850A | | MS269xA | | Number of Carriers | Channel Bandwidth [MHz] | Center Frequency [MHz] | Frequency Span [MHz] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | -033 /133 | -034 /134 | -077 /177 | -078 /178 | | | | |
| MS2850A | sub6 | DL | – | – | n/a | n/a | 2 | – | – | 255 |
| | | DL | – | – | n/a | n/a | 1 | – | ≥ 800 | 125 |
| | | UL | | | | | n/a | | | |
| | | DL | – | – | n/a | n/a | 1 | ≥ 30 | < 800 | 125 |
| | | UL | | | | | n/a | | | |
| | | DL | – | – | n/a | n/a | 1 | < 30 | < 800 | 31.25 |
| | | UL | | | | | n/a | | | |
| MS269xA | sub6 | DL | n/a | n/a | ✓ | ✓ | 1 | – | – | 125 |
| | | UL | | | | | n/a | | | |
| | | DL | n/a | n/a | ✓ | X | 1 | – | – | 62.5 |
| | | UL | | | | | n/a | | | |
| | | DL | n/a | n/a | X | X | 1 | – | – | 31.25 |
| | | UL | | | | | n/a | | | |

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### 3.6.1.4 Trace (EVM vs Subcarrier, EVM vs Symbol, Spectral Flatness)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace].

When EVM vs Subcarrier, EVM vs Symbol, or Spectral Flatness is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.6.1.4-1 Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>    The Trace function menu configuration changes depending on the settings of this function.<br><br>Options:<br>  EVM vs Subcarrier<br>    Displays EVM vs Subcarrier in a graph window.<br>  EVM vs Symbol<br>    Displays EVM vs Symbol in a graph window.<br>  Spectral Flatness<br>    Displays Spectral Flatness in a graph window.<br>  Power vs RB<br>    Displays Power vs Resource Block in a graph window.<br>  EVM vs RB<br>    Displays EVM vs Resource Block in a graph window.<br>  Summary<br>    Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets vertical scale of graphical result.<br>    Refer to Table 3.6.1.4-2 Scale function menu |
| F4 | Storage | Sets storage method.<br>    Refer to Table 3.6.1.4-3 Storage function menu |
| F6 | Subcarrier Number | Sets the subcarrier number of Marker position and EVM vs Symbol displayed.<br>Range:   0 to (Number of RBs × 12 − 1) |
| F7 | Symbol Number | Sets the symbol number of Marker position and EVM vs Subcarrier displayed.<br>For NR FDD sub-6GHz Downlink,<br>Range:   Subcarrier Spacing = 15 kHz: 0 to 139<br>          Subcarrier Spacing = 30 kHz: 0 to 279<br>          Subcarrier Spacing = 60 kHz: 0 to 559 |

**Table 3.6.1.4-1 Trace function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| F8 | EVM vs Subcarrier View | Displayed when EVM vs Subcarrier is selected by F1: Trace Mode.<br>Sets whether to enable averaging in EVM vs Subcarrier, and the display type.<br>Options:<br>　Each Symbol<br>　　Displays EVM vs Subcarrier of Symbol set in Symbol Number when EVM vs Subcarrier is displayed.<br>　Averaged over all Symbols<br>　　Displays EVM vs Subcarrier of the analysis slot length set in Measurement Interval.<br>　Graph View<br>　　Selects a graph display type of EVM vs Subcarrier from the average (RMS), and the average value and peak value (RMS&Peak). |
| | EVM vs Symbol View | Displayed when EVM vs Symbol is selected by F1: Trace Mode.<br>Sets whether to enable averaging in EVM vs Symbol, and the display type.<br>Options:<br>　Each Subcarrier<br>　　Displays EVM vs Symbol of Subcarrier set in Subcarrier Number when EVM vs Symbol is displayed.<br>　Averaged over all Subcarrier<br>　　Displays EVM vs Symbol in all subcarriers.<br>　Graph View<br>　　Selects a graph display type of EVM vs Symbol from the average (RMS), and the average value and peak value (RMS&Peak). |
| | Spectral Flatness Type | Displayed when Spectral Flatness is selected by F1: Trace Mode.<br>Sets type of Spectral Flatness displayed.<br>Options:<br>　Amplitude<br>　　Displays Amplitude in Spectral Flatness.<br>　Phase<br>　　Displays Phase in Spectral Flatness. |

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**Table 3.6.1.4-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options: %, dB |
| F2 | EVM Scale | Sets the upper limit for the EVM scale.<br>Range:　2%, 5%, 10%, 20%　　　(in %)<br>　　　　　–40 dB, –20 dB, 0 dB　　(in dB) |
| F3 | Flatness Scale | Sets a scale of Spectral Flatness.<br>Options:<br>　Amplitude<br>　　　Sets the upper and lower limit values of Amplitude in Spectral Flatness (±10 dB, ±3 dB, ±1 dB).<br>　Phase<br>　　　Sets the upper and lower limit values of Phase in Spectral Flatness (±60 deg, ±20 deg, ±6 deg). |

**Table 3.6.1.4-3   Storage function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Storage | Press **Storage** to display. |
| F1 | Mode | Sets the storage mode.<br>Options:<br>　Off　　　Updates data per measurement.<br>　Average　Displays the average per measurement.<br>　Average & Max<br>　　　Displays the average and maximum values per measurement. |
| F2 | Count | Sets the measurement count.<br>Range:　　2 to 9999 |

### 3.6.1.5    Trace (Power vs RB, EVM vs RB)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace].

When Power vs RB or EVM vs RB is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.6.1.5-1    Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>The Trace function menu configuration changes depending on the settings of this function.<br>Options:<br>EVM vs Subcarrier<br>Displays EVM vs Subcarrier in a graph window.<br>EVM vs Symbol<br>Displays EVM vs Symbol in a graph window.<br>Spectral Flatness<br>Displays Spectral Flatness in a graph window.<br>Power vs RB<br>Displays Power vs Resource Block in a graph window.<br>EVM vs RB<br>Displays EVM vs Resource Block in a graph window.<br>Summary<br>Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets vertical scale of a graphical result.<br>Refer to Table 3.6.1.5-2 Scale function menu |
| F6 | Slot Number | Sets the slot number of Marker position, Power vs RB, and EVM vs RB displayed.<br>For NR FDD sub-6GHz Downlink,<br>Range:    Subcarrier Spacing = 15 kHz: 0 to 9<br>Subcarrier Spacing = 30 kHz: 0 to 19<br>Subcarrier Spacing = 60 kHz: 0 to 39 |
| F7 | Resource Block Number | Sets the resource block number of Marker position, Power vs RB, and EVM vs RB displayed.<br>Range:    0 to Number of RBs − 1 |

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**Table 3.6.1.5-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |
| F2 | EVM Scale | Sets the upper limit for the EVM scale.<br>Range:    2%, 5%, 10%, 20%          (in %)<br>          −40 dB, −20 dB, 0 dB      (in dB)<br>***Note:***<br>          EVM Scale is valid only for EVM vs RB. |

### 3.6.1.6    Trace (Summary)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace].

When Summary is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.6.1.6-1    Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>    The Trace function menu configuration changes depending on the settings of this function.<br><br>Options:<br>    EVM vs Subcarrier<br>        Displays EVM vs Subcarrier in a graph window.<br>    EVM vs Symbol<br>        Displays EVM vs Symbol in a graph window.<br>    Spectral Flatness<br>        Displays Spectral Flatness in a graph window.<br>    Power vs RB<br>        Displays Power vs Resource Block in a graph window.<br>    EVM vs RB<br>        Displays EVM vs Resource Block in a graph window.<br>    Summary<br>        Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets the unit of EVM measurement result.<br>                    Refer to Table 3.6.1.6-2 Scale function menu |
| F4 | Storage | Sets the storage mode.<br>                    Refer to Table 3.6.1.6-3 Storage function menu |

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**Table 3.6.1.6-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |

**Table 3.6.1.6-3   Storage function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Storage | Press **Storage** to display. |
| F1 | Mode | Sets the storage mode.<br>Options:<br>  Off       Updates data per measurement.<br>  Average   Displays the average per measurement.<br>  Average & Max<br>            Displays the average and maximum values per measurement. |
| F2 | Count | Sets the measurement count.<br>Range:      2 to 9999 |

## 3.6.2 Carrier Aggregation Analysis

To set modulation analysis items, press 〔F2〕 (Carrier Aggregation Analysis) on the Measure function menu to display the Carrier Aggregation Analysis function menu.

The Carrier Aggregation Analysis function menu consists of two pages that are toggled by pressing 〔→〕.

**Table 3.6.2-1    Carrier Aggregation Analysis function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Carrier Aggregation Analysis | Press **Carrier Aggregation Analysis** to display. |
| F1 | Analysis Time | Sets measurement position.<br>Refer to 3.6.2.1 "Analysis Time" |
| F2 | Basic Settings | Sets the basic parameters for such as each channel and signal.<br>Refer to 3.6.2.2 "Basic Settings" |
| F7 | Advanced Settings | Sets the detailed parameters for modulation analysis.<br>Refer to 3.6.2.3 "Advanced Settings" |
| Page 2 | Carrier Aggregation Analysis | Press **Carrier Aggregation Analysis** and then 〔→〕 to display. |
| F1 | Trace | Sets the trace.<br>Refer to 3.6.2.4, 3.6.2.5 "Trace" |

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## 3.6.2.1 Analysis Time

Set the measurement position in the Analysis Time function menu that is displayed by pressing ⬚ (Analysis Time) on page 1 of the Carrier Aggregation Analysis function menu.

**Table 3.6.2.1-1 Analysis Time function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Analysis Time | Press **Analysis Time** to display. |
| F1 | Starting Slot Number | Sets the starting slot number. It is fixed to 0 Slot. |
| F2 | Measurement Interval | Sets the analysis slot length. NR FDD sub-6GHz Downlink    Subcarrier Spacing = 15 kHz:   10 Slot    Subcarrier Spacing = 30 kHz:   20 Slot    Subcarrier Spacing = 60 kHz:   40 Slot |

## 3.6.2.2 Basic Settings

Set basic parameters for modulation analysis, such as the number of Component Carriers, and parameters of channel and signal for each Component Carrier. The Basic Settings function menu and a dialog box to set the parameters for each channel and signal are displayed by pressing [F2] (Basic Settings) on page 1 of the Carrier Aggregation Analysis function menu.

### Menu and Dialog boxes

The menus and the dialog boxes displayed are the same as described in 3.6.1.2 "Basic Settings".

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### 3.6.2.3 Advanced Settings

Set the advanced parameters for modulation analysis. The Advanced Settings function menu is displayed by pressing [F7] (Advanced Settings) on page 1 of the Carrier Aggregation Analysis function menu.

**Table 3.6.2.3-1  Advanced Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Advanced Settings | Press **Advanced Settings** to display. |
| F1 | Equalizer Use data | Selects whether or not to include resource elements other than Reference Signal at calculation of the transmission path loss.<br>Options:<br>　On　Includes resource elements other than Reference Signal at calculation of the transmission path loss.<br>　Off　Does not include resource elements other than Reference Signal at calculation of the transmission path loss. |
| F2 | Amplitude Tracking | Selects On/Off for Amplitude Tracking.<br>Options: On, Off |
| F3 | Phase Tracking | Selects On/Off for Phase Tracking.<br>Options: On, Off |
| F4 | Timing Tracking | Selects On/Off for Timing Tracking.<br>Options: On, Off |
| Page 2 | Advanced Settings | Press **Advanced Settings** and then [→] to display. |
| F1 | Multicarrier Filter | When measuring the multicarrier signal, sets whether to filter the reference carrier.<br>Options: On, Off<br>　　　　It is fixed to On when Number of Carriers > 1. |
| F2 | EVM Window | Turns On or Off the EVM Window.<br>Options: On　Displays the worst among the EVM High and EVM Low values as the measurement result. However, the EVM Mid result is displayed in graph.<br>　　　Off　Displays the EVM Mid.<br>　　　　　Refer to Figure 3.6.1.3-1 "EVM Window" |
| F3 | DC Cancellation | When performing the EVM measurement, select On/Off of this function that eliminates influences due to carrier leakage.<br>Options: On, Off |

**Table 3.6.2.3-1    Advanced Settings function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 2 | Advanced Settings | Press **Advanced Settings** and then ⊡ to display. |
| F4 | Phase Compensation Frequency Center | Selects whether to perform the phase compensation at the same frequency as the center frequency.<br>Options：On, Off |
| F5 | Phase Compensation Frequency Value | Sets the frequency for the phase compensation.<br>This function is available when Phase Compensation Frequency Center is Off.<br>When measuring multicarrier signals, the frequency for performing the phase compensation for each carrier is calculated using the following formula.<br>PhaseCompensationFrequencyValue + FrequencyOffset#n<br>    n: Carrier Number (n = 0 to Number of Carriers − 1)<br>Resolution：1 Hz<br>Range：    Same as Center Frequency |

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## 3.6.2.4 Trace (Power vs RB, EVM vs RB)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Carrier Aggregation Analysis function menu or [Trace].

When Power vs RB or EVM vs RB is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.6.2.4-1   Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window. *Note:* The Trace function menu configuration changes depending on the settings of this function. Options: Power vs RB Displays Power vs Resource Block in a graph window. EVM vs RB Displays EVM vs Resource Block in a graph window. Summary Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets vertical scale of a graphical result. Refer to Table 3.6.2.4-2 Scale function menu |
| F5 | Carrier Number | Sets the carrier number Range: 0 to (Number of Carriers – 1) |
| F6 | Slot Number | Sets the slot number of Marker position, Power vs RB, and EVM vs RB displayed. Range: Subcarrier Spacing = 15 kHz: 0 to 9 Subcarrier Spacing = 30 kHz: 0 to 19 Subcarrier Spacing = 60 kHz: 0 to 39 |
| F7 | Resource Block Number | Sets the resource block number of Marker position, Power vs RB, and EVM vs RB displayed. Range: 0 to Number of RBs – 1 |

**Table 3.6.2.4-2　Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |
| F2 | EVM Scale | Sets the upper limit for the EVM scale.<br>Range:　　2%, 5%, 10%, 20%　　　(in %)<br>　　　　　　−40 dB, −20 dB, 0 dB　　(in dB)<br>***Note:***<br>　　　　EVM Scale is valid only for EVM vs RB. |

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### 3.6.2.5   Trace (Summary)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Carrier Aggregation Analysis function menu or [Trace].

When Summary is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.6.2.5-1   Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window. ***Note:*** The Trace function menu configuration changes depending on the settings of this function. Options: Power vs RB Displays Power vs Resource Block in a graph window. EVM vs RB Displays EVM vs Resource Block in a graph window. Summary Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets the unit of EVM measurement result. Refer to Table 3.6.2.5-2 Scale function menu |

**Table 3.6.2.5-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM. Options:     %, dB |

# 3.7   NR FDD sub-6GHz Uplink

To set the measurement items, press F4 (Measure) on the main function menu or Measure to display the Measure function menu.

**Table 3.7-1    Measure function menu**
**(NR FDD sub-6GHz Uplink)**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Measure | Press **Measure** to display. |
| F1 | Modulation Analysis | Switches the measurement function to Modulation Analysis. It is available when MX285051A-081/MX269051A-081 is installed. |

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## 3.7.1   Modulation Analysis

To set modulation analysis items, press [F1] (Modulation Analysis) on the Measure function menu to display the Modulation Analysis function menu.

The Modulation Analysis function menu consists of two pages that are toggled by pressing [→].

**Table 3.7.1-1   Modulation Analysis function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Modulation Analysis | Press **Modulation Analysis** to display. |
| F1 | Analysis Time | Sets measurement position.<br>Refer to 3.7.1.1 "Analysis Time" |
| F2 | Basic Settings | Sets Basic parameters.<br>Refer to 3.7.1.2 "Basic Settings" |
| F7 | Advanced Settings | Sets the parameters for each channel and signal.<br>Refer to 3.7.1.3 "Advanced Settings" |
| Page 2 | Modulation Analysis | Press **Modulation Analysis** and then [→] to display. |
| F1 | Trace | Sets the trace.<br>Refer to 3.7.1.4, 3.7.1.5, 3.7.1.6 "Trace" |

### 3.7.1.1    Analysis Time

Set the measurement position in the Analysis Time function menu that is displayed by pressing [F1] (Analysis Time) on page 1 of the Modulation Analysis function menu.

**Table 3.7.1.1-1    Analysis Time function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Analysis Time | Press **Analysis Time** to display. |
| F1 | Starting Slot Number | Sets the measurement start position. It is fixed to 0 slot in the MX285051A-081/MX269051A-081. |
| F2 | Measurement Interval | Sets the analysis slot length. It is fixed to the following values. For NR FDD sub-6GHz Uplink, Subcarrier Spacing = 15 kHz: 10 Slots Subcarrier Spacing = 30 kHz: 20 Slots Subcarrier Spacing = 60 kHz: 40 Slots |

The following table lists the slots per frame according to the Subcarrier Spacing.

**Table 3.7.1.1-2    Number of Slots per Frame**

| Subcarrier Spacing | Slots/Frame |
|---|---|
| 15 kHz | 10 |
| 30 kHz | 20 |
| 60 kHz | 40 |

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## 3.7.1.2 Basic Settings

Set the basic parameters for modulation analysis. The Basic Settings function menu is displayed by pressing [F1] (Basic Settings) on page 1 of the Modulation Analysis function menu.

**Table 3.7.1.2-1 Basic Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Basic Settings | Press **Basic Settings** to display. |
| F1 | Frame Parameter | Displays a tab to set the parameters for Frame Parameter.<br>Refer to Table 3.7.1.2-2 Frame Parameter |
| F2 | PUSCH/DM-RS | Displays a tab to set the parameters for PUSCH/DM-RS.<br>Refer to Table 3.7.1.2-4 PUSCH/DM-RS |
| F6 | Restore Default Values | Restores the parameters in the dialog box to the default values. |
| F7 | Set | Sets the parameters specified at the dialog box. |
| F8 | Cancel | Cancels the parameters specified at the dialog box. |

**Table 3.7.1.2-2 Frame Parameter**

| Dialog Box | Function |
|---|---|
| Subcarrier Spacing | Sets the Subcarrier Spacing. For NR FDD sub-6GHz Uplink, Options: 15 kHz, 30 kHz, 60 kHz |
| Number of RBs | Sets the number of the resource blocks for the target signal. Number of RBs is set to the default value when switching the Standard. For NR FDD sub-6GHz Uplink, Options: Subcarrier Spacing = 15 kHz: 25, 52, 79, 106, 133, 160, 216, 270 Subcarrier Spacing = 30 kHz: 11, 24, 38, 51, 65, 78, 106, 133, 162, 189, 217, 245, 273 Subcarrier Spacing = 60 kHz: 11, 18, 24, 31, 38, 51, 65, 79, 93, 107, 121, 135 |
| Channel Bandwidth | Displays the channel bandwidth of the target signal set by the Number of RBs. |
| Cell ID | Sets the Cell ID. Options: 0 to 1007 |
| Phase Compensation | Sets whether to enable or disable Phase Compensation. Phase Compensation sets whether to enable (ON) or disable (OFF) phase compensation during upconversion defined in the 3GPP NR standard (TS 38.211, V15.1.0 or later). Upconversion formula for ON: $\mathrm{Re}\left\{s_l^{(p,\mu)}(t)\cdot e^{j2\pi f_0\left(t-t_{\mathrm{start},l}^{\mu}-N_{\mathrm{CP},l}^{\mu}T_c\right)}\right\}$ Upconversion formula for OFF: $\mathrm{Re}\left\{s_l^{(p,\mu)}(t)\cdot e^{j2\pi f_0 t}\right\}$ For details, refer to 5.4 in TS 38.211 (V15.1.0 or later). |

The following table shows the relation between the Number of RBs setting and the Channel Bandwidth at each Subcarrier Spacing.

**Table 3.7.1.2-3   Relationship Between Number of RBs and Channel Bandwidth**

| Subcarrier Spacing | Number of RBs | Channel Bandwidth |
|---|---|---|
| 15 kHz | 25 | 5 MHz |
| | 52 | 10 MHz |
| | 79 | 15 MHz |
| | 106 | 20 MHz |
| | 133 | 25 MHz |
| | 160*1 | 30 MHz |
| | 216*1 | 40 MHz |
| | 270*1 | 50 MHz |
| 30 kHz | 11 | 5 MHz |
| | 24 | 10 MHz |
| | 38 | 15 MHz |
| | 51 | 20 MHz |
| | 65 | 25 MHz |
| | 78*1 | 30 MHz |
| | 106*1 | 40 MHz |
| | 133*1 | 50 MHz |
| | 162*2 | 60 MHz |
| | 189*2 | 70 MHz |
| | 217*2 | 80 MHz |
| | 245*2 | 90 MHz |
| | 273*2 | 100 MHz |
| 60 kHz | 11 | 10 MHz |
| | 18 | 15 MHz |
| | 24 | 20 MHz |
| | 31 | 25 MHz |
| | 38*1 | 30 MHz |
| | 51*1 | 40 MHz |
| | 65*1 | 50 MHz |
| | 79*2 | 60 MHz |
| | 93*2 | 70 MHz |
| | 107*2 | 80 MHz |
| | 121*2 | 90 MHz |
| | 135*2 | 100 MHz |

*1:   For MS269xA, this is available only when MS269xA-077/177 is installed.

*2:   For MS269xA, this is available only when MS269xA-078/178 is installed.

**Table 3.7.1.2-4　PUSCH/DM-RS**

| Dialog Box | Function |
|---|---|
| Multiplexing Scheme | Sets the Multiplexing Scheme of PUSCH.<br>Options: CP-OFDM, DFT-s-OFDM |
| Group Hopping | Sets whether to use the Group Hopping of DM-RS for PUSCH. |
| Sequence Hopping | Sets whether to use the Sequence Hopping of DM-RS for PUSCH. |
| Slot | Selects the Slot number for which the parameters for the PUSCH/DM-RS is to be displayed.<br>For NR FDD sub-6GHz Uplink,<br>Range:　Subcarrier Spacing = 15 kHz: 0 to 9<br>　　　　Subcarrier Spacing = 30 kHz: 0 to 19<br>　　　　Subcarrier Spacing = 60 kHz: 0 to 39 |
| Enable | Enables or disables the PUSCH/DM-RS at the selected Slot.<br>No measurement result of the PUSCH/DM-RS of the disabled Slot is displayed. |
| Antenna Port | Sets the Antenna Port.<br>Antenna Port settings are common to all Slots.<br>Options: 1000, 1001, 1002, 1003 |
| Modulation Scheme | Selects the modulation scheme for the PUSCH.<br>Options: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM, Auto<br>　　　　When Multiplexing Scheme is CP-OFDM,<br>　　　　PI/2 BPSK cannot be selected. |
| PUSCH Mapping Type | Sets the Mapping Type of PUSCH.<br>Options: typeA, typeB |
| Start Symbol | Sets the Mapping Start Symbol of PUSCH.<br>When the PUSCH Mapping Type is typeA,<br>Range:　0 to DM-RS typeA-pos<br>When the PUSCH Mapping Type is typeB,<br>Range:　0 to 12. |
| Number of Symbols | Sets the number of symbols for PUSCH.<br>Range: 2 to 14-PUSCH Start Symbols |

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**Table 3.7.1.2-4 PUSCH/DM-RS (Cont'd)**

| Dialog Box | Function |
|---|---|
| PUSCH Power Boosting (Auto/Manual) | Selects automatic detection and manual setting of the PUSCH Power of DM-RS.<br>Options: Auto, Manual |
| PUSCH Power Boosting | Sets the PUSCH level of the DM-RS.<br>The following values are set when PUSCH Power Boosting is Auto.<br><br>| DMRS CDM Group without Data | DMRS Config Type | PUSCH Level (dB) |<br>|---|---|---|<br>| 1 | 1 | 0.000 |<br>| 2 | 1 | −3.000 | |
| DM-RS typeA-pos | Sets the DM-RS typeA-pos.<br>This parameter is settable only when PUSCH Mapping Type is typeA.<br>Options: 2, 3 |
| DM-RS config-type | Sets the DM-RS config type. It is fixed to 1. |
| DM-RS add-pos | Sets the DM-RS add-pos.<br>Options: 0, 1, 2, 3 |

**Table 3.7.1.2-4   PUSCH/DM-RS (Cont'd)**

| Dialog Box | Function |
|---|---|
| CDM Group Without Data | Sets the DM-RS associated with PUSCH.<br>Options:  1, 2<br>It is fixed to 2 when Antenna Port is 1002 or 1003. |
| PUSCH PT-RS | Enables or disables the PUSCH PT-RS.<br>Options:  Enable, Disable<br>When Multiplexing Scheme is DFT-s-OFDM, it is fixed to Disable. |
| PT-RS Time Density | Sets the PT-RS Time Density.<br>Options:  1, 2, 4 |
| PT-RS Freq. Density | Sets the PT-RS Freq. Density.<br>Options:  2, 4 |
| PT-RS RE Offset | Sets the PT-RS RE Offset.<br>Options:  00, 01, 10, 11 |
| PUSCH RBs Allocation Auto Detect | Enables or disables the auto detection of the RBs that are allocated to PUSCH.<br>Options:  Enable, Disable<br>When Multiplexing Scheme is DFT-s-OFDM, it is fixed to Disable. |
| PUSCH RBs Allocation Start RB | Sets the Start RB of the RBs that are allocated to PUSCH.<br>Range:    0 to Number Of RBs – 1 |
| PUSCH RBs Allocation Number of RBs | Sets the number of the RBs that are allocated to PUSCH.<br>Range:    1 to the following value<br>When Multiplexing Scheme is CP-OFDM:<br>Number Of RBs – PUSCH Allocation Start RB<br>When Multiplexing Scheme is DFT-s-OFDM:<br>PUSCH RBs Allocation Number of RBs<br>$= 2^{\alpha 2} \cdot 3^{\alpha 3} \cdot 5^{\alpha 5} \leq$<br>Number Of RBs – PUSCH Allocation Start RB*<br>*:    $\alpha 2$, $\alpha 3$, $\alpha 5$ is non-negative integer. |
| Copy to All Slot | Copies the setting of the selected Slot to all the Slots. |

### 3.7.1.3   Advanced Settings

Set the advanced parameters for modulation analysis. The Advanced Settings function menu is displayed by pressing [F7] (Advanced Settings) on page 1 of the Modulation Analysis function menu.

**Table 3.7.1.3-1   Advanced Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Advanced Settings | Press **Advanced Settings** to display. |
| F1 | Equalizer Use data | Selects whether or not to include resource elements other than Reference Signal at calculation of the transmission path loss.<br>Options:<br>On    Includes resource elements other than Reference Signal at calculation of the transmission path loss.<br>Off    Does not include resource elements other than Reference Signal at calculation of the transmission path loss. |
| F2 | Amplitude Tracking | Selects On/Off for Amplitude Tracking.<br>Options:  On, Off |
| F3 | Phase Tracking | Selects On/Off for Phase Tracking.<br>Options:  On, Off |
| F4 | Timing Tracking | Selects On/Off for Timing Tracking.<br>Options:  On, Off |
| Page 2 | Advanced Settings | Press **Advanced Settings** and then ⟶ to display. |
| F1 | Multicarrier Filter | When measuring the multicarrier signal, sets whether to filter the reference carrier.<br>Options:  On, Off |
| F2 | EVM Window | Turns On or Off the EVM Window.<br>Options:  On   Displays the worst among the EVM High and EVM Low values as the measurement result. However, the EVM Mid result is displayed in graph.<br>Off   Displays the EVM Mid.<br>Refer to Figure 3.6.1.3-1 "EVM Window" |
| F3 | DC Cancellation | When performing the EVM measurement, select On/Off of this function that eliminates influences due to carrier leakage.<br>Options:  On, Off |
| F4 | Phase Compensation Frequency Center | Selects whether to perform the phase compensation at the same frequency as the center frequency.<br>Options:  On, Off |
| F5 | Phase Compensation Frequency Value | Sets the frequency for the phase compensation.<br>This function is available when Phase Compensation Frequency Center is Off.<br>Resolution:  1 Hz<br>Range:    Same as Center Frequency |

### 3.7.1.4　Trace (EVM vs Subcarrier, EVM vs Symbol, Spectral Flatness)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace].

When EVM vs Subcarrier, EVM vs Symbol, or Spectral Flatness is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.7.1.4-1　Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>The Trace function menu configuration changes depending on the settings of this function.<br><br>Options:<br>EVM vs Subcarrier<br>　Displays EVM vs Subcarrier in a graph window.<br>EVM vs Symbol<br>　Displays EVM vs Symbol in a graph window.<br>Spectral Flatness<br>　Displays Spectral Flatness in a graph window.<br>Power vs RB<br>　Displays Power vs Resource Block in a graph window.<br>EVM vs RB<br>　Displays EVM vs Resource Block in a graph window.<br>Summary<br>　Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets vertical scale of graphical result.<br>Refer to Table 3.7.1.4-2 Scale function menu |
| F4 | Storage | Sets storage method.<br>Refer to Table 3.7.1.4-3 Storage function menu |
| F6 | Subcarrier Number | Sets the subcarrier number of Marker position and EVM vs Symbol displayed.<br>Range:　0 to (Number of RBs × 12 − 1) |
| F7 | Symbol Number | Sets the symbol number of Marker position and EVM vs Subcarrier displayed.<br>For NR FDD sub-6GHz Uplink,<br>Range:　Subcarrier Spacing = 15 kHz: 0 to 139<br>　　　　Subcarrier Spacing = 30 kHz: 0 to 279<br>　　　　Subcarrier Spacing = 60 kHz: 0 to 559 |

**Table 3.7.1.4-1   Trace function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| F8 | EVM vs Subcarrier View | Displayed when EVM vs Subcarrier is selected by F1: Trace Mode.<br><br>Sets whether to enable averaging in EVM vs Subcarrier, and the display type.<br><br>Options:<br>　Each Symbol<br>　　　Displays EVM vs Subcarrier of Symbol set in Symbol Number when EVM vs Subcarrier is displayed.<br>　Averaged over all Symbols<br>　　　Displays EVM vs Subcarrier of the analysis slot length set in Measurement Interval.<br>　Graph View<br>　　　Selects a graph display type of EVM vs Subcarrier from the average (RMS), and the average value and peak value (RMS&Peak). |
| | EVM vs Symbol View | Displayed when EVM vs Symbol is selected by F1: Trace Mode.<br><br>Sets whether to enable averaging in EVM vs Symbol, and the display type.<br><br>Options:<br>　Each Subcarrier<br>　　　Displays EVM vs Symbol of Subcarrier set in Subcarrier Number when EVM vs Symbol is displayed.<br>　Averaged over all Subcarriers<br>　　　Displays EVM vs Symbol in all subcarriers.<br>　Graph View<br>　　　Selects a graph display type of EVM vs Subcarrier from the average (RMS), and the average value and peak value (RMS&Peak). |
| | Spectral Flatness Type | Displayed when Spectral Flatness is selected by F1: Trace Mode.<br><br>Sets type of Spectral Flatness displayed.<br><br>Options:<br>　Amplitude<br>　　　Displays Amplitude in Spectral Flatness.<br>　Phase<br>　　　Displays Phase in Spectral Flatness. |
| | Page Number | Displayed when Summary is selected by F1: Trace Mode.<br><br>If there are multiple summary pages, use the rotary knob or the numeric keypad to go to the next or previous page. |

**Table 3.7.1.4-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |
| F2 | EVM Scale | Sets the upper limit for the EVM scale.<br>Range:    2%, 5%, 10%, 20%          (in %)<br>             −40 dB, −20 dB, 0 dB       (in dB) |
| F3 | Flatness Scale | Sets a scale of Spectral Flatness.<br>Options:<br>  Amplitude<br>        Sets the upper and lower limit values of Amplitude in Spectral Flatness (±10 dB, ±3 dB, ±1 dB).<br>  Phase<br>        Sets the upper and lower limit values of Phase in Spectral Flatness (±60 deg, ±20 deg, ±6 deg). |

**Table 3.7.1.4-3   Storage function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Storage | Press **Storage** to display. |
| F1 | Mode | Sets the storage mode.<br>Options:<br>  Off        Updates data per measurement.<br>  Average    Displays the average per measurement.<br>  Average & Max<br>        Displays the average and maximum values per measurement. |
| F2 | Count | Sets the measurement count.<br>Range:    2 to 9999 |

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### 3.7.1.5 Trace (Power vs RB, EVM vs RB)

To set Trace, press [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace] to display the Trace function menu.

When Power vs RB or EVM vs RB is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.7.1.5-1   Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>The Trace function menu configuration changes depending on the settings of this function.<br><br>Options:<br>EVM vs Subcarrier<br>Displays EVM vs Subcarrier in a graph window.<br>EVM vs Symbol<br>Displays EVM vs Symbol in a graph window.<br>Spectral Flatness<br>Displays Spectral Flatness in a graph window.<br>Power vs RB<br>Displays Power vs Resource Block in a graph window.<br>EVM vs RB<br>Displays EVM vs Resource Block in a graph window.<br>Summary<br>Displays EVM and power of each channel in a graph window. |
| F3 | Scale | Sets vertical scale of a graphical result.<br>Refer to Table 3.7.1.5-2 Scale function menu |
| F6 | Slot Number | Sets the slot number of Marker position, Power vs RB, and EVM vs RB displayed.<br>For NR FDD sub-6GHz Uplink,<br>Range:   Subcarrier Spacing = 15 kHz: 0 to 9<br>Subcarrier Spacing = 30 kHz: 0 to 19<br>Subcarrier Spacing = 60 kHz: 0 to 39 |
| F7 | Resource Block Number | Sets the resource block number of Marker position, Power vs RB, and EVM vs RB displayed.<br>Range:   0 to Number of RBs − 1 |

**Table 3.7.1.5-2   Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |
| F2 | EVM Scale | Sets the upper limit for the EVM scale.<br>Range:    2%, 5%, 10%, 20%        (in %)<br>          –40 dB, –20 dB, 0 dB      (in dB)<br>***Note:***<br>          EVM Scale is valid only for EVM vs RB. |

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### 3.7.1.6　Trace (Summary)

Set Trace in the Trace function menu that is displayed by pressing [F1] (Trace) on page 2 of the Modulation Analysis function menu or [Trace]. When Summary is selected by F1: Trace Mode, the function menu is as shown in the following table.

**Table 3.7.1.6-1　Trace function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trace | Press **Trace** to display. |
| F1 | Trace Mode | Sets a graphical result in the graph window.<br>***Note:***<br>　　The Trace function menu configuration changes depending on the settings of this function.<br><br>Options:<br>　EVM vs Subcarrier<br>　　　Displays EVM vs Subcarrier in a graph window.<br>　EVM vs Symbol<br>　　　Displays EVM vs Symbol in a graph window.<br>　Spectral Flatness<br>　　　Displays Spectral Flatness in a graph window.<br>　Power vs RB<br>　　　Displays Power vs Resource Block in a graph window.<br>　EVM vs RB<br>　　　Displays EVM vs Resource Block in a graph window.<br>　Summary<br>　　　Displays EVM and power of each channel in a graph window.<br>***Note:***<br>　　The constellation is not displayed when Trace Mode is set to Summary. |
| F3 | Scale | Sets the unit of EVM measurement result.<br>　　　　　Refer to Table 3.7.1.6-2 Scale function menu |
| F4 | Storage | Sets the storage mode.<br>　　　　　Refer to Table 3.7.1.6-3 Storage function menu |

**Table 3.7.1.6-2    Scale function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Scale | Press **Scale** to display. |
| F1 | EVM Unit | Sets the unit of EVM.<br>Options:  %, dB |

**Table 3.7.1.6-3    Storage function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Storage | Press **Storage** to display. |
| F1 | Mode | Sets the storage mode.<br>Options:<br>  Off          Updates data per measurement.<br>  Average    Displays the average per measurement.<br>  Average & Max<br>                  Displays the average and maximum values per measurement. |
| F2 | Count | Sets the measurement count.<br>Range:      2 to 9999 |

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# 3.8   Setting Marker

Configure the marker settings in the Marker function menu that is displayed by pressing [F5] (Marker) on the main function menu or [Marker]. Also, press [Peak Search] to display page 2 of the Marker function menu.

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

***Note:***

When Trace Mode is set to Summary, settings related to the marker function cannot be configured.

**Table 3.8-1   Marker function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Marker | Press **Marker** to display. |
| F1 | Marker | Sets On/Off for the marker function.<br>Option:     On     Enables the marker function.<br>               Off    Disables the marker function. |
| F5 | Constellation Marker Number | Displayed when Modulation Analysis is selected by the Measure function menu.<br>Sets the position of the resource element targeted for the marker.<br>***Note:***<br>    This setting is enabled only for Power vs RB and EVM vs RB.<br>Range:    Number of resource elements detected as 0 to PDSCH or PUSCH. |
|  | Carrier Number | Displayed when Carrier Aggregation Analysis is selected by the Measure function menu.<br>Sets the carrier number targeted for the marker.<br>***Note:***<br>    This setting is enabled only for Power vs RB and EVM vs RB.<br>Range:    0 to Number of Carriers – 1 |

**Table 3.8-1 Marker function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| F6 | Subcarrier Number | Displayed when Trace Mode is other than Power vs RB or EVM vs RB.<br>Sets the position of the subcarrier targeted for the marker.<br>Range: 0 to (Number of RBs × 12 − 1) |
| | Slot Number | Displayed when Trace Mode is Power vs RB or EVM vs RB.<br>Sets the slot number to be displayed.<br>For NR FDD sub-6GHz Downlink<br>    or NR FDD sub-6GHz Uplink,<br>Range: Subcarrier Spacing = 15 kHz: 0 to 9<br>    Subcarrier Spacing = 30 kHz: 0 to 19<br>    Subcarrier Spacing = 60 kHz: 0 to 39 |
| F7 | Symbol Number | Displayed when Trace Mode is other than Power vs RB or EVM vs RB.<br>Sets the position of the symbol targeted for the marker.<br>For NR FDD sub-6GHz Downlink<br>    or NR FDD sub-6GHz Uplink,<br>Range: Subcarrier Spacing = 15 kHz: 0 to 139<br>    Subcarrier Spacing = 30 kHz: 0 to 279<br>    Subcarrier Spacing = 60 kHz: 0 to 559 |
| | Resource Block Number | Displayed when Trace Mode is Power vs RB or EVM vs RB.<br>Sets the resource block number to be displayed.<br>Range: 0 to Number of RBs − 1 |

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**Table 3.8-1 Marker function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 2 | Marker | Press **Marker** and then ⟶ to display. |
| F1 | Peak Search | Moves the marker to the maximum level point within the measurement range. When there are multiple maximum level points, the point corresponding to the smallest value (left side of the scale) on the horizontal axis (Subcarrier, Symbol, or Resource Block) is selected.<br>***Note:***<br>When Trace Mode is set to Power vs Resource Block and there are multiple maximum level points, the point corresponding to the smallest values on the horizontal and vertical (Slot) axes is selected. |
| F2 | Next Peak | Moves the marker to the next largest level point after the current marker level within the measurement range. When there are multiple points, the point corresponding to the smallest value (left side of the scale) on the horizontal axis is selected. However, if the point is the same value as the marker level, the marker is moved to the next maximum point to the horizontal axis position of the marker.<br>***Note:***<br>When Trace Mode is set to Power vs Resource Block, the point corresponding to the smallest values on the horizontal and vertical axes is selected. |
| F3 | Dip Search | Moves the marker to the minimum level position within the measurement range. When there are multiple minimum level points, the greatest point (right side of the scale) on the horizontal axis is selected.<br>***Note:***<br>When Trace Mode is set to Power vs Resource Block and there are multiple minimum level points, the greatest point on the horizontal axis and vertical axis is selected. |
| F4 | Next Dip | Moves the marker to the minimum level point next to the current marker level within the measurement range. When there are multiple points, the greatest point (right side of the scale) on the horizontal axis is selected. However, if the point is the same value as the marker level, the marker is moved to the next minimum point to the horizontal axis position of the marker.<br>***Note:***<br>When Trace Mode is set to Power vs Resource Block, the greatest point on the horizontal axis and vertical axis is selected. |

# 3.9 Setting Trigger

Configure the trigger settings in the Trigger function menu that is displayed by pressing [F6] (Trigger) on the main function menu or [Trigger/Gate].

***Note:***

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

Refer to 4.2 "Replay Function"

**Table 3.9-1 Trigger function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Trigger | Press **Trigger** to display. |
| F1 | Trigger Switch | Sets the trigger synchronization On/Off.<br>Options: On Enables the trigger function.<br>Off Disables the trigger function. |
| F2 | Trigger Source | Sets the trigger source.<br>Options:<br>MS2850A<br>External1 Starts measurement by the trigger input from an external trigger.<br>External2 Starts measurement by the trigger input from an external trigger 2.<br>Video Starts measurement by the video trigger.<br>Wide IF Video<br>An IF signal with a wide passing band of about 50 MHz or greater is detected, and capture starts in synchronization with either the rise or fall of the detected signal.<br>Frame Starts measurement by the equipment-internal trigger.<br>Frame Sync Setup<br>Sets the Frame Trigger starting source if Frame is specified for Trigger Source. Frame Sync Setup function menu is displayed.<br>Refer to Table 3.9-2 Frame Sync Setup function menu<br>MS269xA<br>External Starts measurement by the trigger input from an external trigger.<br>SG Marker Starts measurement by the timing of the Vector Signal Generator option.<br>Video Starts measurement by the video trigger.<br>Wide IF Video<br>An IF signal with a wide passing band of about 50 MHz or greater is detected, and capture starts in synchronization with either the rise or fall of the detected signal. |

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**Table 3.9-1 Trigger function menu (Cont'd)**

| Function Key | Menu Display | Function |
|---|---|---|
| F3 | Trigger Slope | Sets the trigger polarity.<br>Options:<br>Rise Synchronizes with rising edge of the trigger.<br>Fall Synchronizes with falling edge of the trigger. |
| F4 | Video Trigger Level | Sets the trigger level of the Video Trigger.<br>Range: (–150 dBm + Offset Value) to (50 + Offset Value) dBm |
| F5 | Wide IF Video Trigger Level | Sets the trigger level of the Wide IF Video Trigger.<br>Range: –60 to 50 dBm |
| F8 | Trigger Delay | Sets the trigger delay.<br>Range: Refer to Table 3.9-3 Trigger Delay Range. |

**Table 3.9-2 Frame Sync Setup function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| F1 | Off | Captures waveforms according to the equipment-internal trigger signal. |
| F7 | Frame Trigger Period | Sets the frame trigger signal period.<br>Range: 10 ms fixed |
| F8 | Frame Sync Offset | Sets the offset time from when a trigger signal (the equipment-internal trigger signal, Wide IF Video signal, or external trigger signal) is generated until a trigger actually occurs.<br>Range: 0 s fixed |

**Table 3.9-3 Trigger Delay Range**
**(Refer to Table 3.6.1.3-2 for Frequency Span)**

| Model Name | Frequency Span [MHz] | Trigger Delay | |
|---|---|---|---|
| | | Range [s] | Resolution [ns] |
| MS2850A | 255 | ±6.4 | 40 |
| | 125 | ±12.8 | 80 |
| | 31.25 | ±2 | 20 |
| MS269xA | 125 | ±0.5 | 5 |
| | 62.5 | | 10 |
| | 31.25 | ±2 | 20 |

# 3.10 EVM Display (Modulation Analysis)

When pressing [F1] (Modulation Analysis) on the Measure function menu, EVM analysis results are displayed on the right side of the Result window on the screen. When setting to Off, the analysis results are displayed every time. When setting to Average, the average values of analysis results are displayed. When setting to Average & Max, the average and maximum value of analysis results are displayed.

Refer to 3.6.1.4 "Trace", 3.7.1.4 "Trace"

**3**

Measurement

| | | Avg/Max |
|---|---|---|
| Frequency Error | -7.16 / | -7.44 Hz |
| | -0.001 / | -0.001 ppm |
| Transmit Power | -6.79 / | -6.78 dBm |
| Total EVM (rms) | 0.90 / | 0.91 % |
| Total EVM (peak) | 4.32 / | 4.57 % |
| Symbol Number | | 154 |
| Subcarrier Number | | 131 |
| Origin Offset | -46.51 / | -45.83 dB |
| Time Offset | -36.4 / | -39.2 ns |

**Figure 3.10-1    Result window**

■Frequency Error

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

Refer to 3.6.1.4 "Trace"

■Transmit Power

Summary    Displays the mean power value including Cyclic Prefix in the bandwidth defined by Channel Bandwidth in the range set in Starting Slot Number and Measurement Interval.

■Total EVM (rms)

Summary    Displays the root mean square EVM of all subcarriers within the range determined by Starting Slot Number and Measurement Interval.
Switches between % and dB according to settings of EVM Unit.

Refer to 3.6.1.4 "Trace"

■Total EVM (peak)

Summary    Displays the maximum EVM of all subcarriers and all symbols in the range set in Starting Slot Number and Measurement Interval.
Switches between % and dB according to the settings of the EVM Unit.

■Symbol Number

Summary    Displays the symbol number of Total EVM (peak).

■Subcarrier Number

Summary    Displays the subcarrier number of Total EVM (peak).

■Origin Offset

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

■Time Offset

Summary    Displays the time offset between the trigger input and the head of the frame.
This is enabled in the following situations:
- When Trigger Switch is On.
- When the Replay function is executed and when the Storage Mode is Off.

# 3.11 Constellation Display (Modulation Analysis)

When pressing ⬜F1⬜ (Modulation Analysis) on the Measure function menu, the constellation is displayed on the left side of the Result window on the screen.

For the MX285051A-031/081 and MX269051A-031/081, the constellation parameters depend on the Trace Mode settings.

## 3.11.1 Constellation (EVM vs Subcarrier, EVM vs Symbol, Spectral Flatness)

When selecting EVM vs Subcarrier, EVM vs Symbol, or Spectral Flatness from the Trace Mode menu, the following constellation is displayed.

Refer to 3.6.1.4 "Trace", 3.7.1.4 "Trace"

**3**

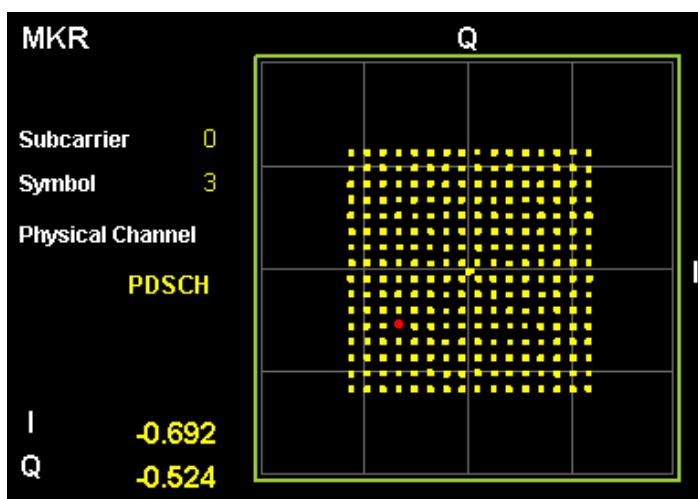*Measurement*



**Figure 3.11.1-1   Constellation display**

■Graph display

Summary     This graph shows a constellation for all subcarriers of the
            symbols specified by Symbol Number.
            The marker-selected subcarrier is displayed in red.

■MKR Subcarrier

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

■MKR I/Q

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

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

■MKR Symbol

Summary　Displays the symbol number set in Constellation Symbol Number.

■MKR Physical Channel

Summary　Displays the type of physical channel for the resource element selected by the marker.

## 3.11.2 Constellation (Power vs RB, EVM vs RB)

When selecting Power vs RB or EVM vs RB from the Trace Mode menu, the PDSCH constellations specified by Slot Number or Resource Block Number are displayed.
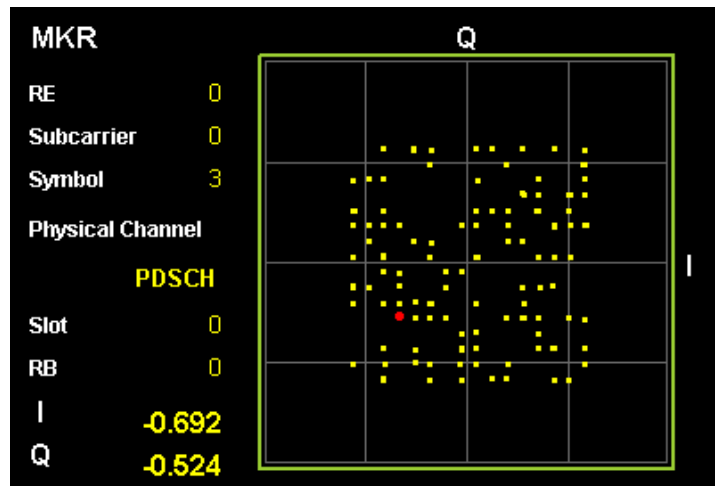
Refer to 3.6.1.5 "Trace", 3.7.1.5 "Trace"



**Figure 3.11.2-1  Constellation display**

■Displaying Graph

Summary    Displays overlapping the constellations of all resource elements of the resource block that is determined by the Slot Number and Resource Block Number settings.
The resource element selected by the marker is displayed in red.

■MKR Resource Element Number (RE)

Summary    Displays the number of the resource element selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Subcarrier

Summary    Displays the subcarrier number of the resource element selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Symbol

Summary    Displays the symbol number of the resource element selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR I/Q

Summary    Displays the I/Q amplitude value of the resource element
selected by the marker. The marker can be moved by using
the cursor keys or the rotary knob.
The amplitude value is normalized to the value obtained by
setting the amplitude value of Reference Signal to 1.0.

■MKR Physical Channel

Summary    Displays the type of physical channel for the resource
element selected by the marker.

■Slot Number

Summary    Displays the slot number set by Slot Number.

■Resource Block Number (RB)

Summary    Displays the resource block number set by Resource Block
Number.

# 3.12 EVM vs Subcarrier Display (Modulation Analysis)

When pressing [F1] (Modulation Analysis) on the Measure function menu, and selecting EVM vs Subcarrier from the Trace Mode menu, EVM for each subcarrier is displayed in the Graph window on the screen.

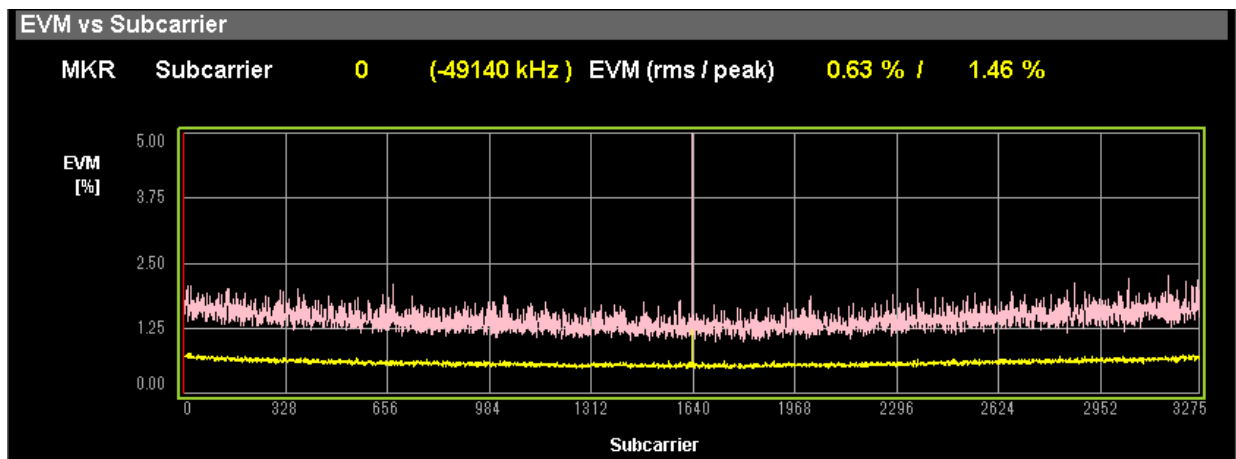<div align="right">Refer to 3.6.1.4 "Trace", 3.7.1.4 "Trace"</div>



**Figure 3.12-1   EVM vs Subcarrier display (Averaged over Symbols)**

■Graph display

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

■MKR Subcarrier

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

■MKR EVM

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

■MKR Symbol

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

***Note:***

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

# 3.13 EVM vs Symbol Display (Modulation Analysis)

When pressing [F1] (Modulation Analysis) on the Measure function menu, and selecting EVM vs Symbol from the Trace Mode menu, EVM for each Symbol is displayed in the Graph window on the screen.
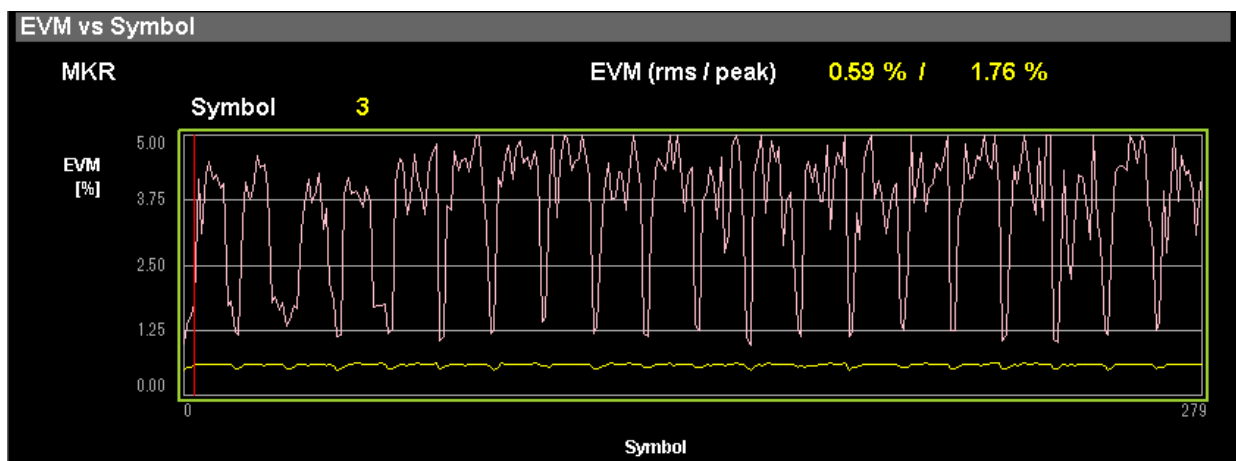
**Figure 3.13-1   EVM vs Symbol display (Averaged over Subcarriers)**

■Graph display

Summary   Displays EVM for each symbol. EVM of each symbol is based on settings of EVM vs Symbol View.
The symbol selected by the marker is displayed in red.

■MKR Symbol

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

■MKR EVM

Summary   Displays the EVM of the marker-selected symbol. The EVM value is submitted to the settings of EVM vs Symbol View.

■MKR Subcarrier

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

*Note:*

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

# 3.14 Spectral Flatness Display (Modulation Analysis)

When pressing F1 (Modulation Analysis) on the Measure function menu, and selecting Spectral Flatness from the Trace Mode menu, the measurement results of Spectral Flatness are displayed in the Graph window on the screen.
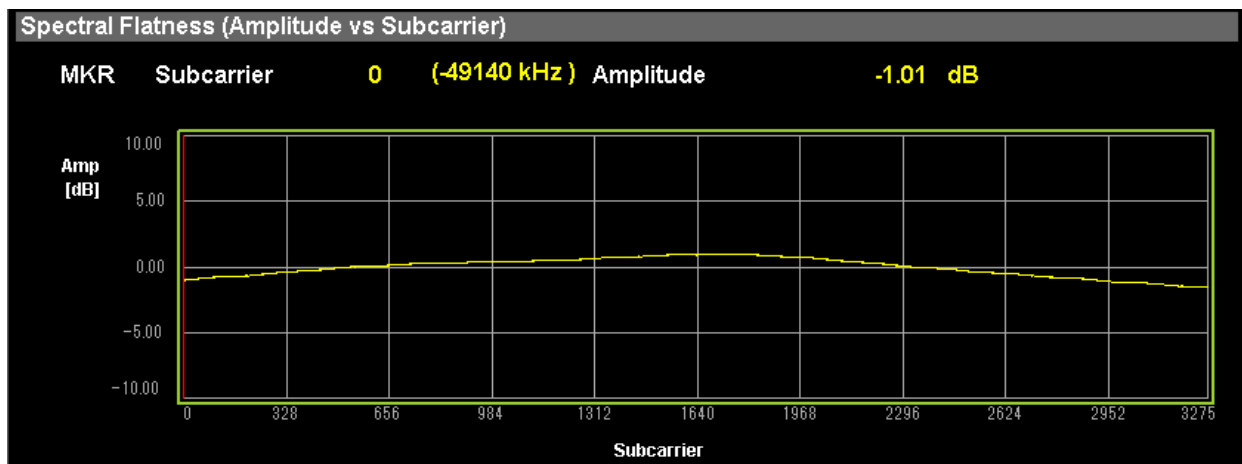
Refer to 3.6.1.4 "Trace", 3.7.1.4 "Trace"



**Figure 3.14-1   Amplitude of Spectral Flatness display**

■Graph display

Summary      Displays the Spectral Flatness value of an input signal. This Spectral Flatness value is based on the average in the range set in Starting Slot Number and Measurement Interval. The marker-selected subcarrier is displayed in red.

■MKR Subcarrier

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

■MKR Amplitude

Summary      Displays Amplitude of Spectral Flatness in the marker-selected subcarrier.

■MKR Phase

Summary      Displays the Phase of Spectral Flatness in the marker-selected subcarrier.

# 3.15 Power vs Resource Block Display (Modulation Analysis)

When pressing ⬚ (Modulation Analysis) on the Measure function menu, and selecting the Power vs RB from the Trace Mode menu, the power for each resource block is displayed in the Graph window on the screen.

Refer to 3.6.1.5 "Trace", 3.7.1.5 "Trace"
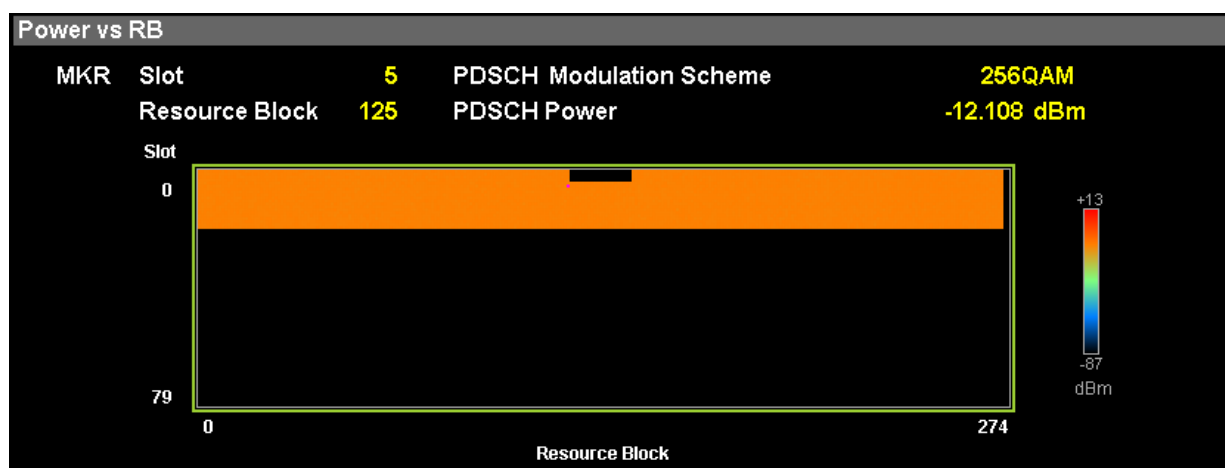


**Figure 3.15-1   Power vs Resource Block display**

■Displaying Graph

Summary   Displays the power for each resource block.
The resource block selected by the marker is displayed in pink frame.

■MKR Slot

Summary   Displays the number of the slot set by Slot Number.

■MKR Resource Block

Summary   Displays the number of the resource block selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Resource Block Power

Summary   Displays the power of the resource block selected by the marker.

■MKR Resource Block Modulation Scheme

Summary   Displays the Modulation Scheme of the resource block selected by the marker.

# 3.16 EVM vs Resource Block Display (Modulation Analysis)

When pressing [F1] (Modulation Analysis) on the Measure function menu, and selecting the EVM vs RB from the Trace Mode menu, EVM for each resource block is displayed in the Graph window on the screen.
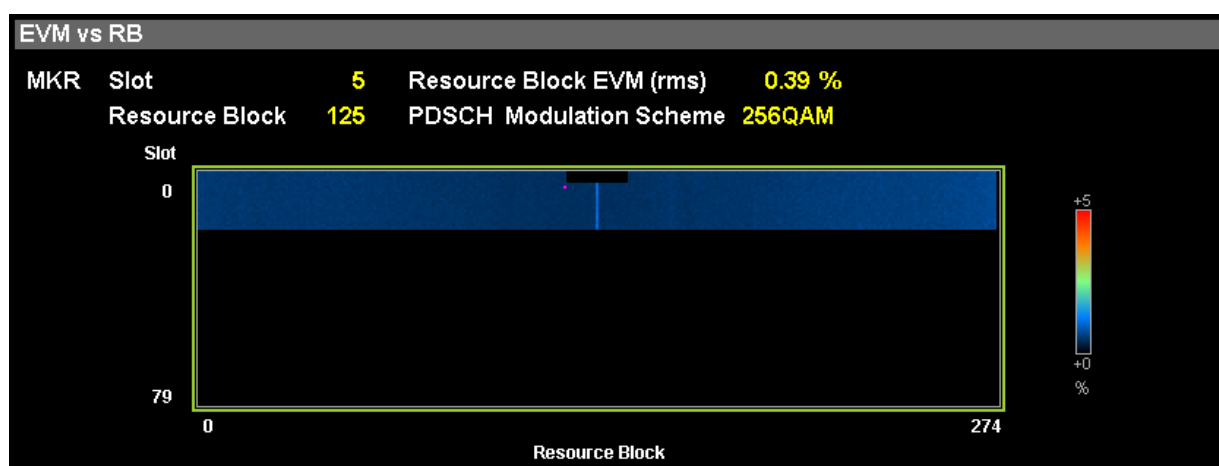
Refer to 3.6.1.5 "Trace", 3.7.1.5 "Trace"



**Figure 3.16-1   EVM vs Resource Block display**

■Displaying Graph

Summary    Displays EVM for each resource block.
           The symbol selected by the marker is displayed in a pink frame.

■MKR Slot

Summary    Displays the number of the slot set by Slot Number.

■MKR Resource Block

Summary    Displays the number of the resource block selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Resource Block EVM

Summary    Displays EVM of the resource block selected by the marker.

■MKR Resource Block Modulation Scheme

Summary    Displays Modulation Scheme of the resource block selected by the marker.

# 3.17 Summary Display (Modulation Analysis)

When pressing F1 (Modulation Analysis) on the Measure function menu, and selecting Summary from the Trace Mode menu, the following results are displayed:

■Result window

Left side of the Result window:

Numeric results of EVM (rms) and EVM (peak)/Subcarrier/Symbol for each modulation analysis

PDSCH (QPSK・16QAM・64QAM・256QAM)
PUSCH (π/2BPSK・QPSK・16QAM・64QAM・256QAM)

■Summary window:

Channel Summary, Symbol Clock Error, …

Refer to 3.6.1.4 "Trace", 3.6.1.5 "Trace", 3.7.1.4 "Trace"

• Channel Summary

Summary       Displays the average EVM, average Power, and peak EVM of the input signal for each channel. The channels that are excluded in Advanced Setting are not displayed.

Avg EVM (rms):     Average EVM

Max EVM (peak):    Peak EVM and its Subcarrier, and Symbol

Avg Power:         Average Power

Channel:           Input signal channels

For NR FDD sub-6GHz Downlink,

P-SS
S-SS
PBCH
DM-RS (PBCH)
PDSCH
DM-RS (PDSCH)
PDCCH
DM-RS (PDCCH)

For NR FDD sub-6GHz Uplink,

PUSCH
DM-RS (PUSCH)

• Symbol Clock Error, IQ Skew, IQ Imbalance, IQ Quad Error

Summary       Displays the symbol clock error, IQ skew, IQ imbalance, and IQ quadrature error.

NR FDD Sub-6GHz Downlink

• Cell ID

Summary         Displays the cell ID.

• OFDM Symbol Tx Power

Summary         Displays OFDM Symbol Tx Power.

NR FDD Sub-6GHz Uplink

• Frequency Error vs Slot

Summary         Displays Frequency Error for each slot of the input signal.

• Origin Offset vs Slot

Summary         Displays Origin Offset for each slot of the input signal.

***Note:***

If there are multiple summary pages, press the Trace function menu [ F8 ] (Page number) and specify the page to be displayed.

Refer to Table 3.7.1.4-1 Trace function menu

# 3.18 Power vs Resource Block Display (Carrier Aggregation)

When pressing [F2] (Carrier Aggregation Analysis) on the Measure function menu, and selecting Power vs RB from the Trace Mode menu, the power for each resource block is displayed in the Result window on the screen.

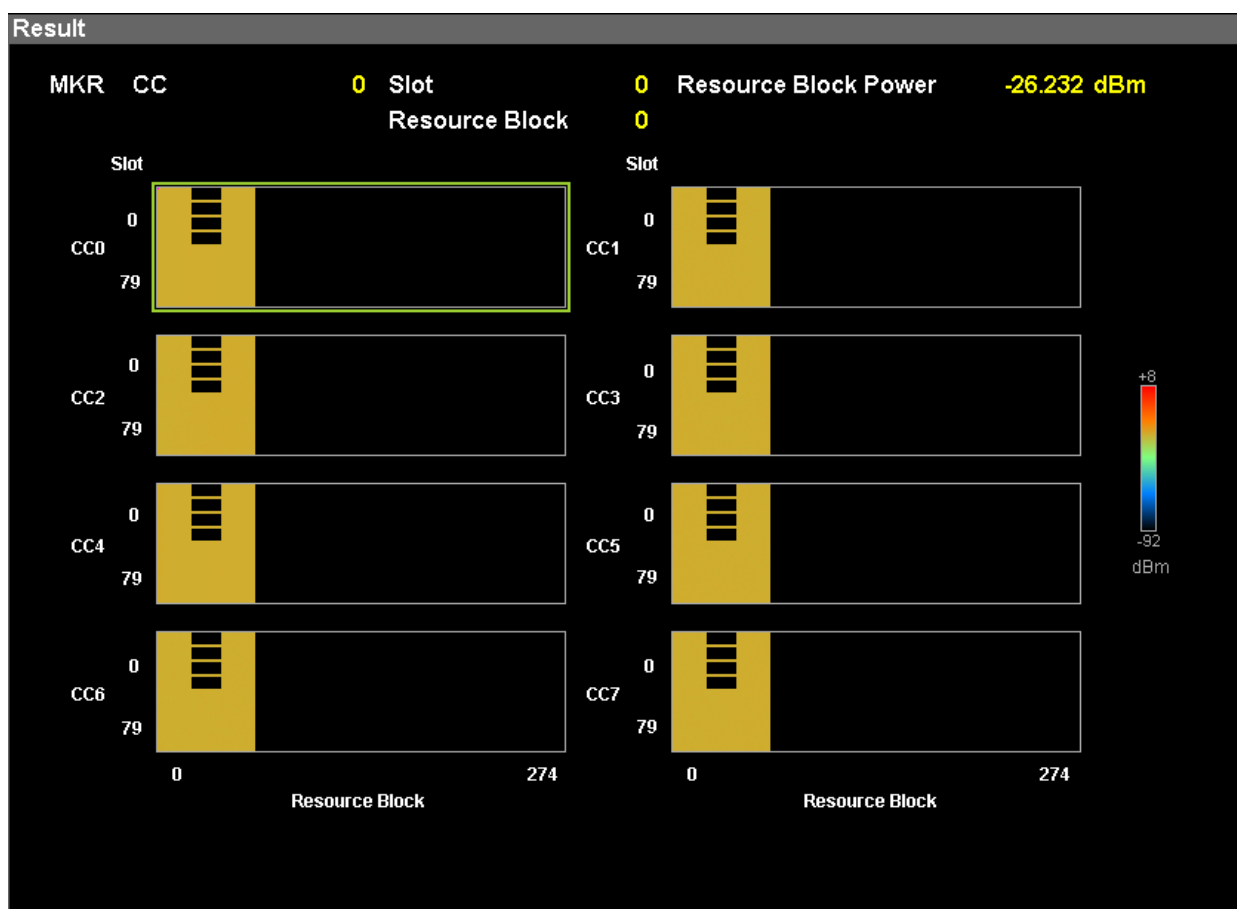Refer to 3.6.2.4 "Trace"



**Figure 3.18-1   Power vs Resource Block display**

■Displaying Graph

Summary      Displays the power for each resource block.
            The resource block selected by the marker is displayed in pink frame.

■MKR CC

Summary      Displays the CC number set by Carrier Number.

■MKR Slot

Summary      Displays the slot number set by Slot Number.

■MKR Resource Block

Summary    Displays the resource block number selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Resource Block Power

Summary    Displays the power of the resource block selected by the marker.

**3**

Measurement

# 3.19 EVM vs Resource Block Display (Carrier Aggregation)

When pressing [F2] (Carrier Aggregation Analysis) on the Measure function menu, and selecting EVM vs RB from the Trace Mode menu, the EVM for each resource block is displayed in the Result window on the screen.

Refer to 3.6.2.4 "Trace"
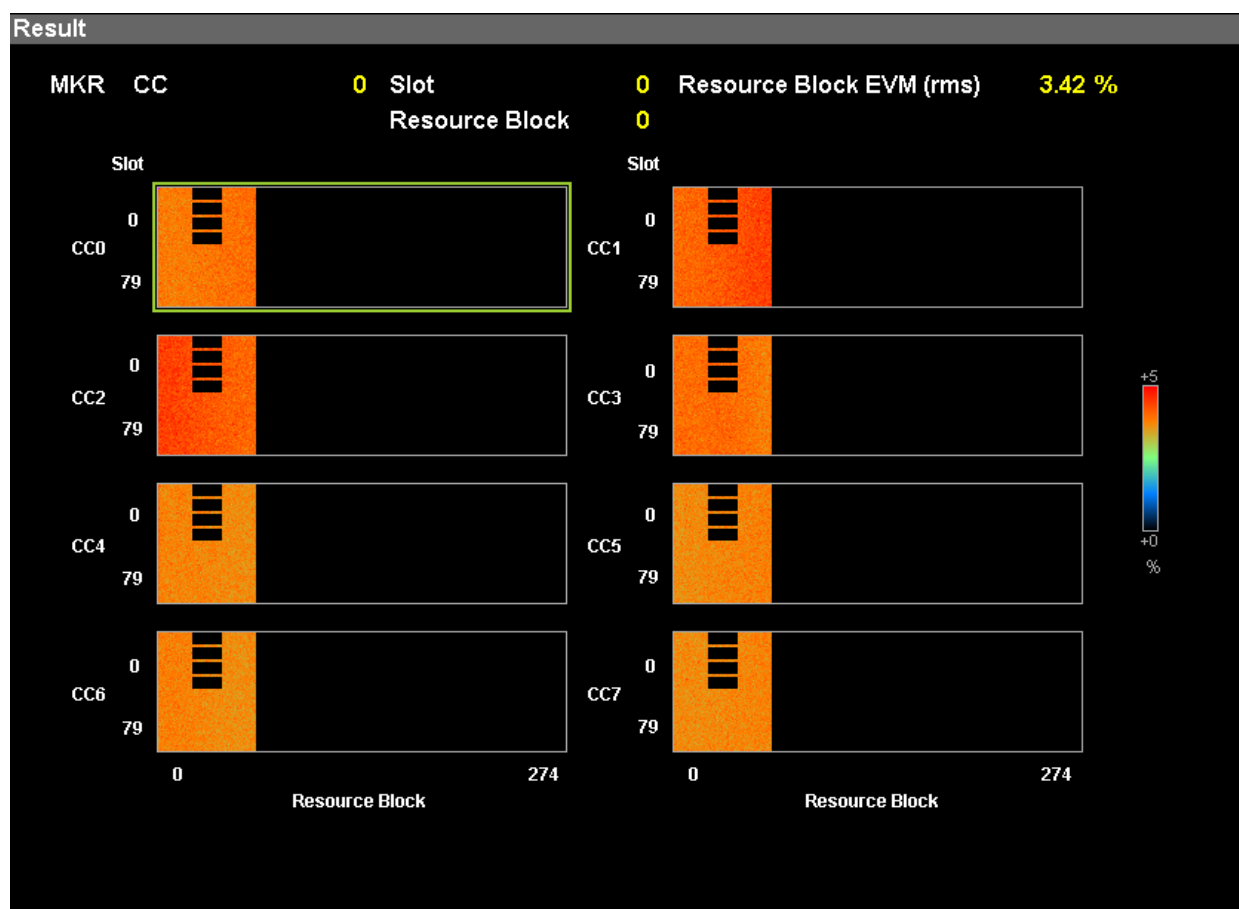


**Figure 3.19-1   EVM vs Resource Block display**

■Displaying Graph

Summary    Displays EVM for each resource block.
           The symbol selected by the marker is displayed in a pink frame.

■MKR CC

Summary    Displays the CC number set by Carrier Number.

■MKR Slot

Summary    Displays the slot number set by Slot Number.

■MKR Resource Block

Summary    Displays the number of the resource block selected by the marker. The marker can be moved by using the cursor keys or the rotary knob.

■MKR Resource Block EVM

Summary    Displays EVM of the resource block selected by the marker.

**3**

Measurement

# 3.20 Summary Display (Carrier Aggregation)

When pressing [F2] (Carrier Aggregation Analysis) on the Measure function menu, and select Summary from the Trace Mode menu, the following measurement values are displayed in the Result window on the screen.

<div align="right">Refer to 3.6.2.5 "Trace"</div>

Tx Total Power
Summary     Displays the total Transmit power of all CCs.

Tx Power Flatness
Summary     Displays the difference between the maximum and minimum values of transmit power among CCs of the input signals.

Frequency Error
Transmit Power
EVM (rms)
EVM (peak)
Timing Difference

# 3.21 Spectrum Measurement

When Standard is set to NR FDD Sub-6GHz Downlink,
Adjacent channel leakage power measurement (ACP),
Channel Power measurement, Occupied bandwidth measurement (OBW),
Spectrum Emission Mask measurement (SEM) of the Spectrum Analyzer
function is available.

3.6.2 "Recalling parameters" of the *MS2850A Signal Analyzer Operation
Manual (Mainframe Operation)*, or *MS2690A/MS2691A/MS2692A Signal
Analyzer Operation Manual (Mainframe Operation)* cannot be executed
when these function is being recalled.

To select the measurement items, press [ F4 ] (Measure) on the main
function menu or [ Measure ] to display the Measure function menu.

■ACP (Swept)

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

■Channel Power (Swept)

Summary     The Channel Power function of the Spectrum Analyzer
            function is recalled, and the channel power is measured
            according to the handed over parameter settings.

■OBW (Swept)

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

■Spectrum Emission Mask (Swept)

Summary     The Spectrum Emission Mask function of the Spectrum
            Analyzer function is recalled, and the spectrum emission
            mask is measured according to the handed over parameter
            settings.

**3**

Measurement

## 3.21.1  Hand over parameter settings

The Carrier Frequency, Input Level, Offset, Offset Value, and Pre-Amp settings are handed over automatically to the relevant parameter of Spectrum analyzer function.

The Trigger and Gate settings are automatically handed over according to Table 3.21.1-1.
The Gate Delay and Gate Length values must be measured by the Modulation Analysis measurement of this application before using the spectrum analyzer function.

**Table 3.21.1-1   Handing over Trigger Settings of This Application to Spectrum Analyzer Function**

| Model Name | This application | | Spectrum Analyzer function | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Trigger Switch | Trigger Source | Trigger Switch | Trigger Source | Gate | Gate Source | Gate Delay | Gate Length |
| MS269xA | Off | - | Off | - | Off | - | - | - |
| MS2850A | Off | - | | | On | Frame | Results* | Results* |
| | On | Frame | | | | | | |
| Common | On | Video | | | | - | - | - |
| | | Other than Frame and Video | | | On | Same as the trigger source of this application. | Results* | Results* |

\*:   The measurement results by this application

## 3.21.2 Advanced Settings

Press [F8] (Advanced Settings) on the second page of the Measure function menu to display the Advanced Settings function menu.

Specify the parameter type of the spectrum analyzer function where the parameters of this application are handed over in the following cases:

・ Standard is set to NR FDD Sub-6GHz Downlink.

・ ACP (Swept), Channel Power (Swept), OBW (Swept), or Spectrum Emission Mask (Swept) of the Spectrum Analyzer function is selected.

**Table 3.21.2-1   Advanced Settings function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| F8 | Standard | Specifies the parameter type of the spectrum analyzer function where the parameters of this application are handed over. <br> Options: <br> Cond.　Uses the parameter "5GNR TDD DL (s6G)_Con" for Conducted. <br> Rad.　Uses the parameter "5GNR TDD DL (s6G)_Rad" for Radiated. |

# Chapter 4　Digitize Function

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

**4**

Digitize Function

# 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.

**Table 4.1-1   Save Captured Data function menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Save Captured Data | Displayed by pressing **Save Captured Data.** |
| F1 | Device | Selects the location of the file to be saved. |
| F2 | File Name | Sets the name of the file to be saved. |
| F3 | Output Rate | Sets the rate of the output data. |
| F7 | Exec Digitize | Executes saving. |
| F8 | Close | Closes the Save Captured Data function menu. |

The IQ data stored in the internal memory at the time of execution of this function is saved to the external memory.

Example:    To save IQ data

<Procedure>

1.  Press [F7] (Capture) 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\5G Measurement
Up to 1000 files can be saved in a folder.

**4**

Digitize Function

## 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<br>"Normal": No error<br>"OverLoad": Level over |
| TriggerPosition | Trigger occurrence position [Sample]<br>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<br>"Normal": Normal mode (fixed) |
| ReferenceLevel | Reference level [dBm]<br>Note that this value does not include the reference level offset. |
| AttenuatorLevel | Attenuator value [dB] |
| InternalGain | Internal gain value [dB]<br>This is an internal parameter. |
| PreAmp | Gain value obtained by PreAmp [dB] |
| IQReverse | IQ reverse setting, fixed to "Normal" |
| TriggerSwitch | Trigger On/Off setting<br>"FreeRun":Trigger is not used<br>"Triggered":Trigger is used |

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

| Item | Descriptions |
|---|---|
| TriggerSource | Trigger source<br>"External": External trigger<br>"External2": External trigger 2<br>"SGMarker": SG Marker trigger |
| TriggerLevel | Trigger level [dBm]<br>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]<br>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<br>Fixed to "1". |
| ExternalReferenceDisp | Reference signal information<br>"Ref.Int":Internal reference signal<br>"Ref.Ext":External reference signal<br>"Ref.Int Unlock":Internal reference signal is unlocked.<br>"Ref.Ext Unlock":External reference signal is unlocked. |
| Correction Factor | Correction value of correction function [dB]<br>The correction factor is added to the IQ data in a data file.<br>0.000 is automatically set when the Correction function is set to Off. |
| Terminal | Signal input terminal<br>"RF": RF terminal |
| ReferencePosition | 0-second reference position<br>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).<br>"Rise": Rising edge<br>"Fall": Falling edge |
| 5GMeasurement Standard | Standard<br>"NRFDDDownlinkSub6Ghz": NR FDD sub-6GHz Downlink<br>"NRFDDUplinkSub6Ghz":     NR FDD sub-6GHz Uplink |
| 5GMeasurement AttenuatorLevel | Attenuator value [dB] when the attenuator is set to Manual. |

**4**

Digitize Function

## 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 | (4 Byte) |
| Q-phase data 1 | (4 Byte) |
| I-phase data 2 | (4 Byte) |
| Q-phase data 2 | (4 Byte) |
| I-phase data 3 | (4 Byte) |
| Q-phase data 3 | (4 Byte) |
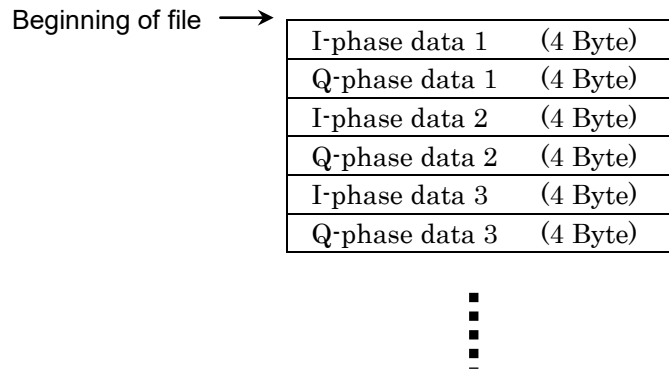
**Figure 4.1.2-1   Format of data file**

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

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

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.

**Table 4.2-1   Replay Function Menu**

| Function Key | Menu Display | Function |
|---|---|---|
| Page 1 | Replay | Press **Replay** to display. |
| F1 | Device | Selects the drive in which the target file is stored. |
| F2 | Application | Selects the name of the application used to save the target file. |
| F7 | Select File | Selects the target file. After selecting the file, the Replay function is executed. |
| F8 | Close | Closes the Replay function menu. |

**4**

Digitize Function

## 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.

***Notes:***

- MX285051A-031 performs the Replay function only for an IQ data file whose sampling rate is 162.5 MHz or 325 MHz.

- MX285051A-081 performs the Replay function only for an IQ data file whose sampling rate is 162.5 MHz.

- MX269051A-031/081 performs the Replay function only for an IQ data file whose sampling rate is 50 MHz, 100 MHz, or 200 MHz.

- Once Replay starts, the settings are initialized except for the parameters specified in Table 4.1.1-1.

## 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 |
| Input Level |
| Attenuator Auto/Manual |
| Attenuator |
| Pre Amp |
| Auto Range |
| Capture Time Auto/Manual |
| Capture Time |
| Trigger Switch |
| Trigger Source |
| Trigger Slope |
| Trigger Delay |
| ACP (Sweep) |
| Channel Power (Sweep) |
| OBW (Sweep) |
| Spectrum Emission Mask (Sweep) |
| Continuous Measurement |
| Single Measurement |
| Erase Warm Up Message |

**4**

Digitize Function

## 4.2.4   Conditions for IQ Data Files That Can Be Replayed

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

**Table 4.2.4-1   IQ data file that can be replayed**

| Name | Value |
|---|---|
| Format | I, Q (32-bit Float Binary format) |
| Sampling rate | MX285051A-031<br>  162.5 MHz, 325 MHz<br>MX285051A-081<br>  162.5 MHz<br>MX269051A-031/081<br>  200 MHz  (With MS269xA-078/178)<br>  100 MHz  (Only with MS269xA-077/177)<br>  50 MHz    (Without MS269xA-077/177) |
| Sample numbers | 22.2 ms or more |

## 4.2.5   Stopping Replay

Stop the Replay function using the following procedure:

<Procedure>

1.   Press  [ F7 ]  (Capture) on the main function menu.

2.   Press  [ F5 ]  (Stop Replaying) to stop the Replay function.

# Chapter 5   Performance Test

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

**5**

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 MS2850A or MS269xA 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.

- Carrier frequency accuracy
- Residual EVM

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

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

## 5.1.2 Instruments for Performance test

Table 5.1.2-1 lists measuring instruments for performance tests.

**Table 5.1.2-1   List of measuring instruments for performance test**

| Required Performance | Recommended Instruments |
|---|---|
| ● Frequency range: 400 MHz to 6 GHz<br>   Resolution: 1 Hz available<br>● Output level range: −30 to −10 dBm (MX285051A)<br>   −25 to −10 dBm (MX269051A)<br>   Resolution: 0.1 dB available<br>● Modulation Bandwidth: more than 100 MHz | Vector signal generator |
| The output level of the vector signal generator is adjustable in the ranges below.<br>MX285051A:<br>   −30 dBm±0.1 dB<br>   −15 dBm±0.1 dB<br>   −10 dBm±0.1 dB<br>MX269051A:<br>   −25 dBm±0.1 dB<br>   −10 dBm±0.1 dB<br>Not required if the vector signal generator has the above transmission power accuracy. | Power meter |

# 5.2 Performance Test Items

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

## 5.2.1 Methods for testing MX285051A-031/MX269051A-031 and MX285051A-081/MX269051A-081

(1)  Test target standards

- Carrier frequency accuracy
- Residual EVM

(2)  Measuring instrument for tests

- Vector signal generator
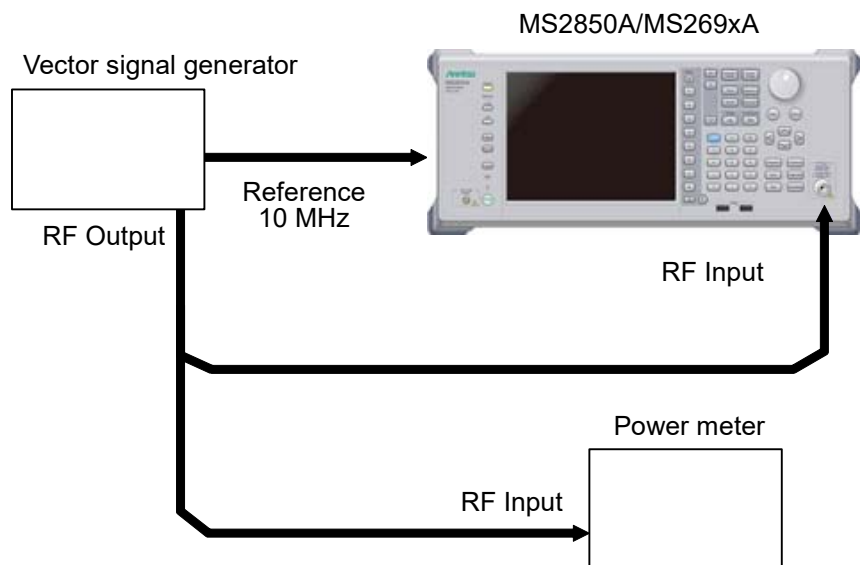- Power meter

(3)  Setup



**Figure 5.2.1-1   Performance test**

(4)   Test procedure

(a)   Signal source adjustment

1.   Input the 10 MHz reference signal output from the signal generator to the Reference Input connector.

2.   Output the following signals from the vector signal generator.

For MX285051A-031/MX269051A-031, output the 5G NR FDD downlink signals as below.

| Subcarrier Spacing | 15 kHz | | 30 kHz | | | 60 kHz | | |
|---|---|---|---|---|---|---|---|---|
| Channel Bandwidth | 25 MHz | 50 MHz | 25 MHz | 50 MHz | 100 MHz | 25 MHz | 50 MHz | 100 MHz |
| MX285051A-031 | ✓ | ✓ | ✓ | – | ✓ | ✓ | – | ✓ |
| MX269051A-031 | | | | | | | | |
|    Without MS269xA-077/177 | ✓ | – | ✓ | – | – | ✓ | – | – |
|    Only with MS269xA-077/177 | – | ✓ | – | ✓ | – | – | ✓ | – |
|    With MS269xA-078/178 | – | ✓ | – | – | ✓ | – | – | ✓ |

For MX285051A-081/MX269051A-081, output the 5G NR FDD uplink signals as below.

| Subcarrier Spacing | 15 kHz | | 30 kHz | | | 60 kHz | | |
|---|---|---|---|---|---|---|---|---|
| Channel Bandwidth | 25 MHz | 50 MHz | 25 MHz | 50 MHz | 100 MHz | 25 MHz | 50 MHz | 100 MHz |
| MX285051A-081 | ✓ | ✓ | ✓ | – | ✓ | ✓ | – | ✓ |
| MX269051A-081 | | | | | | | | |
|    Without MS269xA-077/177 | ✓ | – | ✓ | – | – | ✓ | – | – |
|    Only with MS269xA-077/177 | – | ✓ | – | ✓ | – | – | ✓ | – |
|    With MS269xA-078/178 | – | ✓ | – | – | ✓ | – | – | ✓ |

3.   Input the vector signal generator output signal into the power meter, and adjust the generator's output level to the values below.

–10 dBm±0.1 dB (Pre-amp. turns off, or not installed)

–30 dBm±0.1 dB (Pre-amp. turns on, MX285051A)

–25 dBm±0.1 dB (Pre-amp. turns on, MX269051A)

(b)   Settings of the MS2850A or MS269xA

1.   Turn On the power switch on the front panel then wait until the internal temperature stabilizes.

2.  Press [Application Switch], then press the menu function key displaying the character string "5G Measurement."

3.  Press [F3] (Standard) and select the following 5G standards for testing.
    MX285051A-031/MX269051A-031:
    [F3] (NR FDD sub-6GHz Downlink)
    MX285051A-081/MX269051A-081:
    [F5] (NR FDD sub-6GHz Uplink)

4.  Press [Preset].

5.  Press [F1] (Preset) to perform initialization.

6.  Press [F1] (Modulation Analysis) in the Measure Function menu and press [F2] (Basic Settings) to display Basic Settings.

7.  Press [F1] (Frame Parameter) to display the Frame Parameter Setup tab. Then set the following parameters according to the signals output from vector signal generator.

    Subcarrier Spacing
    Number of RBs

8.  Press [Cal].

9.  Press [F1] (SIGANA All) to perform calibration.

10. Press [F8] (Close).

11. Press [Frequency], enter the frequency output by the vector signal generator using the numeric keypad, then press [Enter].

12. If the Input Level dialog box is displayed when pressing [Amplitude], press [F8] (Close) and then press [F5] (Auto Range).

13. Press [Trace] then press [F4] (Storage) and press [F1] (Mode) to choose Average using the cursor key or the rotary knob, then press [Enter].

14. Press [F2] (Count), enter the measurement count, using the numeric keypad, then press [Enter].

15. Press [Single] to measure.

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

    Press [F3] (System Settings) after pressing [System Config] to display the System Settings screen. Select and set Reference Signal with cursor key, and then press [F7] (Set).

16. Confirm whether the measured Frequency Error (carrier frequency accuracy) is within the specifications.

17. Confirm whether the measured EVM (residual vector error) value is within the specifications.

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Performance Test

(5)     Test Result

■MX285051A-031/081

**Table 5.2.1-1   Carrier frequency accuracy (Pre-amp. turns off, or not installed.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |

**Table 5.2.1-2   Residual EVM (Pre-amp. turns off, or not installed.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |

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Performance Test

**Table 5.2.1-3   Carrier frequency accuracy (Pre-amp. turns on.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 799.999999 MHz | | | | | |
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | | |
| 800 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |

**Table 5.2.1-4   Residual EVM (Pre-amp. turns on.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 799.999999 MHz | | | | |
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | |
| 800 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |

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Performance Test

■MX269051A-031/081

**Table 5.2.1-5  Carrier frequency accuracy (Without MS269xA-077/177,**
**and Pre-amp. turns off or not installed.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |

**Table 5.2.1-6  Residual EVM (Without MS269xA-077/177,**
**and Pre-amp. turns off or not installed.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |

**Table 5.2.1-7 Carrier frequency accuracy (Without MS269xA-077/177 and Pre-amp. turns on.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |

**Table 5.2.1-8 Residual EVM (Without MS269xA-077/177 and Pre-amp. turns on.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 25 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |

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Performance Test

**Table 5.2.1-9   Carrier frequency accuracy (Only with MS269xA-077/177,**
**and Pre-amp. turns off or not installed.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |

**Table 5.2.1-10   Residual EVM (Only with MS269xA-077/177,**
**and Pre-amp. turns off or not installed.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |

**Table 5.2.1-11    Carrier frequency accuracy (Only with MS269xA-077/177 and Pre-amp. turns on.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | –10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | –10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | –10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |

**Table 5.2.1-12    Residual EVM (Only with MS269xA-077/177 and Pre-amp. turns on.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |

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Performance Test

**Table 5.2.1-13   Carrier frequency accuracy (With MS269xA-078/178,
and Pre-amp. turns off or not installed.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | | |
| 400 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 2690 MHz | | | | | |
| 6000 MHz | | | | | |

**Table 5.2.1-14   Residual EVM (With MS269xA-078/178,
and Pre-amp. turns off or not installed.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | |
| 400 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 2690 MHz | | | | |
| 6000 MHz | | | | |

**Table 5.2.1-15   Carrier frequency accuracy (With MS269xA-078/178 and Pre-amp. turns on.)**

| Frequency | Min. limit | Deviation (Hz) | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | | |
| 400 MHz | | | | | |
| 2690 MHz | −10.0 Hz | | +10.0 Hz | ±1.0 Hz | |
| 6000 MHz | | | | | |

**Table 5.2.1-16   Residual EVM (With MS269xA-078/178 and Pre-amp. turns on.)**

| Frequency | Measured value [% (rms)] | Max. limit | Uncertainty | Pass/Fail |
|---|---|---|---|---|
| Subcarrier Spacing 15 kHz, Channel Bandwidth 50 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 30 kHz, Channel Bandwidth 100 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |
| Subcarrier Spacing 60 kHz, Channel Bandwidth 100 MHz | | | | |
| 400 MHz | | | | |
| 2690 MHz | | 1.0% (rms) | 0.1% (rms) | |
| 6000 MHz | | | | |

**5**

Performance Test

# Chapter 6   Other Functions

This chapter describes other functions of this application.

**6**

Other Functions

# 6.1   Selecting Other Functions

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

**Table 6.1-1   Accessory function menu**

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

# 6.2   Setting Title

A title of up to 32 characters can be displayed on the screen. (Character strings of up to 17 characters can be displayed on a function menu. The maximum number of characters to be displayed on the top of the function menu varies according to character string.)

<Procedure>

1.   Press [F8] (Accessory) on the main function menu.

2.   Press [F1] (Title) to display the character string input screen. Select a character using the rotary knob, and enter it by pressing (Enter). Enter the title by repeating this operation. When the title is entered, press [F7] (Set).

3.   Press [F2] (Title) and then select "Off" to hide the title.

# 6.3   Erasing Warmup Message

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

<Procedure>

1.   Press [F8] (Accessory) on the main function menu.

2.   Press [F4] (Erase Warm Up Message) to erase the warmup message.

# *Appendix A    Error Messages*

**Table A-1    Error Messages**

| Message | Description |
|---|---|
| Out of range. | The settable range is exceeded. |
| Not available in Summary Trace. | This operation is invalid when Active Trace is in the Summary state. |
| No file to read. | There is no file that can be read. |
| File read error. | File reading has failed. |
| File format error. | The file format is invalid. |
| Write error. | File writing has failed. |
| Number of the letters over. | This operation is invalid because the maximum number of characters has been exceeded. |
| The model of the main instrument is different. | This operation is invalid because the specified model name does not match. |
| The option configuration is different. | This operation is invalid because the option configuration does not match. |
| File Open error. | Failed to open the specified file. |
| File Close error. | Failed to close the file. |
| Empty File Name | No character is entered. |
| Save File Limit < 100 | The save destination contains the maximum number of files (100). |
| Cannot find device. | The specified device could not be found. |
| Search error | A search error has occurred. |
| Not available when Capture Time is set to Auto. | This operation is invalid when Capture Time is set to Auto. |
| File not found. | The specified file could not be found. |
| Cannot find device. | The specified device could not be found. |
| Selected item is empty. | The selected item (file, etc.) could not be found. |

**Table A-1   Error Messages (Cont'd)**

| Message | Description |
|---|---|
| Only available while replaying. | This operation is invalid when the Replay function is not executed. |
| Shortage of data samples in IQ data file. | Analysis cannot be performed because the number of data samples of the IQ data file is less than the minimum number of data samples required for analysis. |
| Unsupported SpanFrequency. | The frequency span is not supported. |
| Unsupported SamplingClock. | The sampling rate is not supported. |
| Not available if not re-capture after changing common parameter. | This operation is invalid when recapture is not executed after common parameter change. |
| Not available during measurement. | This operation is invalid during measurement. |
| Invalid character | − |

# Appendix B  Measurable Signal

This appendix describes the configuration of the signal that can be measured by the MX285051A-031/081 and MX269051A-031/081.

# B.1  Overview of Signal

Table B.1-1 and B.1-2 show the minimum requirements of the signals that the MX285051A-031/081 and MX269051A-031/081 can measure. To measure with the MX285051A-031/081 and MX269051A-031/081, check that the input signal satisfies the conditions in Table B.1-1 and B.1-2 and that the MX285051A-031/081 and MX269051A-031/081 settings match these conditions.

**Table B.1-1   Signal measurable with the MX285051A-031/MX269051A-031**
**(Minimum requirements)**

| Item | Contents |
|---|---|
| Wireless Standard | 3GPP TS 38.211 (2019-06) |
| Channel Bandwidth | MX285051A-031/MX269051A-031<br>・ For Subcarrier Spacing = 15 kHz<br>  5 MHz(25), 10 MHz(52), 15 MHz(79), 20 MHz(106), 25 MHz(133), 30 MHz(160), 40 MHz(216), 50 MHz(270)<br>・ For Subcarrier Spacing = 30 kHz<br>  5 MHz(11), 10 MHz(24), 15 MHz(38), 20 MHz(51), 25 MHz(65), 30 MHz(78), 40 MHz(106), 50 MHz(133), 60 MHz(162), 70 MHz(189), 80 MHz(217), 90 MHz(245), 100 MHz(273)<br>・ For Subcarrier Spacing = 60 kHz<br>  10 MHz(11), 15 MHz(18), 20 MHz(24), 25 MHz(31), 30 MHz(38), 40 MHz(51), 50 MHz(65), 60 MHz(79), 70 MHz(93), 80 MHz(107), 90 MHz(121), 100 MHz(135)<br>Numbers in parentheses indicate the numbers of resource blocks. |
| Subcarrier Spacing | MX285051A-031/MX269051A-031<br>  15 kHz, 30 kHz, 60 kHz |
| Measurable Maximum Number of Carriers | MX285051A-031: 2<br>MX269051A-031: 1 |

**Table B.1-1 Signal measurable with the MX285051A-031/MX269051A-031 (Minimum requirements) (Cont'd)**

| Item | Contents |
|---|---|
| Physical Channels | PBCH<br>PDSCH<br>PDCCH |
| Physical Signals | Primary synchronization signal<br>Secondary synchronization signal<br>Demodulation reference signals for PBCH<br>Demodulation reference signals for PDSCH<br>Demodulation reference signals for PDCCH |
| Others | • Two or more slots should be mapped to measure PDSCH.<br>• The following channels or signals must be mapped.<br>PDSCH,<br>Demodulation reference signals for PDSCH,<br>or SS-Block |

Appendix

Appendix B

**Table B.1-2   Signal measurable with the MX285051A-081/MX269051A-081**
**(Minimum requirements)**

| Item | Contents |
|---|---|
| Wireless Standard | 3GPP TS 38.211 (2019-06) |
| Channel Bandwidth | MX285051A-081/MX269051A-081<br><br>• For Subcarrier Spacing = 15 kHz<br>　5 MHz(25), 10 MHz(52), 15 MHz(79), 20 MHz(106),<br>　25 MHz(133), 30 MHz(160), 40 MHz(216), 50 MHz(270)<br>• For Subcarrier Spacing = 30 kHz<br>　5 MHz(11), 10 MHz(24), 15 MHz(38), 20 MHz(51), 25 MHz(65),<br>　30 MHz(78), 40 MHz(106), 50 MHz(133), 60 MHz(162),<br>　70 MHz(189), 80 MHz(217), 90 MHz(245), 100 MHz(273)<br>• For Subcarrier Spacing = 60 kHz<br>　10 MHz(11), 15 MHz(18), 20 MHz(24), 25 MHz(31),<br>　30 MHz(38), 40 MHz(51), 50 MHz(65), 60 MHz(79),<br>　70 MHz(93), 80 MHz(107), 90 MHz(121), 100 MHz(135)<br><br>Numbers in parentheses indicate the numbers of resource blocks. |
| Subcarrier Spacing | MX285051A-081/MX269051A-081<br>　15 kHz, 30 kHz, 60 kHz |
| Measurable Maximum Number of Carriers | 1 |
| Physical Channels | PUSCH |
| Physical Signals | Demodulation reference signals for PUSCH |
| Others | • For the PUSCH measurement, if DM-RS add-pos is 0, there must be at least two slots.<br>• The following channels or signals must be mapped.<br>　PUSCH,<br>　Demodulation reference signals for PUSCH |

# *Appendix C  Initial Value List*

**Appendix**

*Appendix C*

# C.1  Common Settings

| | | |
|---|---|---|
| Frequency | | |
| | Center Frequency | 28.00 GHz (MX285051A) |
| | | 3.75 GHz (MX269051A) |
| | RF Spectrum | Normal |
| | | |
| Amplitude | | |
| | Input Level | −10.00 dBm |
| | Attenuator Auto/Manual | Auto |
| | Attenuator Value | 4 dB |
| | Pre-Amp | Off |
| | Offset | Off |
| | Offset Value | 0.00 dB |
| | | |
| Advanced Settings | | |
| | Equalizer Use Data | Off |
| | Amplitude Tracking | On |
| | Phase Tracking | On |
| | Timing Tracking | Off |
| | Multicarrier Filter | On |
| | EVM Window | Off |
| | DC Cancellation | Off |
| | Phase Compensation Frequency Center | On |
| | Phase Compensation Frequency Value | Same as Center Frequency |
| Trace | | |
| | Trace Mode | EVM vs Subcarrier |
| | Scale | |
| | EVM Unit | % |
| | EVM Scale | 5% |
| | Flatness Scale | 10 dB |
| | Storage | |
| | Mode | Off |
| | Count | 10 |
| | Subcarrier Number | 0 Subcarrier |
| | Symbol Number | 3 Symbol |
| | EVM vs Subcarrier View | Averaged over all Symbols |
| | Graph View | RMS&Peak |
| | EVM vs Symbol View | Averaged over all Subcarriers |
| | Graph View | RMS&Peak |
| | Spectral Flatness Type | Amplitude |
| | Slot Number | 0 |
| | Resource Block Number | 0 |

Marker
 Marker          On
 Subcarrier Number     0 Subcarrier
 Symbol Number     3 Symbol
Trigger
 Trigger Switch      Off
 Trigger Source      External
 Trigger Slope      Rise
 Trigger Delay      0 s

Accessory
 Title           On,
             "5G Measurement"

# C.2  MX285051A-031/MX269051A-031

Modulation Analysis
Analysis Time

| | |
|---|---|
| Starting Slot Number | 0 Slot |
| Measurement Interval | 20 Slot |

Basic Settings
    Frame Parameter

| | |
|---|---|
| Test Model | Off |
| Test Model Version | Auto |
| Subcarrier Spacing | 30 kHz |
| Number of RBs | 273 |
| Channel Bandwidth | 100 MHz |
| Cell ID | 0 |
| Synchronization Mode | SS |
| Phase Compensation | On |

    SS Block

| | |
|---|---|
| Enable | On |
| SS-Block Subcarrier Spacing | 30 kHz |
| SS-Block Candidate | Case B (L=8) |
| Antenna Port | 4000 |
| SSB Subcarrier Offset | 6 |
| SSB RB Offset | 126 |
| Periodicity | 10 ms |
| Analysis Frame Number | 0 |
| P-SS Power Boosting | Auto |
| P-SS Power Boosting Value | 0.000 dB |
| S-SS Power Boosting | Auto |
| S-SS Power Boosting Value | 0.000 dB |
| PBCH Power Boosting | Auto |
| PBCH Power Boosting Value | 0.000 dB |
| SS-Block Transmission | All On |

    PDCCH/DM-RS (all slots are set as below)

| | |
|---|---|
| Enable | On |
| Antenna Port | 2000 |
| PDCCH Power Boosting | Auto |
| PDCCH Power Boosting Value | 0.000 dB |
| Number of Symbols | 2 |

    PDSCH/DM-RS (all slots are set as below)

| | |
|---|---|
| Antenna Port | 1000 |
| Modulation Scheme | Auto |
| PDSCH Mapping Type | type A |
| Start symbol | 2 |

Number of Symbols                     12
DM-RS typeA-pos                       2
DM-RS config-type                     1
DM-RS add-pos                         0
DM-RS CDM Group Without Data          2
PDSCH Power Boosting                  Auto
PDSCH Power Boosting Value            −3.000 dB
PDSCH PTRS                            Off
PDSCH PTRS Time Density               1
PDSCH PTRS Freq. Density              2
PDSCH PTRS RE Offset                  00
PDSCH RBs Allocation Auto Detect  Enable
PDSCH RBs Allocation Start RB         0
PDSCH RBs Allocation Number of RBs      273
Advanced Settings (Measure)
Standard                              Conducted

# C.3  MX285051A-081/MX269051A-081

Modulation Analysis
Analysis Time
    Starting Slot Number        0 Slot
    Measurement Interval        20 Slot

Basic Settings
    Frame Parameter
        Subcarrier Spacing        30 kHz
        Number of RBs        273
        Channel Bandwidth        100 MHz
        Cell ID        0
        Phase Compensation        On
    PUSCH/DM-RS (all slots are set as below)
        Multiplexing Scheme        CP-OFDM
        Group Hopping        On
        Sequence Hopping        Off
        Antenna Port        1000
        Modulation Scheme        Auto
        PUSCH Mapping Type        type A
        Start symbol        0
        Number of Symbols        14
        DM-RS typeA-pos        2
        DM-RS config-type        1
        DM-RS add-pos        0
        DM-RS CDM Group Without Data        2
        PUSCH Power Boosting        Auto
        PUSCH Power Boosting Value        −3.000 dB
        PUSCH PTRS        Off
        PUSCH PTRS Time Density        1
        PUSCH PTRS Freq. Density        2
        PUSCH PTRS RE Offset        00
        PUSCH RBs Allocation Auto Detect  Enable
        PUSCH RBs Allocation Start RB        0
        PUSCH RBs Allocation Number of RBs        273