# MX887018A/19A
# NR FDD/TDD sub-6GHz
# Uplink
# TX Measurement
# Operation Manual

**Seventh 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 MT8870A Universal Wireless Test Set Operation Manual. Please also refer to it before using the equipment.**
- **Keep this manual with the equipment.**

## ANRITSU CORPORATION

Document No.: M-W3967AE-7.0

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These indicate that the marked part should be recycled.

MX887018/19A
NR FDD/TDD sub-6GHz Uplink TX Measurement
Operation Manual

24 August 2018 (First Edition)
21 January 2022 (Seventh Edition)

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### Revision History:

February 29th, 2020
December 17th, 2021

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- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
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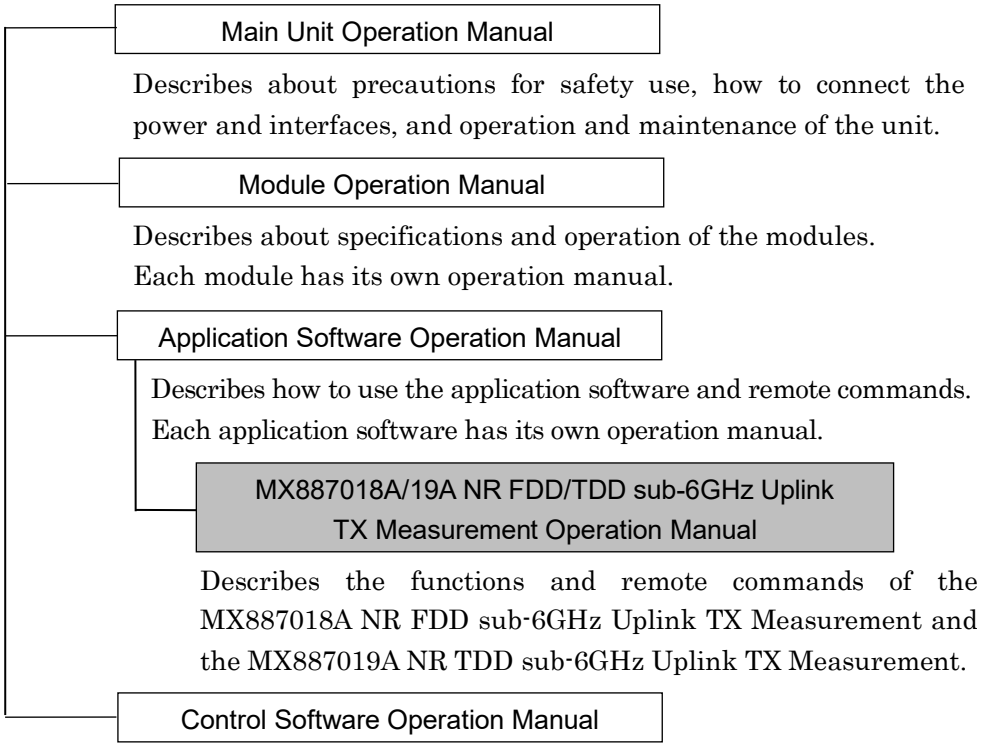
# About This Manual

This manual mainly describes the operation of
the MX887018A NR FDD sub-6GHz Uplink TX Measurement
and the MX887019A NR TDD sub-6GHz Uplink TX Measurement.

Products related to the MT8870A Universal Wireless Test Set include:

- MT8870A Universal Wireless Test Set (main unit)
- Modules installed in the MT8870A
- Application software installed in the MT8870A
- Control software installed in a PC to control the MT8870A remotely

These products are referred to as the "Universal Wireless Test Set Series". The operation manuals for the Universal Wireless Test Set Series consist of separate documents for the main unit, module(s), application software, and control software, as shown below. ▭ represents this manual.

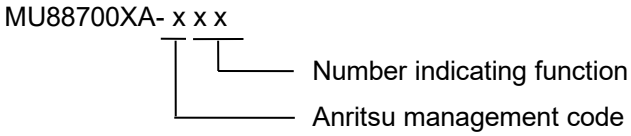


# Convention Used in This Manual

Except where there is a good reason to do otherwise, this manual assumes the use of MT8870A and MU887000A.
Note that the descriptions in this manual also apply to MT8872A, MU887001A, or MU887002A. MU887000A/01A means the MU887000A or MU887001A.

Additionally, the Anritsu management code of the options described in this manual is "0" unless there is a reason.

The option number: The option number is indicated by three digits.



# Table of Contents


**About This Manual ..... I**

**Chapter 1 Outline ..... 1-1**

1.1 Outline ..... 1-2
1.2 Composition ..... 1-3
1.3 License Registration ..... 1-4
1.4 Abbreviations ..... 1-4

**Chapter 2 Fundamental Measurement ..... 2-1**

2.1 Common Operations ..... 2-2
2.2 Transmit Power ..... 2-23
2.3 Occupied Bandwidth ..... 2-25
2.4 Spectrum Emission Mask ..... 2-27
2.5 Adjacent Channel Leakage Power Ratio ..... 2-33
2.6 Modulation Analysis ..... 2-35
2.7 Measurement Results ..... 2-47
2.8 Capturing Waveform Data ..... 2-48
2.9 Sample Programs ..... 2-52

**Chapter 3 Sequence Measurement ..... 3-1**

3.1 Outline ..... 3-2
3.2 Setting Sequence Table ..... 3-7
3.3 Setting Measurement Conditions Table ..... 3-13
3.4 Controlling and Monitoring Sequence ..... 3-15
3.5 Measurement Results ..... 3-19
3.6 Sample Program ..... 3-20

**Chapter 4 SCPI Command Reference..... 4-1**

4.1 List of Commands ..... 4-2
4.2 Details of Commands ..... 4-26

**Chapter 5 Native Command Reference .... 5-1**

5.1 List of Commands ..... 5-2
5.2 Details of Commands ..... 5-26

**Chapter 6 Performance Test..... 6-1**

6.1 Outline ..... 6-2
6.2 Instruments for Testing Performance..... 6-3
6.3 Calibration (MX887018A/19A)..... 6-5
6.4 Performance Tests
(MX887018A/19A / MV887018A/19A) ..... 6-11
6.5 Calibration (MX887018A-001/19A-001) ..... 6-40
6.6 Performance Tests (MX887018A-001/19A-001) ..... 6-47
6.7 Servicing..... 6-59

**Appendix A Specifications..... A-1**

**Index ..... Index-1**

# Chapter 1 Outline



This chapter outlines the MX887018A NR FDD sub-6GHz Uplink TX Measurement and the MX887019A NR TDD sub-6GHz Uplink TX Measurement. Refer to Appendix A “Specifications” for the software functions and performance.

1.1 Outline ..... 1-2
1.2 Configuration ..... 1-3
1.2.1 Standard configuration ..... 1-3
1.2.2 Options ..... 1-3
1.3 License Registration ..... 1-4
1.4 Abbreviations ..... 1-4

# 1.1 Outline

The MX887018A NR FDD sub-6GHz Uplink TX Measurement (hereafter MX887018A) adds the NR FDD sub-6GHz wireless measurement function to the MU887000A TRX Test Module.

The MX887019A NR TDD sub-6GHz Uplink TX Measurement (hereafter MX887019A) adds the NR TDD sub-6GHz wireless measurement function to the MU887000A TRX Test Module.

The MX887018A supports setting of an arbitrary waveform pattern for transmitting as the NR FDD sub-6GHz downlink signal.
The MX887019A supports setting of an arbitrary waveform pattern for transmitting as the NR TDD sub-6GHz downlink signal.

Regardless of the uplink signal information, MX887018A and MX887019A (hereinafter MX887018A/19A) transmit the modulated waveform pattern loaded from memory as the downlink signal (Non-signalling method).

The Signalling method, which detects the Uplink signal information, such as call processing with the mobile station, and changes the Downlink signal modulation, is not supported.

The signal transmitted from the MU887000A to the mobile station is the downlink signal and the signal transmitted from the mobile station to the MU887000A is the uplink signal.

When conducting the RX measurement by the MX887018A/19A, transmit a waveform pattern from the MU887000A and execute throughput measurement by the mobile station.

When conducting the TX measurement by the MX887018A/19A, set the trigger source to Frame and start the measurement. The measurement is performed at the timing synchronized with waveform markers of waveform patterns (uplink frame start).

With MX887018A-001 NR FDD Contiguous ENDC TX Measurement and MX887019A-001 NR TDD Contiguous ENDC TX Measurement options, the MT8870A can carry out TX measurement of the mobile station supporting Contiguous ENDC.

# 1.2 Configuration

The configurations of the MX887018A and MX887019A are shown in 1.2.1 and 1.2.2.

## 1.2.1 Standard configuration

The following tables show the standard configuration of the software.

**Table 1.2.1-1 MX887018A Standard Configuration**

| Item | Model/Code | Name | Qty | Remarks |
|---|---|---|---|---|
| Software | | Storage media (DVD, etc.) | 1 | |
| | MX887018A | NR FDD sub-6GHz Uplink TX Measurement | | License file included on storage media (DVD, etc.) |
| | W3967AE | MX887018A/19A NR FDD/TDD sub-6GHz Uplink TX Measurement Operation Manual | | English, on storage media (DVD, etc.) |

**Table 1.2.1-2 MX887019A Standard Configuration**

| Item | Model/Code | Name | Qty | Remarks |
|---|---|---|---|---|
| Software | | Storage media (DVD, etc.) | 1 | |
| | MX887019A | NR TDD sub-6GHz Uplink TX Measurement | | License file included on storage media (DVD, etc.) |
| | W3967AE | MX887018A/19A NR FDD/TDD sub-6GHz Uplink TX Measurement Operation Manual | | English, on storage media (DVD, etc.) |

## 1.2.2 Options

The following tables show the software options.

**Table 1.2.2-1 MX887018A-001 Option**

| Item | Model/Code | Name | Remarks |
|---|---|---|---|
| Option | MX887018A-001 | NR FDD Contiguous ENDC TX Measurement | License file included on storage media (DVD, etc.) |

**Table 1.2.2-2 MX887019A-001 Option**

| Item | Model/Code | Name | Remarks |
|---|---|---|---|
| Option | MX887019A-001 | NR TDD Contiguous ENDC TX Measurement | License file included on storage media (DVD, etc.) |

## 1.3 License Registration

Before the MX887018A or MX887019A can be used, the software license must be registered in the MT8870A.

Refer to Chapter 8 "Utility Tool" in *the MU887000A TRX Test Module Operation Manual* for the license registration procedure.

## 1.4 Abbreviations

The abbreviations used in this manual are listed in Table 1.4-1.

**Table 1.4-1 Abbreviations**

| Abbreviation | Name |
|---|---|
| ACLR | Adjacent Channel Leakage Power Ratio |
| DL | Downlink |
| EN-DC (ENDC) | E-UTRA/NR Dual Connectivity |
| ENBW | The aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block |
| E-UTRA | Evolved Universal Terrestrial Radio Access |
| EVM | Error Vector Magnitude |
| FDD | Frequency Division Duplex |
| LTE | Long Term Evolution |
| NR | New Radio |
| OBW | Occupied Bandwidth |
| PUSCH | Physical Uplink Shared Channel |
| RB | Resource Block |
| RMC | Reference Measurement Channel |
| SCS | Subcarrier spacing |
| SEM | Spectrum Emission Mask |
| TDD | Time Division Duplex |
| UL | Uplink |
| UTRA | Universal Terrestrial Radio Access |

# Chapter 2 Fundamental Measurement

This chapter describes the fundamental functions and commands of the MX887018A/19A. For details of the commands, refer to Chapter 4 “SCPI Command Reference” and Chapter 5 “Native Command Reference”.


2.1 Common Operations ..... 2-2
2.1.1 Selecting application ..... 2-2
2.1.2 Setting ports ..... 2-2
2.1.3 Frequency and level ..... 2-3
2.1.4 Setting transmission signal ..... 2-5
2.1.5 Waveform patterns ..... 2-6
2.1.6 Setting NR sub-6GHz signals ..... 2-6
2.1.7 Setting measurement ..... 2-19
2.1.8 Starting/stopping measurement ..... 2-20
2.2 Transmit Power ..... 2-23
2.3 Occupied Bandwidth ..... 2-25
2.4 Spectrum Emission Mask ..... 2-27
2.5 Adjacent Channel Leakage Power Ratio ..... 2-33
2.6 Modulation Analysis ..... 2-35
2.6.1 Frequency Error ..... 2-36
2.6.2 EVM ..... 2-37
2.6.3 Carrier leakage ..... 2-38
2.6.4 Rho ..... 2-38
2.6.5 In-band emissions for non-allocated RB ..... 2-39
2.6.6 Spectrum Flatness ..... 2-42
2.7 Measurement Results ..... 2-47
2.8 Capturing Waveform Data ..... 2-48
2.9 Sample Programs ..... 2-52
2.9.1 Spectrum Emission Mask ..... 2-52
2.9.2 Modulation Analysis ..... 2-59

# 2.1 Common Operations

This section describes operations that are common to the measurements. Both Native and SCPI commands are described in the introduction to commands.

## 2.1.1 Selecting application

Switch the MU887000A application software to cellular by setting the parameter to CELLULAR using the following command.

```
SYSSEL
:INSTrument[:SELect]
```

Switch the MX887018A/19A measurement standard using the following command. Set the parameter to NR sub-6GHz when a function described in Section 2.2, “Transmit Power” to Section 2.6, “Modulation Analysis” is to be used.

The MX887018A/19A supports the sequence measurement. When performing the NR sub-6GHz measurement using a function described in Chapter 3 “Sequence Measurement”, set the parameter to SEQUENCE and set NR as the sequence measurement configuration.

- Setting Measurement Mode
  ```
  STDSEL
  :CONFigure:CELLular:MEASurement:STANdard
  ```
- Sequence Measurement Configuration
  ```
  SEQMEAS
  :CONFigure:CELLular:SEQuence:SETup
  ```

## 2.1.2 Setting ports

Set the MU887000A test ports to be used. The following command sets both the test port for outputting the downlink signal and the test port for inputting the uplink signals.

```
PORT
:ROUTe:PORT:CONNect:DIRection
```

When setting the sequence table in sequence measurement, the sequence commands set the input and output test port.
The above-mentioned command sets the inputting test port.

## 2.1.3 Frequency and level

Frequency

Set the frequency and channel of the measured signal using the following commands.

The signal sent from the MU887000A to the mobile station is the downlink signal and the signal sent from the mobile station to the MU887000A is the uplink signal.

- Operation Band
  Set the Operation Band on Table 2.1.6-3.
  BAND
  :CONFigure:CELLular:NR:FUNDamental:BAND
- Uplink Channel
  ULCHAN
  :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel
- Uplink Frequency (mobile station Tx)
  ULFREQ
  TXFREQ
  :CONFigure:CELLular:MEASurement:RFSettings:FREQuency
- Downlink Channel
  DLCHAN
  :CONFigure:CELLular:MEASurement:RFSettings:DLCHannel
- Downlink Frequency (mobile station Rx)
  DLFREQ
  RXFREQ
  :CONFigure:CELLular:GENerator:RFSettings:FREQuency
- E-UTRA Uplink Channel
  ULCHAN_EUTRA
  :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa
- E-UTRA Uplink Frequency (mobile station Tx)
  ULFREQ_EUTRA
  :CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa

### Level

Set the level of the signal sent (Tx) from and received (Rx) by the MU887000A using the following commands.

- Output Level
  `OLVL`
  `:CONFigure:CELLular:GENerator:RFSettings:LEVel`
- Input Level
  `ILVL`
  `:CONFigure:CELLular:MEASurement:RFSettings:LEVel`

### Cable loss correction

The loss of coaxial cables can be corrected for the output, input, and measured levels.
Refer to Chapter 3 “Basic Operation” in the *MU887000A TRX Test Module Operation Manual* for an explanation of the commands and loss correction data.

## 2.1.4 Setting transmission signal

To transmit the waveform pattern from MU887000A by using the Cellular application software, load the waveform file into the waveform memory, and then follow the procedure below:

1. Select the waveform file in the waveform memory.
2. Select the waveform pattern in the waveform file selected in step 1.
3. Set the Modulation On/Off and Output On/Off.

Use the following commands to select waveform file and waveform pattern and to set modulation and output On and Off.

- Output On/Off
  `LVL`
  `:CONFigure:CELLular:GENerator:RFSettings:STATe`
- Modulation On/Off
  `MOD`
  `:CONFigure:CELLular:GENerator:BBMode`
- Waveform File Select
  `PACKAGE`
  `:CONFigure:CELLular:GENerator:ARB:PACKage:SELect`
- Waveform Pattern Select
  `DLPAT`
  `:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect`
  `DLPAT_SYNC`
  `:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC`

Use the following commands to load the waveform file into the waveform memory.
Refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

- To load waveform file into the waveform memory
  `:SOURce:GPRF:GENerator:ARB:FILE:LOAD`
- To query the file name in the waveform memory
  `:SOURce:GPRF:GENerator:ARB:WAVeform:NAME`
- To optimize the waveform memory capacity
  `:SOURce:GPRF:GENerator:ARB:WAVeform:DEFRag`
- To delete waveform file in the waveform memory
  `:SOURce:GPRF:GENerator:ARB:WAVeform:DELete`
- To query the waveform memory free space
  `:SOURce:GPRF:GENerator:ARB:WAVeform:FREE`

## 2.1.5 Waveform patterns

To transmit a NR sub-6GHz waveform pattern, specify a file in the MV887018A NR FDD sub-6GHz Downlink Waveforms or the MV887019A NR TDD sub-6GHz Downlink Waveforms as the waveform file.

Refer to Chapter 3, "Waveform File Details" in the *Waveform File for Cellular Application Operation Manual* for an explanation of the MV887018A NR FDD sub-6GHz Downlink Waveforms or the MV887019A NR TDD sub-6GHz Downlink Waveforms.

## 2.1.6 Setting NR sub-6GHz signals

Set the following items to configure the NR sub-6GHz signal.

### Frame Structure

FDD and TDD are defined for the frame structure of the NR sub-6GHz signal. FDD is available for MX887018A, TDD is available for MX887019A.

### Frequency Range

FR1 and FR2 are defined for the frequency range of the NR sub-6GHz signal. Only FR1 is available for MX887018A/19A.

### UL Channel Bandwidth

An NR sub-6GHz system has a variable transmission bandwidth called the channel bandwidth. The following values are available for MX887018A/19A.
5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

### Subcarrier Spacing

Sets the subcarrier spacing (Δf) of PUSCH.
The following values are available for MX887018A/19A.
15, 30, 60 kHz

### DL/UL Periodicity

Sets the output pattern periods of downlink signals and uplink signals. Performs measurements under the assumption that these signal cycles are repeated.

### UL Duration

Sets the UL signal period of DL/UL Periodicity by slot.
Sets the number of slots from the end of DL/UL Periodicity.

### RMC Configuration

Select the target physical channel from the following:
PUSCH: Physical Uplink Shared Channel

UL RMC Waveform

Sets the PUSCH waveform. The following values are available for MX887018A/19A.

CP-OFDM, DFT-s-OFDM

UL RMC Modulation

Sets the modulation scheme for PUSCH. The following values are available for MX887018A/19A.

π/2-BPSK , QPSK, 16QAM, 64QAM

UL RMC Starting RB Number

UL RMC Number of RBs

For the NR sub-6GHz system, a value specified for subcarrier spacing is a signal period. Each signal period is called a “subcarrier” and a set of 12 subcarriers is called a “resource block” (RB).

The target RB is specified using the starting RB number and the number of RBs.

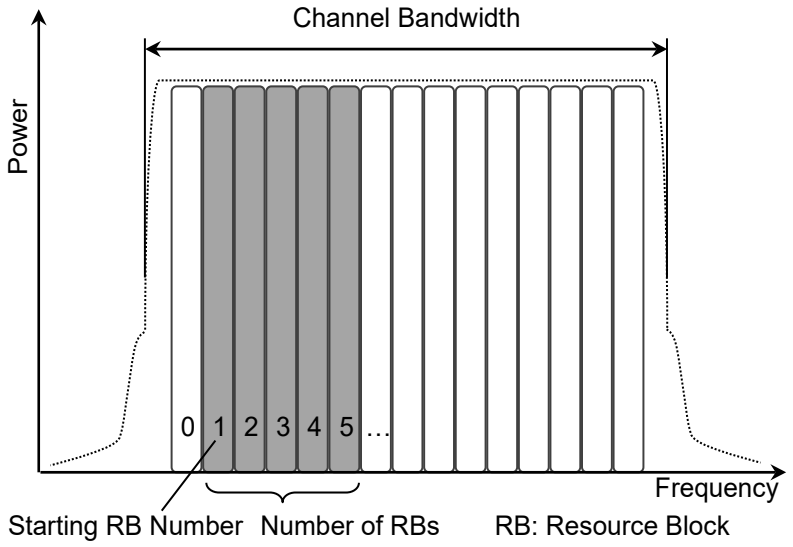



**Figure 2.1.6-1 Target Resource Blocks**

Uplink Channels, Downlink Channels, and Operation Band

The frequency of the signals sent and received by the MU887000A is set by the channel numbers as specified in TS 38.101 5.4.2.3 Channel raster entries for each operating band.

If the Uplink Channel Number setting is changed, the Downlink Channel Number, Operation Band, Downlink Frequency, and Uplink Frequency are changed as well.

Changing Downlink Channel Number setting changes the Uplink Channel Number, Operation Band, Downlink Frequency, and Uplink Frequency settings.

However, when the Uplink Frequency setting is changed, the Downlink Frequency, Uplink and Downlink Channel Numbers, and Operation Band settings are not changed. And, it is the same when the Downlink Frequency setting is changed.

The following table shows the relationship between the Downlink Channel Number and Uplink Channel Number settings.

**Table 2.1.6-1 Relationship between Uplink Channel Number and Downlink Channel Number**

| Operation Band | Uplink Channel Number (ul_ch) and Downlink Channel Number (dl_ch) |
|---|---|
| 1 | dl_ch = ul_ch + 38000 |
| 2, 25 | dl_ch = ul_ch + 16000 |
| 3 | dl_ch = ul_ch + 19000 |
| 5, 8 | dl_ch = ul_ch + 9000 |
| 7 | dl_ch = ul_ch + 24000 |
| 12 | dl_ch = ul_ch + 6000 |
| 20 | dl_ch = ul_ch – 8200 |
| 28 | dl_ch = ul_ch + 11000 |
| 66 | dl_ch = ul_ch + 80000 |
| 70 | dl_ch = ul_ch + 60000 |
| 71 | dl_ch = ul_ch – 9200 |
| 74 | dl_ch = ul_ch + 9600 |
| 34, 38, 39, 40, 41, 50, 51, 77, 78, 79 | dl_ch = ul_ch |

Setting the Uplink Channel Number ($N_{UL}$) or the Downlink Channel Number ($N_{DL}$) determines the Operation Band as in Table 2.1.6-3.

Setting the Uplink Channel Number ($N_{UL}$) or the Downlink Channel Number ($N_{DL}$) determines the following values as in Table 2.1.6-2.

$\Delta F_{Global}$, $F_{REF\text{-}Offs}$, $N_{REF\text{-}Offs}$ ($N_{REF}$ indicates $N_{UL}$ or $N_{DL}$ .)

Setting the Uplink Channel Number ($N_{UL}$) or the Downlink Channel Number ($N_{DL}$) determines the Frame Structure as in Table 2.1.6-4.

**Table 2.1.6-2 NR-ARFCN parameters for the global frequency raster (Reprinted from 3GPP TS 38.101, Table 5.4.2.1-1)**

| Frequency range | $\Delta F_{Global}$ [kHz] | $F_{REF-Offs}$ [MHz] | $N_{REF-Offs}$ | Range of $N_{REF}$ |
|---|---|---|---|---|
| 0 – 3000 MHz | 5 | 0 | 0 | 0 – 599999 |
| 3000 – 24250 MHz | 15 | 3000 | 600000 | 600000 – 2016666 |

When Downlink Channel Number is changed, the MX887018A/19A executes the following processes:

1. Determines values of following parameters based on Downlink Channel Number ($N_{DL}$).

   $\Delta F_{Global}$, $F_{REF-Offs}$, $N_{REF-Offs}$

2. Calculates Downlink frequency ($F_{DL}$) from following equation.

   $F_{DL} = F_{REF-Offs} + (\Delta F_{Global} / 1000) \times (N_{DL} - N_{REF-Offs})$

3. Sets Downlink frequency at MU887000A.
4. Refer to Table 2.1.6-3 and find the range of Downlink Channel Numbers of the currently set Operation Band. Then check if the specified Downlink Channel Number ($N_{DL}$) is within the range.
5. If $N_{DL}$ is within the range in Step 4, find Uplink Channel Number ($N_{UL}$) from the Operation Band and Downlink Channel Number ($N_{DL}$) in Table 2.1.6-1.
6. If $N_{DL}$ is not within the range in Step 4, refer to Table 2.1.6-3 and find the Operation Band which the Downlink Channel Number ($N_{DL}$) belongs to. Then change the currently set Operation Band to the appropriate one. When you find multiple Operation Bands which the $N_{DL}$ belongs to, select the Operation Band with the smallest number. Find the Uplink Channel Number ($N_{UL}$) from the Operation Band and Downlink Channel Number ($N_{DL}$) in Table 2.1.6-1.
7. Determines values of following parameters based Uplink Channel Number ($N_{UL}$).

   $\Delta F_{Global}$, $F_{REF-Offs}$, $N_{REF-Offs}$

8. Calculates Uplink Frequency ($F_{UL}$) from following equation.

   $F_{UL} = F_{REF-Offs} + (\Delta F_{Global} / 1000) \times (N_{UL} - N_{REF-Offs})$

9. Sets Uplink frequency ($F_{UL}$) at MU887000A.

When Uplink Channel is changed, the MX887018A/19A executes the following processing:

1. Determines values of following parameters based on Uplink Channel Number ($N_{UL}$).

   $\Delta F_{Global}$, $F_{REF\text{-}Offs}$, $N_{REF\text{-}Offs}$

2. Calculates Uplink frequency ($F_{UL}$) from following equation.

   $F_{UL} = F_{REF\text{-}Offs} + (\Delta F_{Global} / 1000) \times (N_{UL} - N_{REF\text{-}Offs})$

3. Sets Uplink frequency at MU887000A.

4. Refer to Table 2.1.6-3 and find the range of Uplink Channel Numbers of the currently set Operation Band. Then check if the specified Uplink Channel Number ($N_{UL}$) is within the range.

5. If $N_{UL}$ is within the range in Step 4, find Downlink Channel Number ($N_{DL}$) from the Operation Band and Uplink Channel Number ($N_{UL}$) in Table 2.1.6-1.

6. If $N_{UL}$ is not within the range in Step 4, refer to Table 2.1.6-3 and find the Operation Band which the Uplink Channel Number ($N_{UL}$) belongs to. Then change the currently set Operation Band to the appropriate one. When you find multiple Operation Bands which the $N_{UL}$ belongs to, select the Operation Band with the smallest number. Find the Downlink Channel Number ($N_{DL}$) from the Operation Band and Uplink Channel Number ($N_{UL}$) in Table 2.1.6-1.

7. Determines values of following parameters based on Downlink Channel Number ($N_{DL}$).

   $\Delta F_{Global}$, $F_{REF\text{-}Offs}$, $N_{REF\text{-}Offs}$

8. Calculates Downlink frequency ($F_{DL}$) from following equation.

   $F_{DL} = F_{REF\text{-}Offs} + (\Delta F_{Global} / 1000) \times (N_{DL} - N_{REF\text{-}Offs})$

9. Sets Downlink frequency ($F_{DL}$) at MU887000A.

The operation bands that the MX887018A/19A supports are as in the following table.

**Table 2.1.6-3 NR Channel Numbers and TX-RX Frequency Separation**

| Operation Band | Freq Sep (MHz) | Downlink | | | Uplink | | |
|---|---|---|---|---|---|---|---|
| | | $F_{DL\_low}$ (MHz) | $F_{DL\_high}$ (MHz) | Range of $N_{DL}$ | $F_{UL\_low}$ (MHz) | $F_{UL\_high}$ (MHz) | Range of $N_{UL}$ |
| 1 | 190 | 2110 | 2170 | 422000 to 434000 | 1920 | 1980 | 384000 to 396000 |
| 2 | 80 | 1930 | 1990 | 386000 to 398000 | 1850 | 1910 | 370000 to 382000 |
| 3 | 95 | 1805 | 1880 | 361000 to 376000 | 1710 | 1785 | 342000 to 357000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 5 | 45 | 869 | 894 | 173800 to 178800 | 824 | 849 | 164800 to 169800 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 7 | 120 | 2620 | 2690 | 524000 to 538000 | 2500 | 2570 | 500000 to 514000 |
| 8 | 45 | 925 | 960 | 185000 to 192000 | 880 | 915 | 176000 to 183000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 12 | 30 | 729 | 746 | 145800 to 149200 | 699 | 716 | 139800 to 143200 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 20 | -41 | 791 | 821 | 158200 to 164200 | 832 | 862 | 166400 to 172400 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 25 | 80 | 1930 | 1995 | 386000 to 399000 | 1850 | 1915 | 370000 to 383000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 28 | 55 | 758 | 803 | 151600 to 160600 | 703 | 748 | 140600 to 149600 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 34 | 0 | 2010 | 2025 | 402000 to 405000 | 2010 | 2025 | 402000 to 405000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 38 | 0 | 2570 | 2620 | 514000 to 524000 | 2570 | 2620 | 514000 to 524000 |
| 39 | 0 | 1880 | 1920 | 376000 to 384000 | 1880 | 1920 | 376000 to 384000 |
| 40 | 0 | 2300 | 2400 | 460000 to 480000 | 2300 | 2400 | 460000 to 480000 |
| 41 | 0 | 2496 | 2690 | 499200 to 538000 | 2496 | 2690 | 499200 to 538000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 50 | 0 | 1432 | 1517 | 286400 to 303400 | 1432 | 1517 | 286400 to 303400 |
| 51 | 0 | 1427 | 1432 | 285400 to 286400 | 1427 | 1432 | 285400 to 286400 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 66 | 400 | 2110 | 2200 | 422000 to 440000 | 1710 | 1780 | 342000 to 356000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 70 | 300 | 1995 | 2020 | 399000 to 404000 | 1695 | 1710 | 339000 to 342000 |
| 71 | -46 | 617 | 652 | 123400 to 130400 | 663 | 698 | 132600 to 139600 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 74 | 48 | 1475 | 1518 | 295000 to 303600 | 1427 | 1470 | 285400 to 294000 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 77*1 | 0 | 3300 | 3800 | 620000 to 653333 | 3300 | 3800 | 620000 to 653333 |
| 77*2 | 0 | 3300 | 4200 | 620000 to 680000 | 3300 | 4200 | 620000 to 680000 |
| 78 | 0 | 3300 | 3800 | 620000 to 653333 | 3300 | 3800 | 620000 to 653333 |
| 79*2 | 0 | 4400 | 5000 | 693334 to 733333 | 4400 | 5000 | 693334 to 733333 |

*1: MU887000A/01A without 001 option.

*2: MU887000A/01A with 001 option or MU887002A

**Table 2.1.6-4 Relationship between Operation Band and Frame Structure**

| Operation Band | Frame Structure |
|---|---|
| 1 to 3 | FDD |
| 5 | FDD |
| 7 to 8 | FDD |
| 12, 20, 25, 28 | FDD |
| 34 | TDD |
| 38 to 41 | TDD |
| 50, 51 | TDD |
| 66, 70, 71, 74 | FDD |
| 77 to 79 | TDD |

Cell ID

Sets the Cell ID.

Antenna port

Sets the Antenna port.

PUSCH mapping type

Sets the PUSCH mapping type

DMRS Duration

Sets the DMRS Duration.

DMRS add pos

Sets the DMRS add pos.

DMRS typeA pos

If the type A is selected for the PUSCH mapping type, sets DMRS typeA pos for that case.

DMRS Configuration Type

Sets the DMRS Configuration Type.

Group Hopping

Turns On or Off DMRS Group Hopping. This is valid only when UL RMC Waveform is set to DFT-s-OFDM.

Sequence Hopping

Turns On or Off DMRS Sequence Hopping. This is valid only when UL RMC Waveform is set to DFT-s-OFDM.

Pre Phase Correction

Turns On or Off Pre Phase Correction. Set this parameter to OFF, when the uplink signal is up-converted to the RF frequency without phase compensation.

RAN Operation

Sets the Operation mode of Radio Access Network.

EN-DC Measurement Mode
Sets the Measurement mode of EN-DC.

E-UTRA UL Channel Bandwidth
Sets the channel bandwidth of E-UTRA. The following values are available.
1.4, 3, 5, 10, 15, 20 MHz

E-UTRA UL Starting RB
E-UTRA UL Number of RBs
Sets the E-UTRA RB with the UL starting RB number and the UL number of RBs.

E-UTRA Frame Structure
FDD and TDD are defined for the frame structure of the E-UTRA.
FDD is for MX887018A, and TDD for MX887019A.

E-UTRA Group Hopping
Turns On or Off E-UTRA DMRS Group Hopping.

E-UTRA Cyclic shift
Sets the E-UTRA DMRS Cyclic shift.

E-UTRA Cell ID
Sets the E-UTRA Cell ID.

E-UTRA Delta SS
Sets the E-UTRA Delta SS.

E-UTRA Uplink Channel
The E-UTRA Frequency is set by the channel numbers as specified in TS 36.101 5.7.3 Carrier frequency and EARFCN.

When the E-UTRA Uplink Channel Number setting is changed, Uplink Frequency and Frame Structure are changed as well. However, when the Uplink Frequency setting is changed, the Channel Number and Frame Structure settings are not changed.

The Operation Band and the following values are determined according to the Uplink Channel Number and Table 2.1.6-5.
Uplink lowest frequency ($F_{UL\_low}$), Uplink offset number ($N_{Offs\text{-}UL}$)

The Frame Structure is determined according to the Operation Band and Table 2.1.6-6.

When Uplink Channel Number is changed, the MX887018A/19A-001 executes the following processing:

1. Calculate the following values from the Uplink Channel Number and Table 2.1.6-5.
   Uplink lowest frequency ($F_{UL\_low}$), Uplink offset number ($N_{Offs\text{-}UL}$)
2. Calculate the Uplink Frequency by the following equation.

$$F_{UL} = F_{UL\_low} + 0.1 \times (N_{UL} - N_{Offs\text{-}UL})$$

3. Set the Uplink Frequency to the MU887000A.

**Table 2.1.6-5 E-UTRA channel numbers and Default UE TX-RX frequency separation (Reprinted from 3GPP TS 36.101 Table 5.7.3-1 and Table 5.7.4-1)**

| Band | Freq Sep (MHz) | Downlink | | | Uplink | | |
|---|---|---|---|---|---|---|---|
| | | $F_{DL\_low}$ (MHz) | $N_{Offs\text{-}DL}$ | Range of $N_{DL}$ | $F_{UL\_low}$ (MHz) | $N_{Offs\text{-}UL}$ | Range of $N_{UL}$ |
| 1 | 190 | 2110 | 0 | 0 to 599 | 1920 | 18000 | 18000 to 18599 |
| 2 | 80 | 1930 | 600 | 600 to 1199 | 1850 | 18600 | 18600 to 19199 |
| 3 | 95 | 1805 | 1200 | 1200 to 1949 | 1710 | 19200 | 19200 to 19949 |
| 4 | 400 | 2110 | 1950 | 1950 to 2399 | 1710 | 19950 | 19950 to 20399 |
| 5 | 45 | 869 | 2400 | 2400 to 2649 | 824 | 20400 | 20400 to 20649 |
| 6 | 45 | 875 | 2650 | 2650 to 2749 | 830 | 20650 | 20650 to 20749 |
| 7 | 120 | 2620 | 2750 | 2750 to 3449 | 2500 | 20750 | 20750 to 21449 |
| 8 | 45 | 925 | 3450 | 3450 to 3799 | 880 | 21450 | 21450 to 21799 |
| 9 | 95 | 1844.9 | 3800 | 3800 to 4149 | 1749.9 | 21800 | 21800 to 22149 |
| 10 | 400 | 2110 | 4150 | 4150 to 4749 | 1710 | 22150 | 22150 to 22749 |
| 11 | 48 | 1475.9 | 4750 | 4750 to 4949 | 1427.9 | 22750 | 22750 to 22949 |
| 12 | 30 | 729 | 5010 | 5010 to 5179 | 699 | 23010 | 23010 to 23179 |
| 13 | –31 | 746 | 5180 | 5180 to 5279 | 777 | 23180 | 23180 to 23279 |
| 14 | –30 | 758 | 5280 | 5280 to 5379 | 788 | 23280 | 23280 to 23379 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 17 | 30 | 734 | 5730 | 5730 to 5849 | 704 | 23730 | 23730 to 23849 |
| 18 | 45 | 860 | 5850 | 5850 to 5999 | 815 | 23850 | 23850 to 23999 |
| 19 | 45 | 875 | 6000 | 6000 to 6149 | 830 | 24000 | 24000 to 24149 |
| 20 | –41 | 791 | 6150 | 6150 to 6449 | 832 | 24150 | 24150 to 24449 |
| 21 | 48 | 1495.9 | 6450 | 6450 to 6599 | 1447.9 | 24450 | 24450 to 24599 |
| 22 | 48 | 3510 | 6600 | 6600 to 7399 | 3410 | 24600 | 24600 to 25399 |
| 23 | 100 | 2180 | 7500 | 7500 to 7699 | 2000 | 25500 | 25500 to 25699 |
| 24 | 180 | 1525 | 7700 | 7700 to 8039 | 1626.5 | 25700 | 25700 to 26039 |
| 25 | –101.5 | 1930 | 8040 | 8040 to 8689 | 1850 | 26040 | 26040 to 26689 |
| 26 | 45 | 859 | 8690 | 8690 to 9039 | 814 | 26690 | 26690 to 27039 |
| 27 | 45 | 852 | 9040 | 9040 to 9209 | 807 | 27040 | 27040 to 27209 |
| 28 | 55 | 758 | 9210 | 9210 to 9659 | 703 | 27210 | 27210 to 27659 |
| 29 | N/A | 717 | 9660 | 9660 to 9769 | N/A | N/A | N/A |
| 30 | 45 | 2350 | 9770 | 9770 to 9869 | 2305 | 27660 | 27660 to 27759 |
| 31 | 10 | 462.5 | 9870 | 9870 to 9919 | 452.5 | 27760 | 27760 to 27809 |
| 32 | N/A | 1452 | 9920 | 9920 to 10359 | N/A | N/A | N/A |
| 33 | 0 | 1900 | 36000 | 36000 to 36199 | 1900 | 36000 | 36000 to 36199 |
| 34 | 0 | 2010 | 36200 | 36200 to 36349 | 2010 | 36200 | 36200 to 36349 |
| 35 | 0 | 1850 | 36350 | 36350 to 36949 | 1850 | 36350 | 36350 to 36949 |
| 36 | 0 | 1930 | 36950 | 36950 to 37549 | 1930 | 36950 | 36950 to 37549 |
| 37 | 0 | 1910 | 37550 | 37550 to 37749 | 1910 | 37550 | 37550 to 37749 |
| 38 | 0 | 2570 | 37750 | 37750 to 38249 | 2570 | 37750 | 37750 to 38249 |
| 39 | 0 | 1880 | 38250 | 38250 to 38649 | 1880 | 38250 | 38250 to 38649 |
| 40 | 0 | 2300 | 38650 | 38650 to 39649 | 2300 | 38650 | 38650 to 39649 |
| 41 | 0 | 2496 | 39650 | 39650 to 41589 | 2496 | 39650 | 39650 to 41589 |
| 42 | 0 | 3400 | 41590 | 41590 to 43589 | 3400 | 41590 | 41590 to 43589 |
| 43 | 0 | 3600 | 43590 | 43590 to 45589 | 3600 | 43590 | 43590 to 45589 |

**Table 2.1.6-5 E-UTRA channel numbers and Default UE TX-RX frequency separation (Reprinted from 3GPP TS 36.101 Table 5.7.3-1 and Table 5.7.4-1) (Cont'd)**

| Band | Freq Sep (MHz) | Downlink | | | Uplink | | |
|---|---|---|---|---|---|---|---|
| | | $F_{DL\_low}$ (MHz) | $N_{Offs-DL}$ | Range of $N_{DL}$ | $F_{UL\_low}$ (MHz) | $N_{Offs-UL}$ | Range of $N_{UL}$ |
| 44 | 0 | 703 | 45590 | 45590 to 46589 | 703 | 45590 | 45590 to 46589 |
| 45 | 0 | 1447 | 46590 | 46590 to 46789 | 1447 | 46590 | 46590 to 46789 |
| 46 | 0 | 5150 | 46790 | 46790 to 54539 | 5150 | 46790 | 46790 to 54539 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 48 | 0 | 3550 | 55240 | 55240 to 56739 | 3550 | 55240 | 55240 to 56739 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 65 | 190 | 2110 | 65536 | 65536 to 66435 | 1920 | 131072 | 131072 to 131971 |
| 66 | 400 | 2110 | 66436 | 66436 to 67335 | 1710 | 131972 | 131972 to 132671 |
| 67 | N/A | 738 | 67336 | 67336 to 67535 | N/A | N/A | N/A |
| 68 | 55 | 753 | 67536 | 67536 to 67835 | 698 | 132672 | 132672 to 132971 |
| 69 | N/A | 2570 | 67836 | 67836 to 68335 | N/A | N/A | N/A |
| 70 | 300 | 1995 | 68336 | 68336 to 68585 | 1695 | 132972 | 132972 to 133121 |
| 71 | –46 | 617 | 68586 | 68586 to 68935 | 663 | 133122 | 133122 to 133471 |
| … | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 250 | 0 | 3550 | 253644 | 253644 to 255143 | 3550 | 253644 | 253644 to 255143 |
| 252* | N/A | 5150 | 255144 | 255144 to 256143 | N/A | N/A | N/A |
| 255* | N/A | 5725 | 260894 | 260894 to 262143 | N/A | N/A | N/A |

*: MU887000A/01A with 001 option or MU887002A.

**Table 2.1.6-6 Relationship between Band and Frame Structure**

| Band | Frame Structure |
|---|---|
| 1 to 14 | FDD |
| 17 to 32 | FDD |
| 33 to 46 | TDD |
| 48 | TDD |
| 65 to 71 | FDD |
| 250 | TDD |
| 252, 255 | FDD |

Use the following commands to set the NR sub-6GHz signals

- Frame Structure
  `FRAMETYPE`
  `:CONFigure:CELLular:NR:FSTRucture`
- Frequency Range
  `FREQRANGE`
  `:CONFigure:CELLular:NR:FREQuency:RANGe`
- UL Channel Bandwidth
  `ULBANDWIDTH`
  `:CONFigure:CELLular:NR:CBANdwidth`
- UL Subcarrier Spacing
  `ULSCS`
  `:CONFigure:CELLular:NR:SCS`
- DL/UL Periodicity
  `DLULPERIOD`
  `:CONFigure:CELLular:NR:DLUL:PERiod`
- UL Duration
  `ULDURATION`
  `:CONFigure:CELLular:NR:UL:DURation`
- RMC Configuration
  `CHCONFIG`
  `:CONFigure:CELLular:NR:CTYPe`
- UL RMC Waveform
  `ULWAVEFORM`
  `:CONFigure:CELLular:NR:WAVeform`
- UL RMC Modulation
  `ULRMC_MOD`
  `:CONFigure:CELLular:NR:MODulation:MSCHeme`
- UL RMC Number of RBs
  `ULRMC_RB`
  `:CONFigure:CELLular:NR:RBALlocation:NRB`
- UL RMC Starting RB
  `ULRB_START`
  `:CONFigure:CELLular:NR:RBALlocation:ORB`
- Cell ID
  `CELLID`
  `:CONFigure:CELLular:NR:CID`
- Antenna port
  `ULDMRSPORT`
  `:CONFigure:CELLular:NR:DMRS:PORT`
- PUSCH mapping type
  `ULMAPPINGTYPE`
  `:CONFigure:CELLular:NR:PUSCh:MTYPe`

- DMRS Duration
  ULDMRSDURATION
  :CONFigure:CELLular:NR:DMRS:DURation
- DMRS add pos
  ULDMRSADDPOS
  :CONFigure:CELLular:NR:DMRS:ADDPos
- DMRS typeA pos
  ULDMRSTYPEAPOS
  :CONFigure:CELLular:NR:DMRS:TYPE:APOSition
- UL DMRS Config Type
  ULDMRSTYPE
  :CONFigure:CELLular:NR:DMRS:TYPE
- Group Hopping
  GROUPHOPPING
  :CONFigure:CELLular:NR:DMRS:GHOPping
- Sequence Hopping
  SEQUENCEHOPPING
  :CONFigure:CELLular:NR:DMRS:SHOPping
- Pre Phase Correction
  PREPHASECORR
  :CONFigure:CELLular:NR:PCRRection
- RAN Operation
  RANOP
  :CONFigure:CELLular:NR:RANoperation
- EN-DC Measurement Mode
  ENDCMEASMODE
  :CONFigure:CELLular:NR:ENDC:MMODe
- E-UTRA UL Channel Bandwidth
  ULBANDWIDTH_EUTRA
  :CONFigure:CELLular:NR:EUTRa:CBANdwidth
- E-UTRA UL Number of RBs
  ULRMC_RB_EUTRA
  :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB
- E-UTRA UL Starting RB
  ULRB_START_EUTRA
  :CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB
- E-UTRA Frame Structure
  FRAMETYPE_EUTRA
  :CONFigure:CELLular:NR:EUTRa:FSTRucture
- E-UTRA Group Hopping
  GROUPHOPPING_EUTRA
  :CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping

- E-UTRA Cyclic shift
  CSHIFT_EUTRA
  :CONFigure:CELLular:NR:EUTRa:DMRS:CSHift
- E-UTRA Cell ID
  CELLID_EUTRA
  :CONFigure:CELLular:NR:EUTRa:CID
- E-UTRA Delta SS
  DELTASS_EUTRA
  :CONFigure:CELLular:NR:EUTRa:DSS
- E-UTRA Uplink Channel
  ULCHAN_EUTRA
  :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa

## 2.1.7 Setting measurement

Set the following measurement items.

- Trigger Source
  TRGSRC
  :TRIGger:CELLular:NR:FUNDamental:SOURce
- Trigger Level
  TRGLVL
  :TRIGger:CELLular:NR:FUNDamental:LEVel
- Trigger Delay
  TRGDLY
  :TRIGger:CELLular:NR:FUNDamental:DELay
- Trigger Timeout
  TRGTOUT
  :TRIGger:CELLular:NR:FUNDamental:TOUT
- Mininum Trigger Gap
  TRGMGAP
  :TRIGger:CELLular:NR:FUNDamental:MGAP
- Measurement Offset
  MEASOFFSET
  :CONFigure:CELLular:NR:FUNDamental:MOFFset

Use the following command when not measuring.

- Setting all measurement items to off
  ALLMEASITEMS_OFF
  :CONFigure:CELLular:NR:FUNDamental:AMITems:OFF

## 2.1.8 Starting/stopping measurement

### Starting measurement

To start measurement, send the following command.
The status indication lamp 3 of MU887000A is on during the execution of measurement or analysis. For the explanation of the status lamp, refer to Appendix D "Status Indication of lamps" in *the MU887000A TRX Test Module Operation Manual.*

- Measurement Start
  `SNGLS`
  `:INITiate:CELLular:MEASurement:SINGle`
- Measurement Start (Synchronization)
  `SWP`

### Stopping measurement

To stop measurement, send the following command.

- Measurement Stop
  `MEASSTOP`
  `:ABORt:CELLular:MEASurement`

### Checking measurement status

Query the measurement status and errors using the following commands.

- Tx Measurement Status
  `TXMSTAT`
- Measurement Status
  `MSTAT`
  `:FETCh:CELLular:MEASurement:STATe`

**Table 2.1.8-1 Query Response**

| Response | Description |
|---|---|
| 0 | Measurement completed normally |
| 2 | Level exceeded<br>The MU887000A receive level is higher than the set input level. |
| 5 | Synchronization word not detected<br>No reference signal was detected for Uplink frame synchronization. |
| 9 | Measurement in progress or not executed |
| 12 | Tx measurement timeout<br>No trigger occurred before measurement timed out. |
| 20 | Measurement cannot be performed<br>The measurement cannot be performed because the currently set measurement band includes unwanted signals. |

The measurement status and errors can be queried using the status registers.
Refer to Chapter 3 “Fundamental Operation” in the *MU887000A TRX Test Module Operation Manual* for an explanation of the status registers.
The allocations of MX887018A/19A status registers are described in the following tables.



Native command mode

**Table 2.1.8-2 Bit Definition of End Event Status Register (Signal Generator)**

| Bit | Description |
|---|---|
| 7 to 1 | Not used and always set to 0. |
| 0 | Changed to 1 at end of reading waveform file |

**Table 2.1.8-3 Bit Definition of End Event Status Register (Measurement)**

| Bit | Description |
|---|---|
| 7 to 2 | Not used and always set to 0. |
| 1 | Changed to 1 after trigger prepared |
| 0 | Changed to 1 when measurement preparation completed |

**Table 2.1.8-4 Bit Definition of Error Event Status Register (Signal Generator)**

| Bit | Description |
|---|---|
| 7 to 1 | Not used and always set to 0. |
| 0 | Changed to 1 at error in read waveform file |

**Table 2.1.8-5 Bit Definition of Error Event Status Register (Measurement)**

| Bit | Description |
|---|---|
| 7 to 3 | Not used and always set to 0. |
| 2 | Changed to 1 at measurement timeout |
| 1 | Changed to 1 when measurement result under level |
| 0 | Changed to 1 when measurement result over level |

SCPI Command mode

**Table 2.1.8-6 Bit Definition of Signal Generator Status Register**

| Bit | Description |
|---|---|
| 16 to 1 | Not used and always set to 0. |
| 0 | Changed to 1 while reading file |

**Table 2.1.8-7 Bit Definition of Measurement Status Register**

| Bit | Description |
|---|---|
| 16 to 2 | Not used and always set to 0. |
| 1 | Changed to 1 while preparing trigger |
| 0 | Changed to 1 during measurement |

**Table 2.1.8-8 Bit Definition of Signal Generator Questionable Register**

| Bit | Description |
|---|---|
| 16 to 1 | Not used and always set to 0. |
| 0 | Changed to 1 at error in read file |

**Table 2.1.8-9 Bit Definition of Measurement Questionable Register**

| Bit | Description |
|---|---|
| 16 to 3 | Not used and always set to 0. |
| 2 | Changed to 1 at measurement timeout |
| 1 | Changed to 1 when measurement result under level |
| 0 | Changed to 1 when measurement result over level |

# 2.2 Transmit Power

The Transmit Power measures the power in the Channel Bandwidth specified in 5.3 and Measurement Bandwidth specified in Table 6.3.1-1 of 3GPP TS 38.101-1 (V16.5.0).



**Table 2.2-1 Transmit Power Measurement Bandwidth (MHz)**

| Channel Bandwidth (MHz) | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measurement Bandwidth (MHz) | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

In Transmit Power measurement for Intra-Band Contiguous EN-DC, the bandwidth (ENBW) is calculated by the following equation.
ENBW = f_endc_rightedge − f_endc_leftedge
However, it is rounded to a value in the following range.
NR BW + LTE BW – 10 kHz ≤ ENBW ≤ NR BW + LTE BW + 10 kHz

f_leftedge(nr) = NR UL frequency – NR channel bandwidth / 2
f_rightedge(nr) = NR UL frequency + NR channel bandwidth / 2

f_leftedge(eutra) = LTE UL frequency – LTE channel bandwidth / 2
f_rightedge(eutra) = LTE UL frequency + LTE channel bandwidth / 2

f_endc_leftedge = min(f_leftedge(nr), f_leftedge(eutra))
f_endc_rightedge = max(f_rightedge(nr), f_rightedge(eutra))

**Table 2.2-2 Channel Power Measurement Bandwidth (MHz)**

| Channel Bandwidth [MHz] | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measurement Bandwidth (MHz) | 4.515 | 9.375 | 14.235 | 19.095 | 23.955 | 28.815 | 38.895 | 48.615 | 58.35 | 68.07 | 78.15 | 88.23 | 98.31 |

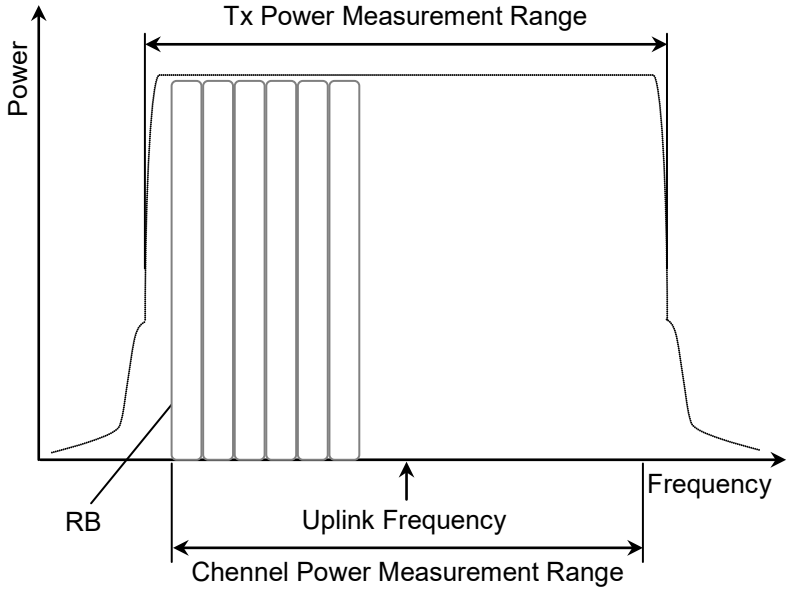



**Figure 2.2-1 Tx Power Measurement Range**

Set the following parameter to measure the Tx Power.

Measurement enable and measurement count

Enable Tx Power measurement and specify the measurement count. The Tx Power is measured for 1 subframe (1 ms) at each measurement count.

```
PWR_SET
:CONFigure:CELLular:NR:FUNDamental:POWer:SET
```

Use the following commands to query the Tx power measurement results.

- Tx Power (Tx Power Result)

```
POWER
:FETCh:CELLular:NR:FUNDamental:POWer:TXPower
```

- Channel Power (Channel Power Result)

```
CHPWR
:FETCh:CELLular:NR:FUNDamental:POWer:CHPower
```

# 2.3 Occupied Bandwidth

Occupied Bandwidth is the bandwidth with a specific proportion of the total measured power.



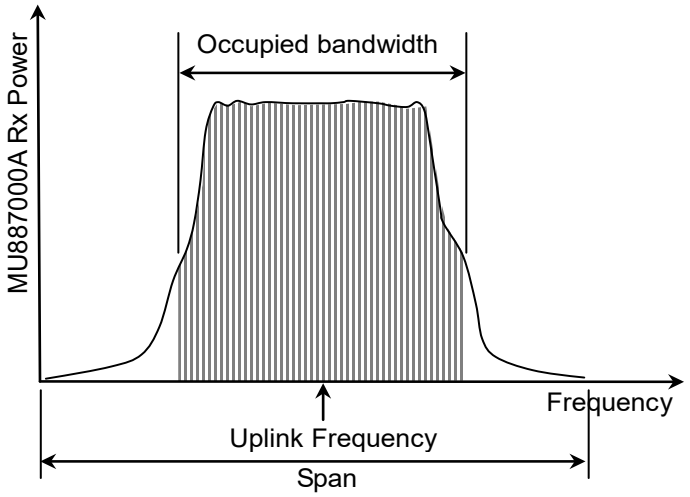



**Figure 2.3-1 Occupied Bandwidth**

The Occupied Bandwidth measurement settings are:

Span

The frequency span is determined by the channel bandwidth setting, referring to Section 2.1.6 “Setting NR sub-6GHz signals”.

**Table 2.3-1 Occupied Bandwidth Measurement Frequency Range**

| **Channel Bandwidth** | **5** | **10** | **15** | **20** | **25** | **30** | **40** |
|---|---|---|---|---|---|---|---|
| Span (MHz) | 10.0159 | 20.0134 | 30.0110 | 40.0085 | 50.0061 | 60.0159 | 80.0110 |
| **Channel Bandwidth** | **50** | **60** | **70** | **80** | **90** | **100** | |
| Span (MHz) | 100.0061 | 120.0134 | 140.009 | 160.0159 | 180.0110 | 200.0061 | |

**Table 2.3-2 Occupied Bandwidth Measurement Frequency Range for Intra-Band Contiguous EN-DC**

| E-UTRA BW [MHz] / BW [MHz] | 1.4 | 3 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|
| 5 | 12.82348633 | 16.04614258 | 20.07446289 | 30.14526367 | 40.08178711 | 50.15258789 |
| 10 | 22.89428711 | 26.11694336 | 30.14526367 | 40.08178711 | 50.15258789 | 60.08911133 |
| 15 | 32.83081055 | 36.0534668 | 40.08178711 | 50.15258789 | 60.08911133 | 70.02563477 |
| 20 | 42.90161133 | 46.12426758 | 50.15258789 | 60.08911133 | 70.02563477 | 80.09643555 |
| 25 | 52.83813477 | 56.06079102 | 60.08911133 | 70.02563477 | 80.09643555 | 90.03295898 |
| 30 | 62.90893555 | 66.1315918 | 70.02563477 | 80.09643555 | 90.03295898 | 100.1037598 |
| 40 | 82.91625977 | 86.13891602 | 90.03295898 | 100.1037598 | 110.0402832 | 120.111084 |
| 50 | 102.923584 | 106.1462402 | 110.0402832 | 120.111084 | 130.0476074 | 140.1184082 |
| 60 | 122.9309082 | 126.1535645 | 130.0476074 | 140.1184082 | 150.0549316 | 160.1257324 |
| 70 | 142.9382324 | 146.0266113 | 150.0549316 | 160.1257324 | 170.0622559 | 180.1330566 |
| 80 | 162.9455566 | 166.0339355 | 170.0622559 | 180.1330566 | 190.0695801 | 200.1403809 |
| 90 | 182.9528809 | 186.0412598 | 190.0695801 | 200.1403809 | 210.0769043 | 220.1477051 |
| 100 | 202.8259277 | 206.048584 | 210.0769043 | 220.1477051 | 230.0842285 | 240.020752 |

Occupied Bandwidth power ratio

The power ratio (occupied ratio) for determining the Occupied Bandwidth is 99.0%.

Measurement enable and measurement count

Enable Occupied Bandwidth measurement and specify the measurement count. The Occupied Bandwidth is measured for 1 subframe (1 ms) at each measurement count.

```
OBW_SET
:CONFigure:CELLular:NR:FUNDamental:OBW:SET
```

Use the following command to query the results of Occupied Bandwidth measurement.

- OBW Result

```
OBW
:FETCh:CELLular:NR:FUNDamental:OBW
```

- OBW Frequency Result

```
OBWFREQ
:FETCh:CELLular:NR:FUNDamental:OBW:FREQuency
```

# 2.4 Spectrum Emission Mask

Spectrum Emission Mask measurement measures the peak level, frequency, and margin at the frequency range specified in TS 38.101-1 (V16.5.0) 6.5.2.2 Spectrum Emission Mask.

For Intra-Band Contiguous EN-DC, the peak level, frequency, and margin are measured in the frequency range specified in TS38.521-3 (V16.4.0) 6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC.

When using the MX887018A/19A, the spectrum emission mask frequency ranges are called Range 1, Range 2, Range 3, and Range 4 starting sequentially from the end of the channel bandwidth.

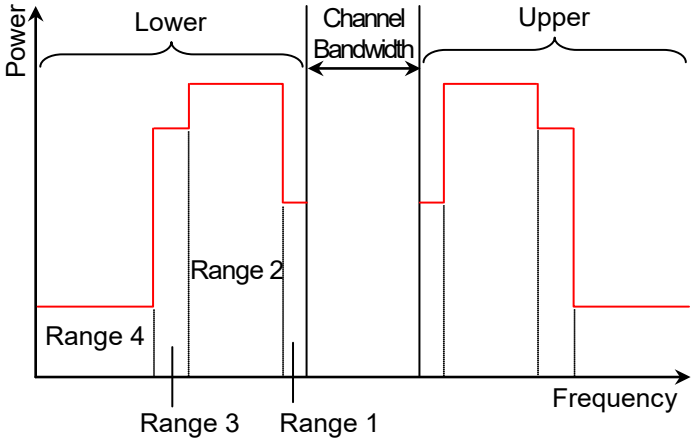



**Figure 2.4-1 Mask Range of Spectrum Emission Mask**

The frequency ranges of Range 1 to 4 vary depending on the channel bandwidth.

**Table 2.4-1 Frequency Ranges of Range 1 to 4**

| | Frequency Ranges | | | |
|---|---|---|---|---|
| **Channel Bandwidth (MHz)** | **Range 1** | **Range 2** | **Range 3** | **Range 4** |
| 5 | 0 to 1 MHz | 1 to 5 MHz | 5 to 6 MHz | 6 to 10 MHz |
| 10 | 0 to 1 MHz | 1 to 5 MHz | 5 to 10 MHz | 10 to 15 MHz |
| 15 | 0 to 1 MHz | 1 to 5 MHz | 5 to 15 MHz | 15 to 20 MHz |
| 20 | 0 to 1 MHz | 1 to 5 MHz | 5 to 20 MHz | 20 to 25 MHz |
| 25 | 0 to 1 MHz | 1 to 5 MHz | 5 to 25 MHz | 25 to 30 MHz |
| 30 | 0 to 1 MHz | 1 to 5 MHz | 5 to 30 MHz | 30 to 35 MHz |
| 40 | 0 to 1 MHz | 1 to 5 MHz | 5 to 40 MHz | 40 to 45 MHz |
| 50 | 0 to 1 MHz | 1 to 5 MHz | 5 to 50 MHz | 50 to 55 MHz |
| 60 | 0 to 1 MHz | 1 to 5 MHz | 5 to 60 MHz | 60 to 65 MHz |
| 70 | 0 to 1 MHz | 1 to 5 MHz | 5 to 70 MHz | 70 to 75 MHz |
| 80 | 0 to 1 MHz | 1 to 5 MHz | 5 to 80 MHz | 80 to 85 MHz |
| 90 | 0 to 1 MHz | 1 to 5 MHz | 5 to 90 MHz | 90 to 95 MHz |
| 100 | 0 to 1 MHz | 1 to 5 MHz | 5 to 100 MHz | 100 to 105 MHz |
| Measurement bandwidth | 30 kHz | 1 MHz | 1 MHz | 1 MHz |

**Table 2.4-2 Frequency Ranges of Range 1 to 4 for Intra-Band Contiguous EN-DC**

| | Frequency Ranges | | | |
|---|---|---|---|---|
| | **Range 1** | **Range 2** | **Range 3** | **Range 4** |
| | 0 to 1 MHz | 1 to 5 MHz | 5 to ENBW*MHz | ENBW* to (ENBW*+5) MHz |
| Measurement bandwidth | 30 kHz | 1 MHz | 1 MHz | 1 MHz |

*: ENBW is the sum of NR channel bandwidth and E-UTRA channel bandwidth, and is calculated by the following equation:

ENBW = f_endc_rightedge – f_endc_leftedge,
However, it is rounded to a value in the following range.
NR BW + LTE BW – 10 kHz ≤ ENBW ≤ NR BW + LTE BW + 10 kHz

f_leftedge(nr) = NR UL frequency – NR channel bandwidth / 2
f_rightedge(nr) = NR UL frequency + NR channel bandwidth / 2

f_leftedge(eutra) = LTE UL frequency– LTE channel bandwidth / 2
f_rightedge(eutra) = LTE UL frequency + LTE channel bandwidth / 2

f_endc_leftedge = min(f_leftedge(nr), f_leftedge(eutra))
f_endc_rightedge = max(f_rightedge(nr), f_rightedge(eutra))

The Spectrum Emission Mask settings are:

Measurement enable and measurement count
Enable Spectrum Emission Mask measurement and specify the measurement count. The Spectrum Emission Mask is measured for 1 subframe (1 ms) at each measurement count.

The results of the spectrum emission mask measurement are:

- Peak level and frequency at each level

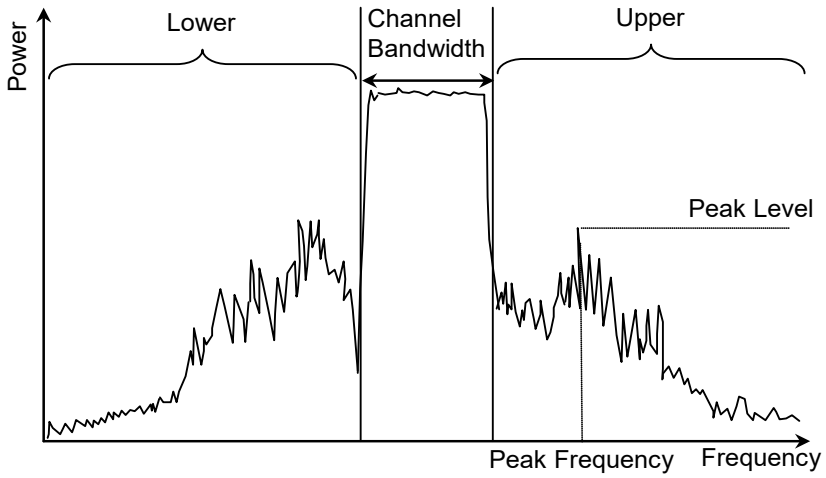



**Figure 2.4-2 Spectrum Emission Mask Measurement Result**

**Table 2.4-3 Frequency Ranges for Measurement Results**

| Bandwidth (MHz) | Frequency Difference from Channel Bandwidth $\Delta f_{OOB}$ (MHz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0-1 | 1-5 | 5-6 | 6-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 |
| 5 | ✓ | ✓ | ✓ | ✓ | | | | | |
| 10 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 15 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| 20 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 30 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 40 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 50 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 70 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 80 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 90 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 100 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Measurement Bandwidth (MHz) | * | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Frequency Range (freq_range) | 1, –1 | 2, –2 | 3, –3 | 4, –4 | 5, –5 | 6, –6 | 7, –7 | 8, –8 | 9, –9 |

*: The measurement bandwidth varies depending on the bandwidth setting.
Bandwidth ≤ 40 MHz: 1% of Bandwidth
Bandwidth > 40 MHz: 0.03 MHz

**Table 2.4-3 Frequency Ranges for Measurement Results (Cont'd)**

| Bandwidth (MHz) | Frequency Difference from Channel Bandwidth $\Delta f_{OOB}$ (MHz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 35-40 | 40-45 | 45-50 | 50-55 | 55-60 | 60-65 | 65-70 | 70-75 | 75-80 |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 40 | ✓ | ✓ | | | | | | | |
| 50 | ✓ | ✓ | ✓ | ✓ | | | | | |
| 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| 70 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 80 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 90 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 100 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Measurement Bandwidth (MHz) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Frequency Range (freq_range) | 10, –10 | 11, –11 | 12, –12 | 13, –13 | 14, –14 | 15, –15 | 16, –16 | 17, –17 | 18, –18 |

**Table 2.4-3 Frequency Ranges for Measurement Results (Cont'd)**

| Bandwidth (MHz) | Frequency Difference from Channel Bandwidth $\Delta f_{OOB}$ (MHz) | | | | |
|---|---|---|---|---|---|
| | 80-85 | 85-90 | 90-95 | 95-100 | 100-105 |
| 5 | | | | | |
| 10 | | | | | |
| 15 | | | | | |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | |
| 40 | | | | | |
| 50 | | | | | |
| 60 | | | | | |
| 70 | | | | | |
| 80 | ✓ | | | | |
| 90 | ✓ | ✓ | ✓ | | |
| 100 | ✓ | ✓ | ✓ | ✓ | ✓ |
| Measurement Bandwidth (MHz) | 1 | 1 | 1 | 1 | 1 |
| Frequency Range (freq_range) | 19, –19 | 20, –20 | 21, –21 | 22, –22 | 23, –23 |

**Table 2.4-4 Frequency Ranges for Measurement Results in Intra-Band Contiguous EN-DC**

| | Frequency Difference from ENBW $\Delta f_{OOB}$ (MHz) | | | |
|---|---|---|---|---|
| | 0-1 | 1-5 | 5 – ENBW | ENBW – (ENBW+5) |
| | ✓ | ✓ | ✓ | ✓ |
| Measurement Bandwidth (MHz) | 0.03 | 1 | 1 | 1 |
| Frequency Range (freq_range) | 1, –1 | 2, –2 | 3, –3 | 4, –4 |

Use the following commands to set the spectrum emission mask measurement.

- Measurement ON/OFF and Measurement Count
  SEM_SET
  :CONFigure:CELLular:NR:FUNDamental:SEMask:SET

The commands for querying the spectrum emission mask measurement results are:

- Judgement (SEM Template Judgement)
  SEMPASS
  :FETCh:CELLular:NR:FUNDamental:SEMask:JUDGement
- Peak Level and Frequency (SEM Worst Value)
  WORST_SEM_LV
  :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel
  TTL_WORST_SEM_LV
  :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:TTL
- Margin and Frequency (SEM Mask Margin)
  WORST_SEM
  :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin
  TTL_WORST_SEM
  :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:TTL
- Peak Level and Frequency (Detail) (SEM Worst Value (Detail))
  WORST_SEM_DET_LV
  :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail
  TTL_WORST_SEM_DET_LV
  :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail:TTL
- Margin and Frequency (Detail) (SEM Mask Margin (Detail))
  WORST_SEM_DET
  :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail
  TTL_WORST_SEM_DET
  :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail:TTL

# 2.5 Adjacent Channel Leakage Power Ratio

Adjacent Channel Leakage Power Ratio (ACLR) measures the ratio of in-band power to the power leaking to adjacent channels specified in 3GPP TS 38.101-1 (V15.2.0) 6.5.2.4 Adjacent channel leakage ratio.

The NR and UTRA frequency bandwidths are specified for adjacent channels. The power leaking to the two adjacent channels is measured for UTRA.



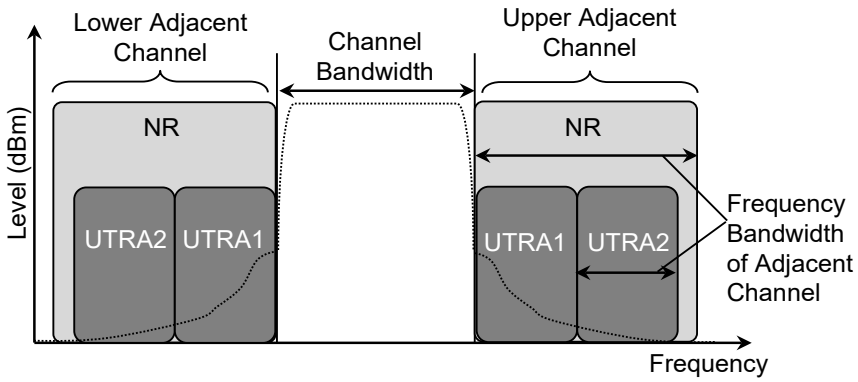



**Figure 2.5-1 Adjacent Channels for ACLR Measurement**

The frequency bandwidth of the adjacent channels varies with the channel bandwidth.

**Table 2.5-1 Adjacent Channel Frequency Bandwidth (MHz)**

| Channel Bandwidth (MHz) | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UTRA | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 | 3.84 |
| NR | 4.515 | 9.375 | 14.235 | 19.095 | 23.955 | 28.815 | 38.895 | 48.615 | 58.35 | 68.07 | 78.15 | 88.23 | 98.31 |

For Intra-Band Contiguous EN-DC, ACLR is specified in TS 38.521-3 (V.16.4.0) 6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC.

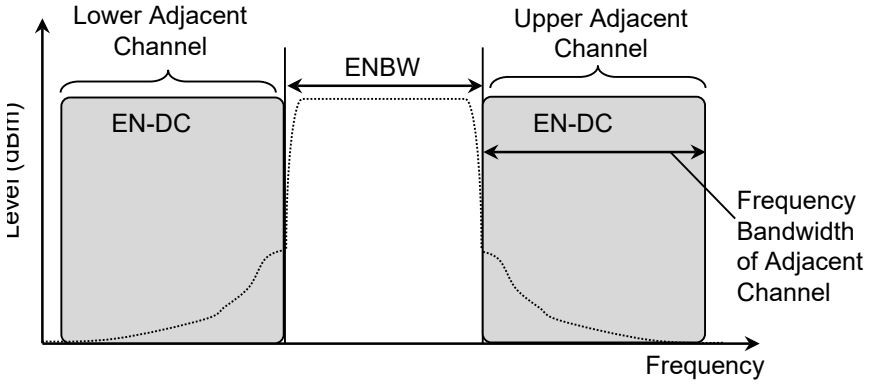



**Figure 2.5-2 Adjacent Channels for ACLR Measurement (Intra-Band Contiguous EN-DC)**

Frequency bandwidth of Adjacent channel = 0.95 × ENBW.

The ACLR measurement parameters are:

Measurement enable and measurement count

Enable ACLR measurement and specify the measurement count.
The Adjacent Channel Leakage Power Ratio is measured for 1 subframe (1 ms) at each measurement count.

```
ACLR_SET
:CONFigure:CELLular:NR:FUNDamental:ACLR:SET
```

Use the following command to query the results of the ACLR measurement.

- ACLR Result

```
ACLR
:FETCh:CELLular:NR:FUNDamental:ACLR
```

# 2.6 Modulation Analysis

Modulation analysis measures:

- Frequency Error
- EVM
- Carrier Leakage
- Waveform Quality (Rho)
- In-band Emissions for Non-Allocated RB
- Spectrum Flatness

### Measurement enable and measurement count

Modulation analysis of 1 slot (except slot at signal rising) is performed at each measurement count.

```
MOD_SET
:CONFigure:CELLular:NR:FUNDamental:MODulation:SET
```

### 2.6.1 Frequency Error

Frequency error measurement measures the carrier frequency and frequency error at Uplink.

Set the uplink frequency as the reference frequency for error measurement by referring to Section 2.1.3 “Frequency and level”.

Use the following commands to query the frequency error measurement results:

- Carrier Frequency (Carrier Frequency Result)
  `CARRF`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:CFRequency`
- Frequency Error (Carrier Frequency Error Result)
  `CARRFERR`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:FERRor`
- Worst Value of Frequency Error (Worst Carrier Frequency Error Result)
  `WORST_CARRFERR`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:FERRor:WORSt`

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

## 2.6.2 EVM

Error Vector Magnitude (EVM) is the magnitude ratio of the error vector to the reference vector. The error vector is the difference between the vector of the measured signal and the reference vector.
The difference in phase between the vector of the measured signal and the reference vector is called the phase error while the difference in magnitude is called the magnitude error.

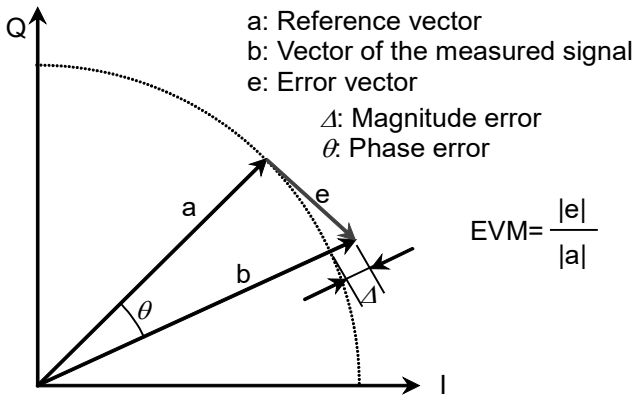



**Figure 2.6.2-1 Definition of EVM**

Query the EVM measurement result using the following commands:

- EVM (EVM Result)
  `EVM`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:EVM`
- Peak EVM (Peak EVM Result)
  `PVECTERR`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:PEVM`
- EVM of the Reference Signal (Reference Signal EVM Result)
  `RSEVM`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:RSEVm`
- Phase Error (Phase Error Result)
  `PHASEERR`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:PHERror`
- Magnitude Error (Magnitude Error Result)
  `MAGTDERR`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:MERRor`

The reference signal is defined in TS 38.211 6.4.1 “Reference Signal”.
The target symbol for EVM measurement differs with RMC Configuration as described in Section 2.1.6 “Setting NR sub-6GHz signals”. (PUSCH measurements are available, but PRACH and PUCCH measurement is not.)

PUSCH: Measures reference signal of EVM. Symbols other than the reference signal are the target for EVM and peak EVM measurement.

## 2.6.3 Carrier leakage

Carrier Leakage is an origin offset of input signal on the IQ constellation. After normalizing the signals to be measured and ideal signals, calculate the carrier leakage from the vector distribution (the average leakage value of the I, Q signals to be measured (Z(n)) from the ideal signals (R(n))).

$$Origin_i = \frac{\sum\{Z_i(n) - R_i(n)\}}{N}$$
$$Origin_q = \frac{\sum\{Z_q(n) - R_q(n)\}}{N}$$
$$\text{OriginOffset} = Origin_i{}^2 + Origin_q{}^2$$

Query the mobile station carrier leakage measurement result using the following command:

- Carrier Leakage Result
  `CARRLEAK`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:CARLeakage`

## 2.6.4 Rho

Waveform quality (ρ: Rho) shows the correlation between an ideal noiseless waveform and the measured signal. It is 1 when both signals match each other.
The approximate relationship between Rho and EVM is:

$$\rho \approx \frac{1}{1 + EVM^2}$$

Query the Rho measurement results using the following command:

- Rho Result
  `RHO`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:RHO`

## 2.6.5 In-band emissions for non-allocated RB

The In-band Emission for Non-Allocated RB is the ratio between the signal power of the allocated RBs and the signal power in the non-allocated RBs.
TS 38.101-1 6.4.2.3 “Inband emissions” specifies three measurement ranges: Carrier Leakage, General, and IQ Image.



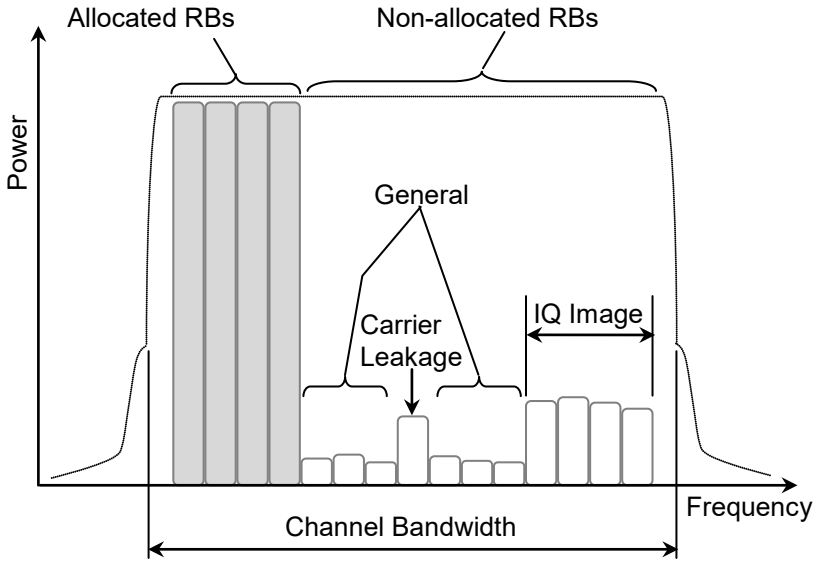



**Figure 2.6.5-1 In-Band Emission Measurement Range**

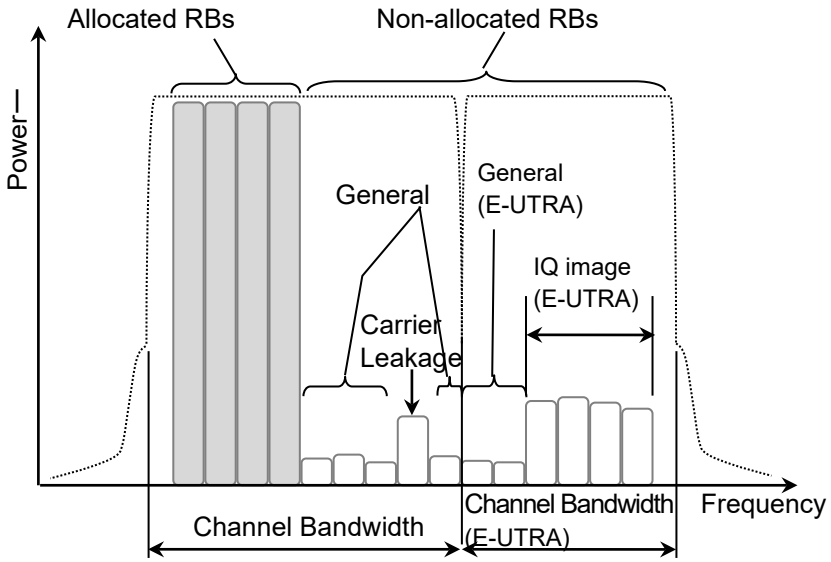



**Figure 2.6.5-2 In-Band Emission Measurement Range (Intra-Band Contiguous EN-DC)**

Set the allocated RB using Narrowbands Index, UL RMC Number of RBs, and UL RMC Starting RB as described in Section 2.1.6 “Setting NR sub-6GHz signals”.

Query the In-Band Emissions measurement results using the following commands:

- In-Band Emissions (Carrier Leakage) Result
  `INBANDE_LEAK`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:CARLeakage`
- In-Band Emissions (General) Result
  `INBANDE_GEN`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:GENeral`
- In-Band Emissions (IQ Image) Result
  `INBANDE_IMG`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:IQIMage`
- In-Band Emissions (General) limit
  `INBANDE_GENUL`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:GENeral`
- In-Band Emissions (IQ Image) limit
  `INBANDE_IMGUL`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:IQIMage`
- In-Band Emissions (Carrier Leakage) limit
  `INBANDE_LEAKUL`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage`
- In-Band Emissions margin
  `INBANDE_MARG`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:MARGin`
- In-Band Emissions Measured Item
  `INBANDEITEM`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:ITEM`
- In-Band Emissions Judgement
  `INBANDEPASS`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:JUDGement`

- E-UTRA In-Band Emissions (Carrier Leakage) Result
  INBANDE_LEAK_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:CARLeakage
- E-UTRA In-Band Emissions (General) Result
  INBANDE_GEN_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:GENeral
- E-UTRA In-Band Emissions (IQ Image) Result
  INBANDE_IMG_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:IQIMage
- E-UTRA In-Band Emissions (General) limit
  INBANDE_GENUL_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:GENeral
- E-UTRA In-Band Emissions (IQ Image) limit
  INBANDE_IMGUL_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:IQIMage
- E-UTRA In-Band Emissions (Carrier Leakage) limit
  INBANDE_LEAKUL_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:CARLeakage
- E-UTRA In-Band Emissions margin
  INBANDE_MARG_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:MARGin
- E-UTRA In-Band Emissions Measured Item
  INBANDEITEM_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:ITEM
- E-UTRA In-Band Emissions Judgement
  INBANDEPASS_EUTRA
  :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:JUDGement

## 2.6.6 Spectrum Flatness

Spectrum Flatness measurement measures the maximum and minimum values of the relative level of the subcarriers.

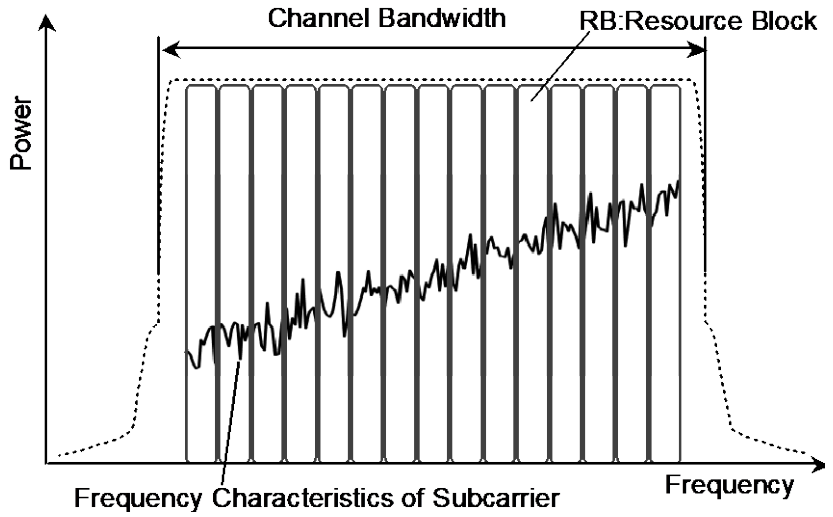



**Figure 2.6.6-1 Measurement Range of Spectrum Flatness**

TS 38.101-1 6.4.2.4 EVM equalizer spectrum flatness specifies two separate frequency ranges (Range 1 and Range 2) in the operation band . Range 1 covers the range of 3 MHz or higher, and Range 2 covers the range lower than 3 MHz from both ends of the operation band.

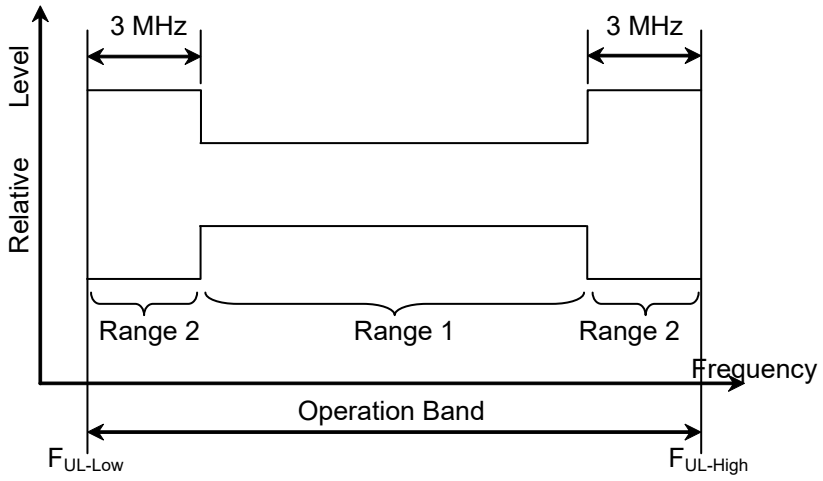



**Figure 2.6.6-2 Standard Range of Spectrum Flatness**

The measured data varies depending on where the target channel bandwidth is located in the operation band.

When the measurement range is within Range 1, the maximum value, minimum value, and ripple (maximum value – minimum value) of Range 1 are measured.

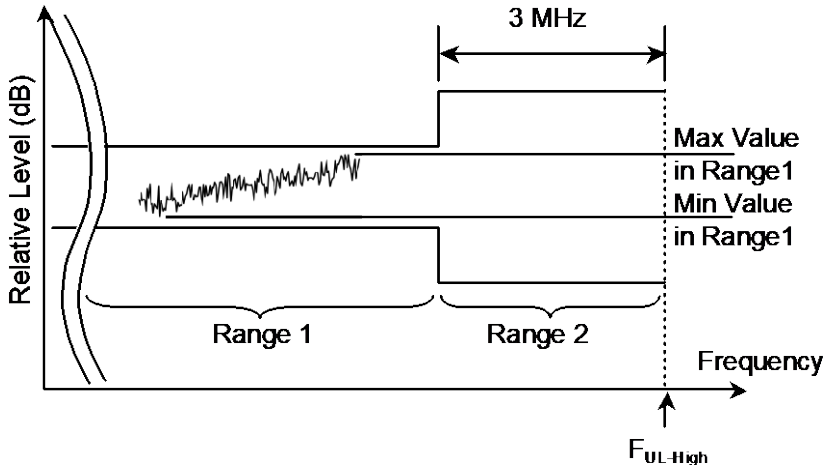



**Figure 2.6.6-3 Channel Bandwidth in Range 1**

When the measurement range is within Range 2, the maximum value, minimum value, and ripple (maximum value – minimum value) of Range 2 are measured.

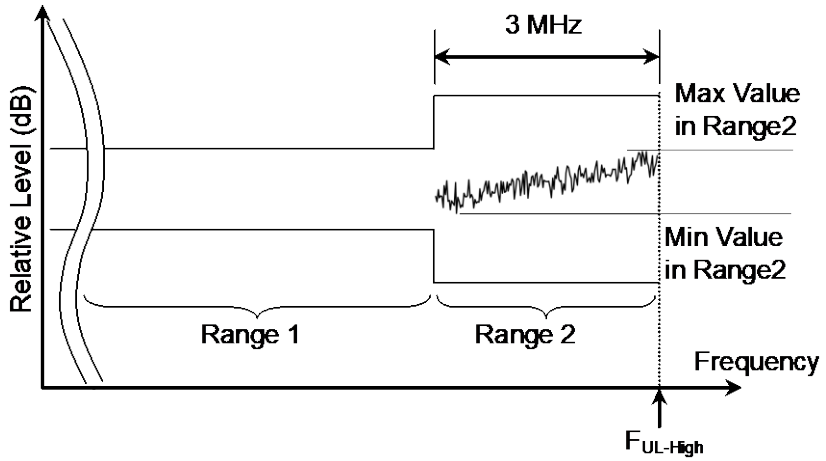



**Figure 2.6.6-4 Channel Bandwidth in Range 2**

When the measurement range crosses both Range 1 and Range 2, the following values are measured:
Maximum value, Minimum value,
and Ripple (maximum value – minimum value) of Range 1
Maximum value, Minimum value,
and Ripple (maximum value – minimum value) of Range 2
Difference between maximum value of Range 1
and minimum value of Range 2
Difference between maximum value of Range 2
and minimum value of Range 1

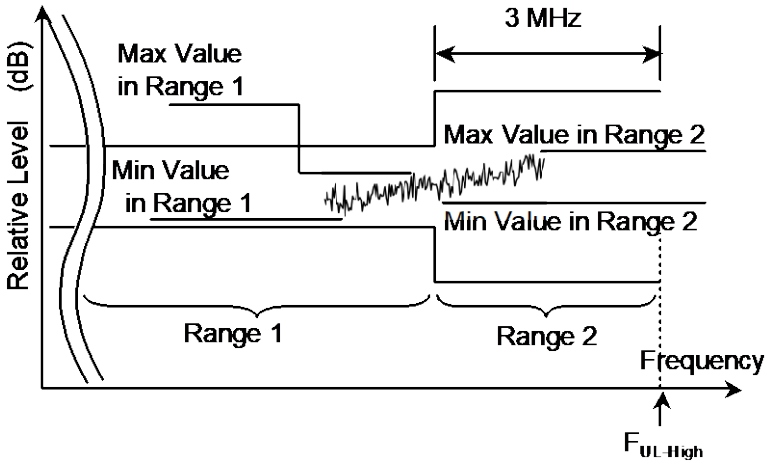



**Figure 2.6.6-5 Channel Bandwidth Crossing Range 1 and Range 2**

The MX887018A/19A measures the frequency characteristics of the subcarrier for the number of times specified for modulation analysis. The maximum and minimum values of the level are recorded for each subcarrier, like peak hold and minimum hold for a spectrum analyzer.

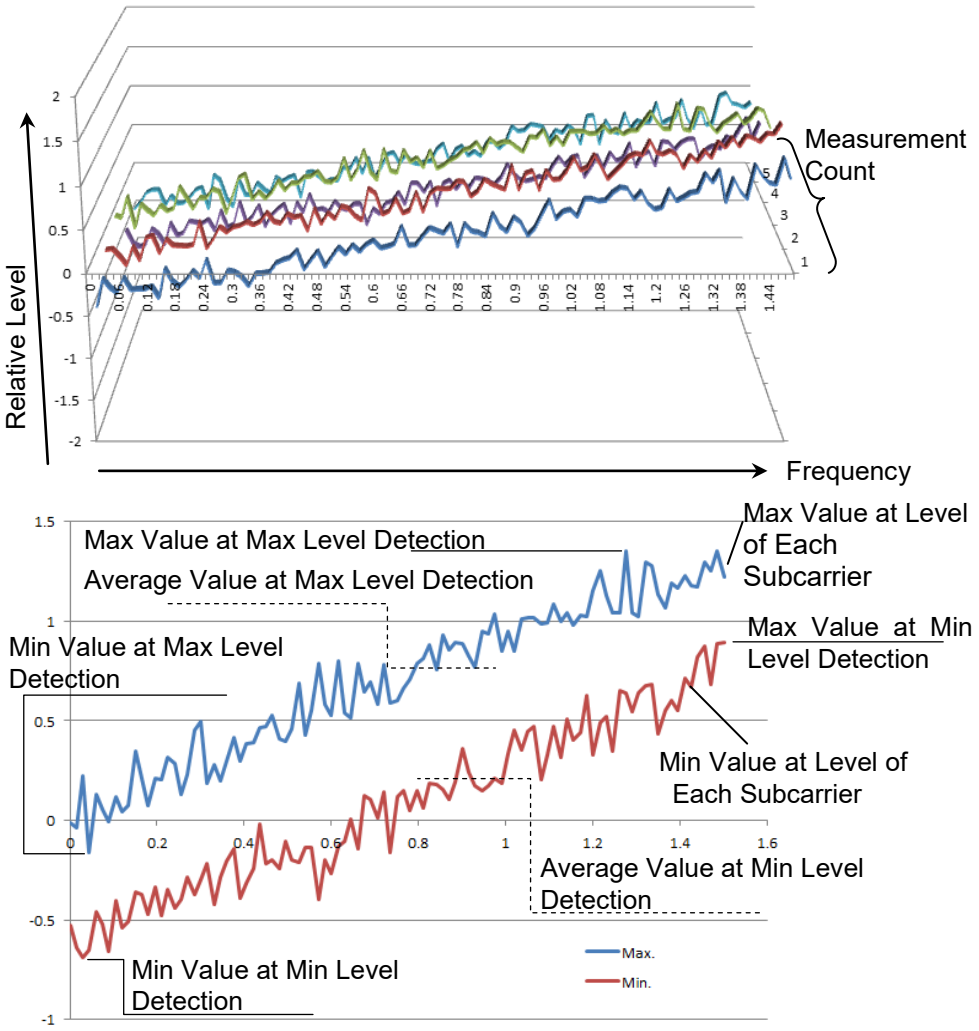



**Figure 2.6.6-6 Types of Spectrum Flatness Measurement Results**

- Operation band
  The range for spectrum flatness is determined by setting the operation band.
  BAND
  :CONFigure:CELLular:NR:FUNDamental:BAND

Query the spectrum flatness measurement results using the following commands:

- Range 1 Maximum Value (Spectrum Flatness (≥ 3 MHz (R1 +)) Result)
  `SPECFLAT1_P`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1P`
- Range 1 Minimum Value (Spectrum Flatness (≥ 3 MHz (R1 –)) Result)
  `SPECFLAT1_M`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1M`
- Range 1 Ripple (Spectrum Flatness (≥ 3 MHz (RP1)) Result)
  `SPECFLAT_RP1`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP1`
- Range 2 Maximum Value (Spectrum Flatness (< 3 MHz (R2 +)) Result)
  `SPECFLAT2_P`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2P`
- Range 2 Minimum Value (Spectrum Flatness (< 3 MHz (R2 –)) Result)
  `SPECFLAT2_M`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2M`
- Range 2 Ripple (Spectrum Flatness (< 3 MHz (RP2)) Result)
  `SPECFLAT_RP2`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP2`
- Range 2 Maximum Value – Range 1 Minimum Value (Spectrum Flatness (RP21) Result)
  `SPECFLAT_RP21`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP21`
- Range 1 Maximum Value – Range 2 Minimum Value (Spectrum Flatness (RP12) Result)
  `SPECFLAT_RP12`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP12`
- Spectrum Flatness Measured Item
  `SPECFLATITEM`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:ITEM`
- Spectrum Flatness Judgement
  `SPECFLATPPPASS`
  `:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:JUDGement`

# 2.7 Measurement Results

The NR sub-6GHz measurement results are queried collectively using the following commands.

- All Results (Tx measurement serult)
  `TXMEASRESULT?`
  `:FETCh:CELLular:NR:FUNDamental:TX?`

# 2.8 Capturing Waveform Data

The following command is used to capture the waveform data after measurement has been completed.

- UL RMC Waveform

```
WAVEFMEAS
:FETCh:CELLular:NR:FUNDamental:TRACe
```

The query parameter, data interval and number of data for capturing the waveform data for each measurement item are listed in the following table.

**Table 2.8-1 Waveform Data Type and Data Interval**

| Measurement Item | Query Parameter | Data Interval |
|---|---|---|
| Occupied Bandwidth | 1 | 67.13867188 kHz |
| Spectrum Emission Mask | 2 | 67.13867188 kHz |
| Constellation (I) | 3 | Subcarrier (15 kHz, 30 kHz, 60 kHz) |
| Constellation (Q) | 4 | |
| EVM (Average) | 5 | Subcarrier (15 kHz, 30 kHz, 60 kHz) |
| EVM (Maximum) | 6 | |
| Phase Error (Average) | 7 | Subcarrier (15 kHz, 30 kHz, 60 kHz) |
| Phase Error (Maximum) | 8 | |
| Magnitude Error (Average) | 9 | Subcarrier (15 kHz, 30 kHz, 60 kHz) |
| Magnitude Error (Maximum) | 10 | |
| In-band Emissions | | Depends on the set subcarrier spacing.<br>15 kHz: 180 kHz<br>30 kHz: 360 kHz<br>60 kHz: 720 kHz |
| dB (Average) | 11 | |
| dB (Maximum) | 12 | |
| dBc (Average) | 13 | |
| dBc (Maximum) | 14 | |
| Spectrum Flatness | | Subcarrier (15 kHz, 30 kHz, 60 kHz) |
| (Average) | 15 | |
| (Maximum) | 16 | |
| (Minimum) | 17 | |
| In-band Emissions (E-UTRA) | | Number of NR Resource Blocks ≠ 0<br>Depends on the set NR subcarrier spacing.<br>15 kHz: 180 kHz<br>30 kHz: 360 kHz<br>60 kHz: 720 kHz<br>Number of LTE Resource Block ≠ 0: 180 kHz |
| dB (Average) | 18 | |
| dB (Maximum) | 19 | |
| dBc (Average) | 20 | |
| dBc (Maximum) | 21 | |

The number of waveform data varies depending on the channel bandwidth and subcarrier spacing setting.

**Table 2.8-2 Channel Bandwidth and Number of Data**

| Measurement Item | Subcarrier spacing (SCS) | Channel Bandwidth (MHz) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Occupied Bandwidth | – | 149 | 299 | 447 | 597 | 745 | 895 | 1193 | 1491 | 1789 | 2087 | 2385 | 2683 | 2979 |
| Spectrum Emission Mask | – | 373 | 597 | 821 | 1043 | 1267 | 1491 | 1937 | 2385 | 2831 | 3277 | 3725 | 4171 | 4619 |
| Constellation, EVM, Phase Error, Magnitude Error, Spectrum Flatness | 15 kHz | 300 | 624 | 948 | 1272 | 1596 | 1920 | 2592 | 3240 | – | – | – | – | – |
| | 30 kHz | 132 | 288 | 456 | 612 | 780 | 936 | 1272 | 1598 | 1944 | 2268 | 2604 | 2940 | 3276 |
| | 60 kHz | – | 132 | 216 | 288 | 372 | 456 | 612 | 780 | 948 | 1116 | 1284 | 1452 | 1620 |
| In-band Emissions | 15 kHz | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 | – | – | – | – | – |
| | 30 kHz | 11 | 24 | 38 | 51 | 65 | 78 | 106 | 133 | 162 | 189 | 217 | 245 | 273 |
| | 60 kHz | – | 11 | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 93 | 107 | 121 | 135 |

**Table 2.8-3 Channel Bandwidth and Number of Data (Intra-band Contiguous EN-DC)**

| | Channel Bandwidth (MHz) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E-UTRA Channel Bandwidth = 1.4 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 191 | 341 | 489 | 639 | 787 | 937 | 1235 | 1533 | 1831 | 2129 | 2427 | 2725 | 3021 |
| Spectrum Emission Mask | 437 | 659 | 883 | 1107 | 1331 | 1553 | 2001 | 2447 | 2893 | 3341 | 3787 | 4235 | 4681 |
| | E-UTRA Channel Bandwidth = 3 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 239 | 389 | 537 | 687 | 835 | 985 | 1283 | 1581 | 1879 | 2175 | 2473 | 2771 | 3069 |
| Spectrum Emission Mask | 507 | 731 | 955 | 1179 | 1401 | 1625 | 2071 | 2519 | 2965 | 3413 | 3859 | 4305 | 4753 |
| | E-UTRA Channel Bandwidth = 5 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 299 | 449 | 597 | 747 | 895 | 1043 | 1341 | 1639 | 1937 | 2235 | 2533 | 2831 | 3129 |
| Spectrum Emission Mask | 597 | 821 | 1045 | 1267 | 1491 | 1715 | 2161 | 2607 | 3055 | 3501 | 3949 | 4395 | 4843 |
| | E-UTRA Channel Bandwidth = 10 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 449 | 597 | 747 | 895 | 1043 | 1193 | 1491 | 1789 | 2087 | 2385 | 2683 | 2981 | 3279 |
| Spectrum Emission Mask | 821 | 1045 | 1267 | 1491 | 1715 | 1937 | 2385 | 2831 | 3279 | 3725 | 4171 | 4619 | 5065 |
| | E-UTRA Channel Bandwidth = 15 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 597 | 747 | 895 | 1043 | 1193 | 1341 | 1639 | 1937 | 2235 | 2533 | 2831 | 3129 | 3427 |
| Spectrum Emission Mask | 1045 | 1267 | 1491 | 1715 | 1937 | 2161 | 2607 | 3055 | 3501 | 3949 | 4395 | 4843 | 5289 |
| | E-UTRA Channel Bandwidth = 20 MHz | | | | | | | | | | | | |
| **Measurement Item** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| Occupied Bandwidth | 747 | 895 | 1043 | 1193 | 1341 | 1491 | 1789 | 2087 | 2385 | 2683 | 2981 | 3279 | 3575 |
| Spectrum Emission Mask | 1267 | 1491 | 1715 | 1937 | 2161 | 2385 | 2831 | 3279 | 3725 | 4171 | 4619 | 5065 | 5513 |

Table 2.8-4 Channel Bandwidth and Number of Data (E-UTRA)

| Measurement Item | E-UTRA Channel Bandwidth | LTE RB ≠ 0 | LTE RB = 0 | | |
|---|---|---|---|---|---|
| | | | NR SCS | | |
| | | | 15 kHz | 30 kHz | 60 kHz |
| In-band Emissions (E-UTRA) | 1.4 | 6 | 6 | 3 | 2 |
| | 3 | 15 | 15 | 8 | 4 |
| | 5 | 25 | 25 | 13 | 7 |
| | 10 | 50 | 50 | 25 | 13 |
| | 15 | 75 | 75 | 38 | 19 |
| | 20 | 100 | 100 | 50 | 25 |

# 2.9 Sample Programs

This section describes sample programs using the free Tera Term software.
For the Tera Term communication settings of, refer to Section 2.3.1 "Ethernet" in the *MU887000A TRX Test Module Operation Manual*.

## 2.9.1 Spectrum Emission Mask

An example of Spectrum Emission Mask measurement using the Native command mode is described here.
The sample program on the following pages can be executed as a Tera Term macro. Refer to the Tera Term Help file for how to execute the macro.

### Processing Flow

1. Set the application software type to the MX887019A.
2. Set the following measurement conditions.

| | |
|---|---|
| Test Port | Port 1 |
| Input Level | –1.0 dBm |
| Uplink Frequency | 3750 MHz |
| Frame Structure | TDD |
| Frequency Range | FR1 |
| Channel Bandwidth | 100 MHz |
| Subcarrier Spacing | 30 kHz |
| DL/UL Periodicity | 10 ms |
| UL Duration (Slot) | 10 |
| RMC Configuration | PUSCH |
| RMC Waveform | CP-OFDM |
| RMC Modulation scheme | QPSK |
| Number of RBs | 273 |
| Starting RB Number | 0 |
| Cell ID | 0 |
| Antenna port | 0 |
| DM-RS duration | single-symbol DM-RS |
| UL-DMRS-add-pos | 0 |
| UL-DMRS-typeA-pos | 2 |
| UL-DMRS-config-type | Type1 |
| Trigger Source | VIDEO |
| Tx Power Measurement | OFF |
| Occupied Bandwidth Measurement | OFF |
| Spectrum Emission Mask Measurement | ON, 100 times |
| Adjacent Channel Leakage Power Ratio Measurement | OFF |
| Modulation Analysis | OFF |

3. Start measurement.
4. Read the measurement status.
5. Query measurement results after measurement is completed.

```
; Sample program for Spectrum Emission Mask
; Anritsu Corporation March,2012
; Macro for Tera Term Version 4.69
;
; set local echo to on
setecho 1
flushrecv
; time out 3 second
timeout=3

; Set language to "Native".
sendln 'SYST:LANG NAT'
call check_error_code

; Set application type to "Cellular".
sendln 'SYSSEL CELLULAR'
call check_error_code

; Set standard to "NR".
sendln 'STDSEL NR'
call check_error_code

; Set test port to "Port1".
sendln 'PORT PORT1,PORT1'
call check_error_code

; Set Input Range to "-1.0 dBm".
sendln 'ILVL PCC,-1.0'
;sendln 'ILVL -1.0 DBM'
call check_error_code

; Set center frequency to "3750 000 000 Hz".
sendln 'ULFREQ 3750000000HZ'
call check_error_code

;************************************************;
; Set Frame Structure to "TDD".
sendln 'FRAMETYPE TDD'
call check_error_code

; Set Frequency Range to "FR1".
sendln 'FREQRANGE FR1'
call check_error_code
```

```
; Set UL Channel Bandwidth to "100MHZ".
sendln 'ULBANDWIDTH 100MHZ'
call check_error_code

; Set UL Subcarrier Spacing to "30 kHz".
sendln 'ULSCS 30KHZ'
call check_error_code

; Set DL/UL Periodicity to "10MS".
sendln 'DLULPERIOD 10MS'
call check_error_code

; Set UL Duration to "10".
sendln 'ULDURATION 10'
call check_error_code

; Set RMC Configuration to "PUSCH".
sendln 'CHCONFIG PUSCH'
call check_error_code

; Set UL RMC Waveform to "CPOFDM".
sendln 'ULWAVEFORM CPOFDM'
call check_error_code

; Set UL RMC Modulation to "QPSK".
sendln 'ULRMC_MOD QPSK'
call check_error_code

; Set UL RMC Number of RBs to "273".
sendln 'ULRMC_RB 273'
call check_error_code

; Set UL RMC Starting RB to "0".
sendln 'ULRB_START 0'
call check_error_code

; Set Cell ID to "0".
sendln 'CELLID 0'
call check_error_code

; Set Antenna port to "0".
sendln 'ULDMRSPORT 0'
call check_error_code
```

```
; Set DMRS Duration to "SINGLE".
sendln 'ULDMRSDURATION SINGLE'
call check_error_code

; Set DMRS add pos to "0".
sendln 'ULDMRSADDPOS 0'
call check_error_code

; Set DMRS typeA pos to "2".
sendln 'ULDMRSTYPEAPOS 2'
call check_error_code

; Set UL DMRS Config Type to "TYPE1".
sendln 'ULDMRSTYPE TYPE1'
call check_error_code

; Set Trigger Source to "VIDEO".
sendln 'TRGSRC VIDEO'
call check_error_code
;************************************************;

; Set Measurement of Tx Power to "OFF".
sendln 'PWR_SET OFF'
call check_error_code

; Set Measurement of Occupied Bandwidth to "OFF".
sendln 'OBW_SET OFF'
call check_error_code

; Set Measurement of Spectrum Emission Mask to "ON","100 times".
sendln 'SEM_SET ON,100'
call check_error_code

; Set Measurement of Adjacent Channel Leakage power Ratio to "OFF".
sendln 'ACLR_SET OFF'
call check_error_code

; Set Measurement of Modulation Analysis to "OFF".
sendln 'MOD_SET OFF'
call check_error_code

; Start measurement
sendln 'SNGLS'
call check_error_code
```

```
; waiting measurement up to 10 second
for i 1 10

  sendln 'MSTAT?'
  pause 1; wait 1 second
  recvln
  recvln
  ;call check_response ; debug
  if result=0 goto _timeout
  if result=1 then
         break
  endif
  call check_error_code
next

; Query Peak level and frequency in each range
sendln 'TTL_WORST_SEM_LV?'
call check_error_code

; Query Spectrum data
sendln 'WAVEFMEAS? 2,0,1135'
call check_error_code

messagebox  'Macro end successfully' 'Finish'

End

;       ------------ subroutines -----------

:check_error_code
  ; query error
  sendln 'SYSERR?'
  waitln 'No error'

  ; in case of timeout
  if result=0 goto _timeout
  ; in case of error occurring
  if result=2 then
         e_message='Error code = '
         strconcat e_message inputstr
         messagebox  e_message 'Command Error occurred'
         end
  endif
```

```
  ; in case of no error

return

:check_response

  ;for debug
  messagebox inputstr 'debug1'
  int2str result_str result
  messagebox result_str 'debug2'

  return

:_timeout
  messagebox  'No response from MT8870A.' 'Time out!'
  call check_error_code
  End
```

## 2.9.2 Modulation Analysis

An example of modulation analysis using the SCPI command mode is described here.

The sample program on the following pages can be executed as a Tera Term macro. Refer to the Tera Term Help file for how to execute the macro.



### Processing Flow

1. Set the application software type to the MX887019A.
2. Set the following measurement conditions.

| | |
|---|---|
| Test Port | Port 1 |
| Input Level | –1.0 dBm |
| Operation band | 77 |
| Uplink Frequency | 3750 MHz |
| Frame Structure | TDD |
| Frequency Range | FR1 |
| Channel Bandwidth | 100 MHz |
| Subcarrier Spacing | 30 kHz |
| DL/UL Periodicity | 10 ms |
| UL Duration (Slot) | 10 |
| RMC Configuration | PUSCH |
| RMC Waveform | CP-OFDM |
| RMC Modulation scheme | QPSK |
| Number of RBs | 273 |
| Starting RB Number | 0 |
| Cell ID | 0 |
| Antenna port | 0 |
| DM-RS duration | single-symbol DM-RS |
| UL-DMRS-add-pos | 0 |
| UL-DMRS-typeA-pos | 2 |
| UL-DMRS-config-type | Type1 |
| Trigger Source | VIDEO |
| Tx Power | OFF |
| Occupied Bandwidth Measurement | OFF |
| Spectrum Emission Mask Measurement | OFF |
| Adjacent Channel Leakage Power Ratio Measurement | OFF |
| Modulation Analysis | ON, 100 times |

3. Start measurement.
4. Read the measurement status.
5. Query the following measurement results when measurement is completed.

| | |
|---|---|
| Frequency | |
| Frequency Error | |
| EVM | |
| Peak EVM | |
| Reference Signal EVM | |
| Phase Error | |
| Magnitude Error | |
| Carrier Leakage | |
| Waveform Quality | |
| In-band Emissions | General, IQ Image, Carrier Leakage |
| Spectrum Flatness | Maximum, Minimum, Ripple value of Range 1 |
| | Maximum, Minimum, Ripple value of Range 2 |
| | Difference between maximum value of Range 2 and minimum value of Range 1 |
| | Difference between maximum value of Range 1 and minimum value of Range 2 |

```
; Sample program for Modulation Analysis
; Anritsu Corporation March,2012
; Macro for Tera Term Version 4.69
;
; set local echo to on
setecho 1
flushrecv
; time out 3 second
timeout=3

; Set language to "SCPI".
sendln 'SYST:LANG SCPI'
call check_error_code

; Set application type to "Cellular".
sendln ':INST CELLULAR'
call check_error_code

; Set standard to "NR".
sendln ':CONF:CELL:MEAS:STAN NR'
call check_error_code

; Set test port to "Port1".
sendln ':ROUTe:PORT:CONNect:DIRection PORT1,PORT1'
call check_error_code

; Set Input Range to "-1.0 dBm".
sendln ':CONFigure:CELLular:MEASurement:RFSettings:LEVel PCC,-1.0'
call check_error_code

; Set Operation band to "77".
sendln ':CONFigure:CELLular:NR:FUNDamental:BAND PCC,77'
call check_error_code

; Set center frequency to "PCC,3750MHZ".
;sendln 'ULFREQ PCC,3750MHZ'
sendln ':CONFigure:CELLular:MEASurement:RFSettings:FREQuency PCC,3750MHZ'
call check_error_code

;************************************************;
; Set Frame Structure to "TDD".
sendln ':CONFigure:CELLular:NR:FSTRucture TDD'
call check_error_code
```

```
; Set Frequency Range to "FR1".
sendln ':CONFigure:CELLular:NR:FREQuency:RANGe FR1'
call check_error_code

; Set UL Channel Bandwidth to "100MHZ".
sendln ':CONFigure:CELLular:NR:CBANdwidth 100MHZ'
call check_error_code

; Set UL Subcarrier Spacing to "30KHZ".
sendln ':CONFigure:CELLular:NR:SCS 30KHZ'
call check_error_code

; Set DL/UL Periodicity to "10MS".
sendln ':CONFigure:CELLular:NR:DLUL:PERiod 10MS'
call check_error_code

; Set UL Duration to "10".
sendln ':CONFigure:CELLular:NR:UL:DURation 10'
call check_error_code

; Set RMC Configuration to "PUSCH".
sendln ':CONFigure:CELLular:NR:CTYPe PUSCH'
call check_error_code

; Set UL RMC Waveform to "CPOFDM".
sendln ':CONFigure:CELLular:NR:WAVeform CPOFDM'
call check_error_code

; Set UL RMC Modulation to "QPSK".
sendln ':CONFigure:CELLular:NR:MODulation:MSCHeme QPSK'
call check_error_code

; Set UL RMC Number of RBs to "273".
sendln ':CONFigure:CELLular:NR:RBALlocation:NRB 273'
call check_error_code

; Set UL RMC Starting RB to "0".
sendln ':CONFigure:CELLular:NR:RBALlocation:ORB 0'
call check_error_code

; Set Cell ID to "0".
sendln ':CONFigure:CELLular:NR:CID 0'
call check_error_code
```

```
; Set Antenna port to "0".
sendln ':CONFigure:CELLular:NR:DMRS:PORT 0'
call check_error_code

; Set DMRS Duration to "SINGLE".
sendln ':CONFigure:CELLular:NR:DMRS:DURation SINGLE'
call check_error_code

; Set DMRS add pos to "0".
sendln ':CONFigure:CELLular:NR:DMRS:ADDPos 0'
call check_error_code

; Set DMRS typeA pos to "2".
sendln ':CONFigure:CELLular:NR:DMRS:TYPE:APOSition 2'
call check_error_code

; Set UL DMRS Config Type to "TYPE1".
sendln ':CONFigure:CELLular:NR:DMRS:TYPE TYPE1'
call check_error_code

; Set Trigger Source to "VIDEO".
sendln ':TRIGger:CELLular:NR:FUNDamental:SOURce VIDEO'
call check_error_code

; Set Measurement of Transmit Power to "OFF".
sendln ':CONFigure:CELLular:NR:FUNDamental:POWer:SET OFF'
call check_error_code

; Set Measurement of Occupied Bandwidth to "OFF".
sendln ':CONFigure:CELLular:NR:FUNDamental:OBW:SET OFF'
call check_error_code

; Set Measurement of Spectrum Emission Mask to "OFF".
sendln ':CONFigure:CELLular:NR:FUNDamental:SEMask:SET OFF'
call check_error_code

; Set Measurement of Adjacent Channel Leakage power Ratio to "OFF".
sendln ':CONFigure:CELLular:NR:FUNDamental:ACLR:SET OFF'
call check_error_code

; Set Measurement of Modulation Analysis to "ON","100 times".
sendln ':CONFigure:CELLular:NR:FUNDamental:MODulation:SET ON,100'
call check_error_code
;************************************************;
```

```
; ! Note !
; Output the RF power of Device under test.

; Start measurement
sendln ':INIT:CELL:MEAS:SING'
call check_error_code

; waiting measurement up to 10 second
for i 1 10

  sendln ':FETC:CELL:MEAS:STAT?'
  pause 1; wait 1 second
  recvln
  recvln
  ;call check_response ; debug
  if result=0 goto _timeout
  if result=1 then
         break
  endif
  call check_error_code
next

; Query Frequency
sendln ':FETC:CELL:NR:FUND:MOD:CFR? AVG'
call check_error_code

; Query Frequency Error
sendln ':FETC:CELL:NR:FUND:MOD:FERR? TTL'
call check_error_code

; Query EVM
sendln ':FETC:CELL:NR:FUND:MOD:EVM? TTL'
call check_error_code

; Query Peak EVM
sendln ':FETC:CELL:NR:FUND:MOD:PEVM? TTL'
call check_error_code

; Query Demodulation Reference Signal EVM
sendln ':FETC:CELL:NR:FUND:MOD:RSEV? TTL'
call check_error_code

; Query Phase Error
```

```
sendln ':FETC:CELL:NR:FUND:MOD:PHER? TTL'
call check_error_code

; Query Magnitude Error
sendln ':FETC:CELL:NR:FUND:MOD:MERR? TTL'
call check_error_code

; Query Carrier Leakage
sendln ':FETC:CELL:NR:FUND:MOD:CARL? TTL'
call check_error_code

; Query Waveform Quality
sendln ':FETC:CELL:NR:FUND:MOD:RHO? TTL'
call check_error_code

; Query Inband Emission - General
sendln ':FETC:CELL:NR:FUND:MOD:IEM:GEN? TTL'
call check_error_code

; Query Inband Emission - IQ Image
sendln ':FETC:CELL:NR:FUND:MOD:IEM:IQIM? TTL'
call check_error_code

; Query Inband Emission - Carrier Leakage
sendln ':FETC:CELL:NR:FUND:MOD:IEM:CARL? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Maximum
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:R1P? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Minimum
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:R1M? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Ripple
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:RP1? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Maximum
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:R2P? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Minimum
```

```
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:R2M? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Ripple
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:RP2? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Max to Range 1 Min
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:RP21? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Max to Range 2 Min
sendln ':FETC:CELL:NR:FUND:MOD:ESFL:RP12? TTL'
call check_error_code

messagebox  'Macro end successfully' 'Finish'

End

;       ------------ subroutines -----------

:check_error_code
  ; query error
  sendln ':SYSTem:ERRor?'
  waitln 'No error'

  ; in case of timeout
  if result=0 goto _timeout
  ; in case of error occurring
  if result=2 then
         e_message='Error code = '
         strconcat e_message inputstr
         messagebox  e_message 'Command Error occurred'
         end
  endif

  ; in case of no error

return
```

```
:check_response

  ;for debug
  messagebox inputstr 'debug1'
  int2str result_str result
  messagebox result_str 'debug2'

  return

:_timeout
  messagebox  'No response from MT8870A.' 'Time out!'
  call check_error_code
  End
```

# Chapter 3 Sequence Measurement

This chapter describes the MX887018A/19A Sequence Measurement function and commands. For a detailed description of the commands, refer to Chapter 4 “SCPI Command Reference” and Chapter 5 “Native Command Reference” in this manual.

A license for the MX887010A Cellular Standards Sequence Measurement is required to execute sequence measurement.


3.1 Outline ..... 3-2
3.2 Setting Sequence Table ..... 3-7
3.2.1 Sequence table setting items ..... 3-7
3.2.2 Sequence table commands ..... 3-10
3.2.3 Setting item error check ..... 3-11
3.3 Setting Measurement Conditions Table ..... 3-13
3.3.1 Setting NR sub-6GHz measurement items ..... 3-13
3.3.2 NR sub-6GHz Measurement condition commands ..... 3-14
3.4 Controlling and Monitoring Sequence ..... 3-15
3.4.1 Controlling and monitoring items ..... 3-15
3.4.2 Sequence control and monitor commands ..... 3-17
3.5 Measurement Results ..... 3-19
3.6 Sample Program ..... 3-20

# 3.1 Outline

The MX887018A/19A NR sub-6GHz Uplink TX Measurement add the following NR sub-6GHz measurement items to the Sequence Measurement mode. Refer to Chapter 2 “Fundamental Measurement” for details of each measurement.

- Tx Power
- Occupied Bandwidth
- Spectrum Emission Mask
- Adjacent Channel Leakage Power Ratio
- Modulation Analysis
  Frequency Error, EVM, Carrier Leakage, In-band Emission, Rho, and Spectrum Flatness

The Sequence Measurement mode does not support the following measurements.

- Waveform Data

NR sub-6GHz measurement can be allocated to any segment in the sequence table.
The segment duration is a sum of A and B in the table below. A and B are decided by measurement items, measurement count, UL Subcarrier Spacing, and UL Channel Bandwidth.
CEILING(x) shows the minimum integer greater than a real number x.

| Item | Segment duration A (ms) |
|---|---|
| Tx Power<br>Occupied Bandwidth<br>Spectrum Emission Mask<br>Adjacent Channel Leakage Power Ratio | Measurement count +1 |
| Modulation analysis | UL Subcarrier Spacing = 15 kHz<br>CEILING (Measurement count / 1) + 2<br>UL Subcarrier Spacing = 30 kHz<br>CEILING (Measurement count / 2) + 2<br>UL Subcarrier Spacing = 60 kHz<br>CEILING (Measurement count / 4) + 2 |

| Item | Segment duration B (ms) |
|---|---|
| Occupied Bandwidth<br>Spectrum Emission Mask<br>Adjacent Channel Leakage Power Ratio | UL Channel Bandwidth ≥ 60 MHz:<br>(Measurement count + 1) × 2<br>UL Channel Bandwidth < 60 MHz:<br>0 |
| Tx Power<br>Modulation analysis | 0 |

When multiple items are measured, make the sum of the longest segment duration of A and B.
Example: UL Subcarrier Spacing = 30 kHz, UL Channel Bandwidth = 60 MHz

| | | |
|---|---|---|
| Tx Power | 50 times | A = 50 + 1 = 51 ms<br>B = 0 ms |
| Occupied Bandwidth | 20 times | A = 20 + 1 = 21 ms<br>B = (20 + 1) × 2 = 42 ms |
| Spectrum Emission Mask | 30 times | A = 30 + 1 = 31 ms<br>B = (30 + 1) × 2 = 62 ms |
| Adjacent Channel Leakage Power Ratio | 50 times | A = 50 + 1 = 51 ms<br>B = (50 + 1) × 2 = 102 ms |
| Modulation Analysis | 100 times | A = 100 / 2 + 2 = 52 ms<br>B = 0 ms |

In this case, the time duration of the NR sub-6GHz signal measured by segment will be 154 ms: the sum of 52 ms (maximum value of A) and 102 ms (maximum value of B).

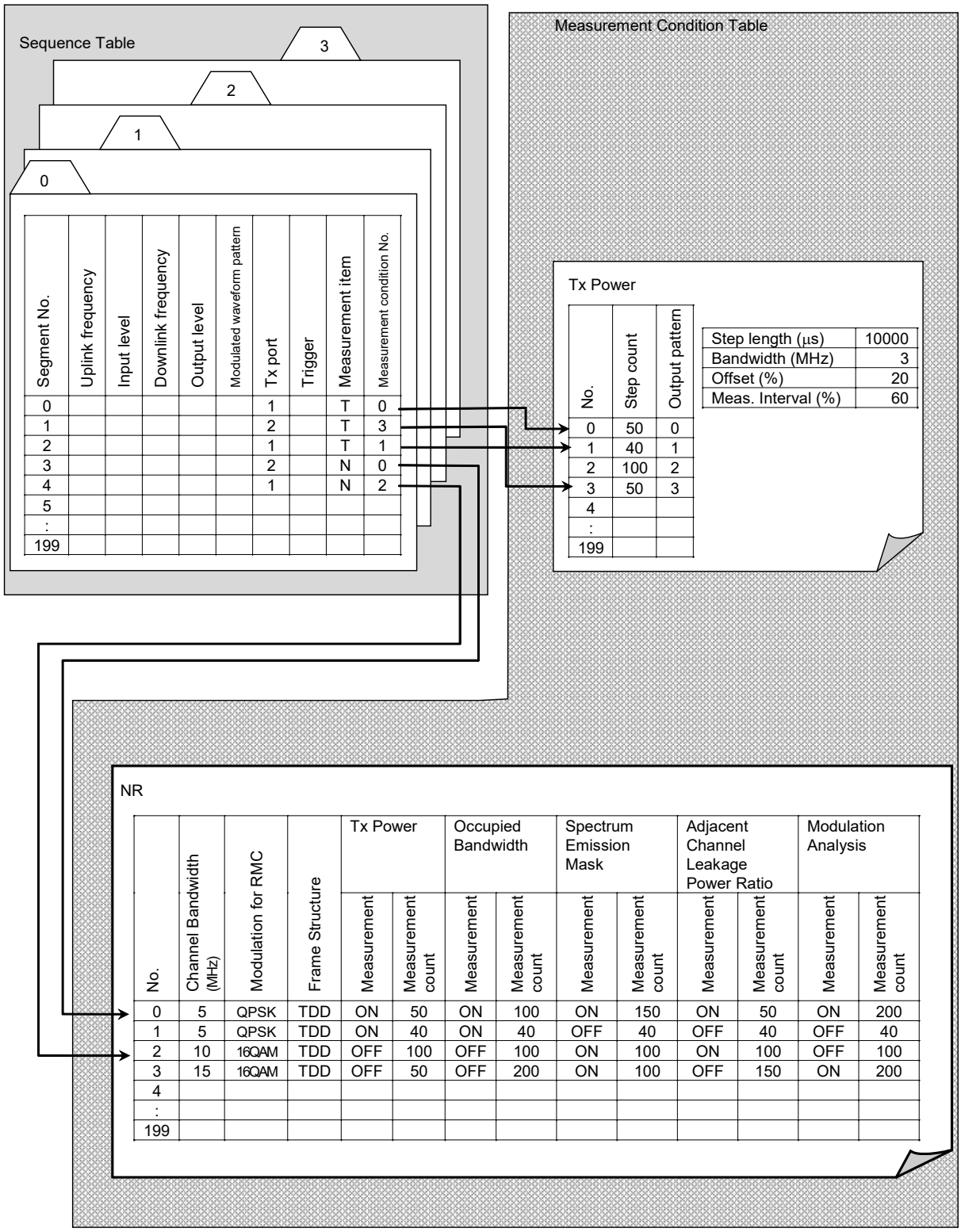



**Figure 3.1-1 Data Composition of Sequence Measurement Condition when MX887018A/19A Installed**

To change measurement to the Sequence Measurement mode, set the parameter to SEQUENCE using the following command.

```
STDSEL
:CONFigure:CELLular:MEASurement:STANdard
```

To modify the frequency, level or waveform pattern of a Downlink signal at sequence measurement, set the MU887000A vector signal generator to the Sequence Measurement mode. Set the parameter to SEQUENCE using the following command. For a detailed description, refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

```
:SOURce:GPRF:GENerator:MODE
```

Set the initial conditions of the Sequence Measurement mode to the following four items from the items described in Section 2.1 “Common Operations”.
Individual values can be set as described in Chapter 2 “Fundamental Measurements” and Chapter 3 “Sequence Measurement”.

- Uplink Frequency (mobile station Tx frequency)
  ```
  ULFREQ
  TXFREQ
  :CONFigure:CELLular:MEASurement:RFSettings:FREQuency
  ```
- Downlink Frequency (mobile station Rx frequency)
  ```
  DLFREQ
  RXFREQ
  :CONFigure:CELLular:GENerator:RFSettings:FREQuency
  ```
- Output Level
  ```
  OLVL
  :CONFigure:CELLular:GENerator:RFSettings:LEVel
  ```
- Input Level
  ```
  ILVL
  :CONFigure:CELLular:MEASurement:RFSettings:LEVel
  ```
- Output On/Off
  ```
  LVL
  :CONFigure:CELLular:GENerator:RFSettings:STATe
  ```
- Modulation On/Off
  ```
  MOD
  :CONFigure:CELLular:GENerator:BBMode
  ```
- Waveform File
  ```
  PACKAGE
  :CONFigure:CELLular:GENerator:ARB:PACKage:SELect
  ```

- Waveform Pattern
  DLPAT
  :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect
  DLPAT_SYNC
  :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC
- Ports
  PORT
  :ROUTe:PORT:CONNect:DIRection

# 3.2 Setting Sequence Table

## 3.2.1 Sequence table setting items

The sequence table setting items are:

- Table number
- Uplink frequency
- Input level
- Downlink frequency
- Output level
- Modulated waveform pattern
- Output test port
- Input test port
- Trigger conditions
- Measurement items
- Step count
- Measurement condition number



Table number

This is the number allocated to the edited sequence table. Four sequence tables are used and each table has a number between 0 and 3.

Rx Frequency, Input level, Tx frequency, Output level, Modulated waveform pattern

Each segment of the sequence table is configured with frequencies (MHz) and levels (dBm) and modulated waveform pattern number. The setting ranges are:

Frequency: 400.000000 to 3800.000000 MHz (MU887000A/01A)
400.000000 to 6000.000000 MHz
(with MU887000A/01A-001)
400.000000 to 6000.000000 MHz (MU887002A)
400.000000 to 6000.000000 MHz
(with MU887002A-007,Test Port 1 to 4)
400.000000 to 7300.000000 MHz
(with MU887002A-007, Test Port 5 to 12)

Input level:

| | | |
|---|---|---|
| MU887000A | –65.0 to +35.0 dBm | (Test Port 1, 2) |
| | –65.0 to +25.0 dBm | (Test Port 3, 4) |
| MU887001A | –65.0 to +35.0 dBm | (Test Port 1 to 4) |
| MU887002A | –65.0 to +35.0 dBm | (TRX 1/2 Test Port 1 to 12) |
| MU887002A (with MU887002A-007) | | |
| | –65.0 to +35.0 dBm | (Test Port 1 to 4) |
| | frequency < 5900 MHz | |
| | –65.0 to +35.0 dBm | (Test Port 5 to 12) |
| | 5900 MHz ≤ frequency | |

–65.0 to +30.0 dBm (Test Port 5 to 12)

Output level:

| | | |
|---|---|---|
| MU887000A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Test Port 1, 2) |
| | –120.0 to 0.0 dBm | (Test Port 3, 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Test Port 1, 2) |
| | –120.0 to –8.0 dBm | (Test Port 3, 4) |
| MU887001A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Test Port 1 to 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Test Port 1 to 4) |
| MU887002A | –130.0 to 0.0 dBm | (TRX 1/2 Test Port 1 to 12) |

Modulated waveform pattern: PAT1 to PATn
(n: waveform information file group range)

For details of the modulated waveform patterns at NR sub-6GHz measurement, refer to Section 2.1.5 “Waveform patterns”.

### Output test port

This sets the RF signal output test port in each segment of the sequence table.
MU887000A: Test port 1 to 4 (When selecting test port 3 or 4, make sure the port number is not the same as the input port.
MU887001A: Test port 1 to 4
MU887002A: Test port 1 to 12

### Input test port

Specifies the segment number and sets the test port for inputting RF signals.

### Trigger conditions

This specifies the trigger condition at each segment of the sequence table.

The setting ranges are:

| | | |
|---|---|---|
| Trigger Source: | Frame | When frame is detected |
| | Free run: | When measurement start command received |
| | Power: | When input level above (below) trigger level |
| Slope: | Rise: | When input level exceeds trigger level |
| Trigger Level: | Level difference from input level | |
| | Set a value in the range of –40.0 to 0 dB. | |

### Measurement item, step count, and measurement condition number

This sets the step count and measurement item for received signals in each segment of the sequence table. To execute the NR sub-6GHz measurement described here, set NR as the measurement item.
The NR measurement conditions are specified in a separate table. A measurement item should be registered in a given segment with its measurement condition number specified in the related table.

***Note:***

If other cellular application software is installed, the measurement mode that corresponds to the license can be set.

In this case, the measurement mode can be switched up to 15 times during the sequence.

As the step count, set a value above the segment duration in 3.1 “Outline”. The step count 1 represents 1 ms. The conditions to decide the segment duration depend on the contents of measurement condition table to refer to.

## 3.2.2 Sequence table commands

The commands that can be used in non CA are shown below.

- Table Number
  SEQTBL
  :CONFigure:CELLular:SEQuence:TABLe
- Uplink Frequency, Input Level, Downlink Frequency, Output Level, and Modulation Pattern
  SEQTRX
  :CONFigure:CELLular:SEQuence:RFSettings:TRX
- Uplink Frequency, Input Level
  SEQTX
  :CONFigure:CELLular:SEQuence:RFSettings:TX
- Output Port
  SEQSGPORT
  :CONFigure:CELLular:SEQuence:RXPort
  :CONFigure:CELLular:SEQuence:PORT:RX
- Input Port
  SEQSAPORT
  :CONFigure:CELLular:SEQuence:PORT:TX
- Trigger
  SEQTRG
  :TRIGger:CELLular:SEQuence
- Trigger (for extension)
  SEQTRGEXT
  :TRIGger:CELLular:SEQuence:EXTension
- Measurement mode, Step Count, Measurement Condition Number
  SEQMEAS
  :CONFigure:CELLular:SEQuence:SETup

### 3.2.3 Setting item error check

Setting errors in the following items in the sequence table can be queried.

- Input level
- Output level
- Step count
- Waveform pattern
- Port
- Amount of capture memory
- Output level change count
- Waveform pattern change count
- Measurement mode change count

The following command is used to query for errors.

```
SEQERR
:FETCh:CELLular:SEQuence:ERRor
SEQERR2
:FETCh:CELLular:SEQuence:ERRor2
```

The following table shows error causes.

**Table 3.2.3-1 Error Cause**

| Parameter | Cause |
|---|---|
| Input level* | Input level is out of range. |
| Output level* | Output level is out of range. |
| Step count | Fail to satisfy the step count conditions in Section 3.2.1. |
| Waveform pattern | The specified waveform file is not loaded in the waveform memory.<br>The specified waveform pattern does not exist in the waveform file. |
| Port | For MU887000A, Port 3 is set for both input port and output port. Or Port 4 is set for both input port and output port. |
| Amount of capture memory | Memory use rate is 100% or above. |
| Output level change count | Output level change count is 3001 or above. |
| Waveform pattern change count | Waveform pattern change count is 101 or above. |
| Measurement mode change count | Measurement mode change count is 16 or above. |

*: The available level depends on the settings of port number and external loss.

Changing the waveform pattern to CW or NC is not counted as waveform pattern change. Some examples of how to count waveform pattern change are shown below.

| Parameter Setting Command | Waveform Pattern Change Count |
|---|---|
| SEQTRX 0,1950.00,-10.00,869.20,-60.00,PAT1 | 1 |
| SEQTRX 1,1950.00,-10.00,869.20,-60.00,CW | 1 |
| SEQTRX 2,1950.00,-10.00,869.20,-60.00,PAT2 | 2 |
| SEQTRX 3,1950.00,-10.00,869.20,-60.00,NC | 2 |
| SEQTRX 4,1950.00,-10.00,869.20,-60.00,PAT3 | 3 |
| SEQTRX 5,1950.00,-10.00,869.20,-60.00,PAT1 | 4 |

# 3.3 Setting Measurement Conditions Table

## 3.3.1 Setting NR sub-6GHz measurement items

The items in the NR sub-6GHz measurement condition table supporting sequence measurement are listed below. Refer to Figure 3.1-1.

- RMC Configuration
- Measurement Offset
- Group hopping On/Off
- Sequence hopping On/Off
- Cell ID
- Operation band
- Channel Bandwidth and Resource Block
- Modulation scheme for Uplink Reference Measurement Channel
- Frame Structure
- UL RMC Waveform
- UL Subcarrier Spacing
- DMRS Duration
- Antenna port
- PUSCH mapping type
- DMRS add pos
- DMRS typeA pos
- UL DMRS Config Type
- Pre Phase Correction
- RAN Operation
- EN-DC Measurement Mode
- E-UTRA Uplink Frequency
- E-UTRA Channel Bandwidth and Resource Block
- E-UTRA Frame Structure
- E-UTRA Group Hopping
- E-UTRA Cyclic shift
- E-UTRA Cell ID
- E-UTRA Delta SS
- Tx Power Measurement on/off and measurement count
- Occupied Bandwidth measurement on/off and measurement count
- Spectrum Emission Mask measurement on/off and measurement count
- Adjacent Channel Leakage Power Ratio measurement on/off and measurement count
- Modulation Analysis measurement on/off and measurement count
- All measurement items off

## 3.3.2 NR sub-6GHz Measurement condition commands

The following commands set and query the NR sub-6GHz measurement conditions.

- NR Parameter
  `NR_SETUP`
  `:CONFigure:CELLular:SEQuence:NR:SETup`

- Measurement on/off and measurement count for each measurement items
  `NR_MEAS`
  `:CONFigure:CELLular:SEQuence:NR:AMITems`

- All measurement items off
  `NR_MEAS_OFF`
  `:CONFigure:CELLular:SEQuence:NR:AMITems:OFF`

# 3.4 Controlling and Monitoring Sequence

## 3.4.1 Controlling and monitoring items

The following items can be set to control the sequence measurement.

- Start and stop segments
- Initialization after completion of sequence measurement

### Start and stop segments

Segment numbers from 0 to 1999 can be set in the sequence table. The start and stop segments must be specified if part of a sequence table is executed. If start and stop segments are not specified, 0 to 199 segments (default) are measured.

### Initialization at end of sequence measurement

Select whether the following items are set to the values described in Section 2.1.3, “Frequency and level”, when sequence measurement is completed.

- Uplink frequency (Tx frequency of mobile station)
- Input level
- Downlink frequency (Rx frequency of mobile station)
- Output level

Use the commands described in Section 2.1.8 “Starting/stopping measurement” to start and stop the sequence measurement and verify the sequence measurement status.
In addition, the following items can be queried.

- Number of measured segments
- Measurement status of each segment
- Measurement status of specified segments
- Progress of sequence measurement

Number of measured segments and measurement status of each segment

The number of completed segment measurements and the status of segments can be monitored during sequence measurement.
The following table lists the response values and status of segments.

**Table 3.4.1-1 Segment Status**

| Response | Segment Status |
|---|---|
| 0 | Measurement completed successfully |
| 2 | Over level |
| 5 | Sync word not detected |
| 9 | Measuring or no measurement |
| 10 | Segment not measured |
| 12 | Tx measurement trigger timeout |

Measurement status of specified segments

Monitor the status of segments by specifying segment numbers from 0 to 1999.

Progress of sequence measurement

The progress can be measured as a proportion of the total number of segments between the start and stop number.

## 3.4.2 Sequence control and monitor commands

The sequence measurement can be controlled and monitored using the following commands.
The status indication lamp 3 of MU887000A is on during the execution of measurement or analysis. For the explanation of the status lamp, refer to Appendix D "Status Indication of lamps" in *the MU887000A TRX Test Module Operation Manual*.

- Starting measurement and signal output
  This command sets the parameters for both specified measurement and signal transmission and executes measurement.
  `SNGLS`
  `:INITiate:CELLular:MEASurement:SINGle`
- Start segment and stop segment for measurement and signal transmission
  This command sets both start segment and end segment for sequence measurement and sets both measurement and signal transmission parameters.
  `SEQCTRL`
  `:CONFigure:CELLular:SEQuence:CONTrol`
- Start segment and stop segment for measurement
  This command sets both start segment and end segment for sequence measurement and sets the measurement parameters only, without affecting the signal transmission parameters.
  `SEQCTRLTX`
  `:CONFigure:CELLular:SEQuence:CONTrol:TX`
- Starting measurement
  This command sets only the parameters for the specified measurement and executes measurement, without affecting the signal transmission parameters.
  `SEQEXECTX`
  `:INITiate:CELLular:SEQuence:EXECute:TX`
- Stopping measurement
  `MEASSTOP`
  `:ABORt:CELLular:MEASurement`
- Initialization after completion of sequence measurement
  `SEQREINIT`
  `:CONFigure:CELLular:SEQuence:RFSettings:REINit`
- Setting the trigger timeout
  `TRGTOUT`
  `:TRIGger:CELLular:MEASurement:TOUT`

The status of sequence measurement can be queried using the following commands.

- Progress of sequence measurement
  SEQPROGRESS
  :FETCh:CELLular:SEQuence:PROGress
- Measurement status of specified segments
  SEQSEGSTAT
  :FETCh:CELLular:SEQuence:SEG:STATe
- Number of measured segments and status of each segment
  SEQMSTAT
  :FETCh:CELLular:SEQuence:STATe

# 3.5 Measurement Results

The NR sub-6GHz measurement results are queried using the following commands.

- All Results (Tx measurement result)
  `NR_TXMEASRESULT`
  `:FETCh:CELLular:SEQuence:NR:TX`

# 3.6 Sample Program

This section describes an example of sequence measurement using the Native command mode.

### Processing Flow

1. Set the application type to CELLULAR.
2. Load the Tx signal pattern file DL_FILE.xml into memory.
3. Set the measurement standard to Sequence measurement.
4. Set the measurement conditions listed in Table 3.6-1 to Table 3.6-3.
5. Set the following items:

| | |
|---|---|
| RF Signal output | On |
| Start segment number | 0 |
| Stop segment number | 1 |
| Initialization after sequence measurement | On |

6. Query the sequence table for errors and abort if errors found.
7. Start measurement.
8. Query the status of measurement.
9. When measurement is completed, query:

   Tx Power of segment 0
   Modulation Analysis of segment 0
   Tx Power of segment 1
   Adjacent Channel Leakage Power Ratio of segment 1
   Occupied Bandwidth of segment 1

**Table 3.6-1 Sequence Table 1**

| Segment number | Uplink frequency (MHz) | Input level (dBm) | Downlink frequency (MHz) | Output level (dBm) | Transmit signal pattern | Output port |
|---|---|---|---|---|---|---|
| 0 | 2620 | 0 | 2620 | –50 | OFF | 1 |
| 1 | 2546 | 0 | 2546 | –55 | OFF | 1 |

**Table 3.6-2 Sequence Table 2**

| Segment number | Trigger source | Trigger slope* | Trigger level | Trigger delay time (ms) | Measurement item | Step count | Measurement condition number |
|---|---|---|---|---|---|---|---|
| 0 | Free run | ↑ | –20 | 0 | NR | 30 | 0 |
| 1 | Free run | ↑ | –25 | 0 | NR | 30 | 1 |

*: ↑: Rise

**Table 3.6-3 Measurement Conditions**

| Item | Setting | | | |
|---|---|---|---|---|
| Measurement Condition Number | 0 | 1 | 2 | … |
| Operation band | 38 | 41 | | |
| Frame Structure | TDD | TDD | | |
| RMC Configuration | PUSCH | PUSCH | | |
| Cell ID | 0 | 0 | | |
| PUSCH Waveform | CP-OFDM | CP-OFDM | | |
| Channel Bandwidth (MHz) | 100 MHz | 100 MHz | | |
| Subcarrier Spacing | 30 kHz | 30 kHz | | |
| Number of RBs | 273 | 273 | | |
| Starting RB Number | 0 | 0 | | |
| UL RMC Modulation scheme | 64QAM | 64QAM | | |
| DMRS duration | Single | Single | | |
| Antenna Port | 0 | 0 | | |
| UL-DMRS-add-pos | 0 | 0 | | |
| PUSCH DMRS Starting position (typeA-pos) | 2 | 2 | | |
| PUSCH DMRS UL-DMRS-config-type | Type1 | Type1 | | |
| Group Hopping | OFF | OFF | | |
| Sequence Hopping | ON | ON | | |
| Pre Phase Correction | OFF | OFF | | |
| Tx Power Measurement | ON | ON | | |
| Tx Power Measurement Count | 5 | 5 | | |
| Modulation Analysis Measurement | ON | OFF | | |
| Modulation Analysis Measurement Count | 5 | 5 | | |
| OBW Measurement | OFF | ON | | |
| OBW Measurement Count | 5 | 5 | | |
| SEM Measurement | OFF | OFF | | |
| SEM Measurement Count | 5 | 5 | | |
| ACLR Measurement | OFF | ON | | |
| ACLR Measurement Count | 5 | 5 | | |

```
; Sample program for NR Sequence Measurement
; Anritsu Corporation May,2019
; Macro for Tera Term Version 4.69
;
; set local echo to on
setecho 1
flushrecv
; time out 10 second
timeout=10

; Set language to "Native".
sendln 'SYST:LANG NAT'
call check_error_code

; Set VSG Mode to "Normal".
sendln 'SOUR:GPRF:GEN:MODE NORMAL'
call check_error_code

; Load ARB File "MV887019A_NRTDD_0001".
sendln 'SOUR:GPRF:GEN:ARB:FILE:LOAD "MV887019A_NRTDD_0001"'
call check_error_code

; waiting load waveform file.
sendln '*WAI'
call check_error_code

; Set application type to "Cellular".
sendln 'SYSSEL CELLULAR'
call check_error_code

; Set standard to "Sequence".
sendln 'STDSEL SEQUENCE'
call check_error_code

; Set download package to "MV887019A_NRTDD_0001".
sendln 'PACKAGE "MV887019A_NRTDD_0001"'
call check_error_code

; Set Sequence Table Parameters of "segment 0".
sendln 'SEQTRX 0,2620,0,2620,-50,OFF'
call check_error_code

sendln 'SEQSGPORT 0,PORT1 '
call check_error_code
```

```
sendln 'SEQTRG 0,FREERUN,RISE,-20,0'
call check_error_code

sendln 'SEQMEAS 0,NR,30,0'
call check_error_code

; Set Sequence Table Parameters of "segment 1".
sendln ' SEQTRX 1,2546,0,2546,-55,OFF'
call check_error_code

sendln 'SEQSGPORT 1,PORT1'
call check_error_code

sendln 'SEQTRG 1,FREERUN,RISE,-25,0'
call check_error_code

sendln 'SEQMEAS 1,NR,30,1'
call check_error_code

; Set Measurement Condition of "NR".
sendln 'NR_SETUP
0,1,38,TDD,PUSCH,0,CPOFDM,100MHZ,30KHZ,10MS,10,273,0,64QAM,SINGLE,0,0,2,TYP
E1,OFF,ON,0,OFF,ON'
call check_error_code

sendln 'NR_SETUP
1,1,41,TDD,PUSCH,0,CPOFDM,100MHZ,30KHZ,10MS,10,273,0,64QAM,SINGLE,0,0,2,TYP
E1,OFF,ON,0,OFF,ON'
call check_error_code

sendln 'NR_MEAS 0,ON,5,ON,5,OFF,5,OFF,5,OFF,5'
call check_error_code

sendln 'NR_MEAS 1,ON,5,OFF,5,ON,5,OFF,5,ON,5'
call check_error_code

; Set Output State to "On".
sendln 'LVL ON'
call check_error_code

; Set Start Segment Number to "0",Stop Segment Number to "1".
sendln 'SEQCTRL 0,1'
call check_error_code
```

```
; Query error of Sequence table settings.
sendln 'SEQERR?'
waitln '0,' '1,' '2,' '3,' '4,'
call check_seqerr_response

; Set Initialization to "On" when sequence finished.
sendln 'SEQREINIT ON'
call check_error_code

; Start measurement
sendln 'SNGLS'
call check_error_code

; waiting measurement up to 10 second
for i 1 10

  sendln 'MSTAT?'
  pause 1; wait 1 second
  recvln
  recvln
  ;call check_response ; debug
  if result=0 goto _timeout
  if result=1 then
         str2int m_code inputstr
         if m_code=0 break     ;Sequence finish normally.
         call check_error_code
  endif

next

; Query Tx power and Modulation Analysis data of "Segment 0".
sendln 'NR_TXMEASRESULT? 0,1'
call check_error_code

; Query Tx Power, Occupied Bandwidth, and ACLR data of "Segment 1".
sendln 'NR_TXMEASRESULT? 1,3'
call check_error_code

End

;       ------------ subroutines -----------

:check_error_code
```

```
  ; query error
  sendln 'SYSERR?'

  waitln 'No error'

  ; in case of timeout

  if result=0 goto _timeout
  ; in case of error occurring
  if result=2 then
         e_message='Error code = '
         strconcat e_message inputstr
         messagebox  e_message 'Command Error occurred'
         end
  endif

  ; in case of no error
  return

:check_seqerr_response

  ;for debug
  strsplit inputstr ','
  err_num=str2int groupmatchstr1
  if err_num then
         ; when error count is not 0.
         messagebox inputstr 'Sequence Table Error'
         End
  endif

  return

:check_response

  ;for debug
  messagebox inputstr 'debug1'
  int2str result_str result
  messagebox result_str 'debug2'
```

```
  return

:_timeout
  messagebox  'No response from MT8870A.' 'Time out!'
  call check_error_code
  End
```

# Chapter 4 SCPI Command Reference

This chapter describes the details of SCPI commands.
To switch to the SCPI command mode, send the command SYST:LANG SCPI.


4.1 List of Commands ..... 4-2
4.1.1 Common commands ..... 4-3
4.1.2 Fundamental measurement commands ..... 4-5
4.1.3 Sequence measurement commands ..... 4-20
4.2 Details of Commands ..... 4-26
4.2.1 Common commands ..... 4-27
4.2.2 Fundamental measurement commands ..... 4-42
4.2.3 Sequence measurement commands ..... 4-157

# 4.1 List of Commands

The following table shows the rules for describing messages.

| | |
|---|---|
| [ ] | Messages or parameters in square brackets can be omitted. |
| \| | Choose one of several choices.<br>A\|B\|C\|D indicates a choice of A, B, C, and D. |
| { } | Curly brackets are used to group options.<br>For A\|B({C\|D}), choose A, B(C), or B(D). |

## 4.1.1 Common commands

Operation Status Register

| Function | Command | Query | Response |
|---|---|---|---|
| Measurement Operation Status Register Query | ----- | :STATus:OPERation:MEASure[:EVENt]? | <mosr> |

Questionable Register

| Function | Command | Query | Response |
|---|---|---|---|
| Measurement Questionable Status Register Query | ----- | :STATus:QUEStionable:MEASure[:EVENt]? | <mqsr> |

Common

| Function | Command | Query | Response |
|---|---|---|---|
| Standard Select | :CONFigure:CELLular:MEASurement:STANdard <std> | :CONFigure:CELLular:MEASurement:STANdard? | <std> |
| Set Connect Port Direction | :ROUTe:PORT:CONNect:DIRection <input>,<output>[,<output>,…,<output>] | :ROUTe:PORT:CONNect:DIRection? | <input>,<output>[,<output>,…,<output>] |

Measurement

| Function | Command | Query | Response |
|---|---|---|---|
| Measurement Stop | :ABORt:CELLular:MEASurement | ----- | ----- |
| Measurement Status | ----- | :FETCh:CELLular:MEASurement:STATe? | <m_status> |
| Measurement Start | :INITiate:CELLular:MEASurement:SINGle | ----- | ----- |

Common Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| Output Level On/Off | :CONFigure:CELLular:GENerator:RFSettings:STATe <on_off> | :CONFigure:CELLular:GENerator:RFSettings:STATe? | <on_off> |
| Output Signal Modulation | :CONFigure:CELLular:GENerator:BBMode <on_off> | :CONFigure:CELLular:GENerator:BBMode? | <on_off> |
| Waveform File Select | :CONFigure:CELLular:GENerator:ARB:PACKage:SELect <pac> | :CONFigure:CELLular:GENerator:ARB:PACKage:SELect? | <pac> |
| Waveform Pattern Select | :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect <pat> | :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect? | <pat> |
| Waveform Pattern Select (SYNC) | :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC <pat> | :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC? | <pat> |

System

| Function | Command | Query | Response |
|---|---|---|---|
| Application Select | :INSTrument[:SELect] <app> | :INSTrument[:SELect]? | <app> |
| Language Selection of Remote Command | :SYSTem:LANGuage <mode> | :SYSTem:LANGuage? | <mode> |

## 4.1.2 Fundamental measurement commands

Common Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| UL Channel Bandwidth | :CONFigure:CELLular:NR:CBANdwidth [<cc>,]<ch_bw> | :CONFigure:CELLular:NR:CBANdwidth? [<cc>] | <ch_bw> |
| Upling Channel | :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel [<cc>,]<ul_ch> | :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel? [<cc>] | <ul_ch> |
| Uplink Frequency | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency [<cc>,]<ul_freq> | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency? [<cc>] | <ul_freq> |
| Downlink Channel | :CONFigure:CELLular:MEASurement:RFSettings:DLCHannel [<cc>,]<dl_ch> | :CONFigure:CELLular:MEASurement:RFSettings:DLCHannel? [<cc>] | <dl_ch> |
| Downlink Frequency | :CONFigure:CELLular:GENerator:RFSettings:FREQuency [<cc>,]<dl_freq> | :CONFigure:CELLular:GENerator:RFSettings:FREQuency? [<cc>] | <dl_freq> |
| Operation Band | :CONFigure:CELLular:NR:FUNDamental:BAND [<cc>,]<band> | :CONFigure:CELLular:NR:FUNDamental:BAND? [<cc>] | <band> |
| Input Level | :CONFigure:CELLular:MEASurement:RFSettings:LEVel [<cc>,]<level> | :CONFigure:CELLular:MEASurement:RFSettings:LEVel? [<cc>] | <level> |
| Output Level (Cell Total) | :CONFigure:CELLular:GENerator:RFSettings:LEVel <level> | :CONFigure:CELLular:GENerator:RFSettings:LEVel? | <level> |

NR sub-6GHz Settings

| Function | Command | Query | Response |
|---|---|---|---|
| Frame Structure | :CONFigure:CELLular:NR:FSTRucture [<cc>,]<mode> | :CONFigure:CELLular:NR:FSTRucture? [<cc>] | <mode> |
| Frequency Range | :CONFigure:CELLular:NR:FREQuency:RANGe [<cc>,]<fr> | :CONFigure:CELLular:NR:FREQuency:RANGe? [<cc>] | <fr> |
| UL Subcarrier Spacing | :CONFigure:CELLular:NR:SCS [<cc>,]<scs> | :CONFigure:CELLular:NR:SCS? [<cc>] | <scs> |
| Cell ID | :CONFigure:CELLular:NR:CID [<cc>,]<id> | :CONFigure:CELLular:NR:CID? [<cc>] | <id> |
| DL/UL Periodicity | :CONFigure:CELLular:NR:DLUL:PERiod [<cc>,]<periodicity> | :CONFigure:CELLular:NR:DLUL:PERiod? [<cc>] | <periodicity> |
| UL Duration | :CONFigure:CELLular:NR:UL:DURation [<cc>,]<duration> | :CONFigure:CELLular:NR:UL:DURation? [<cc>] | <duration> |
| RMC Configuration | :CONFigure:CELLular:NR:CTYPe <val> | :CONFigure:CELLular:NR:CTYPe? | <val> |
| UL RMC Waveform | :CONFigure:CELLular:NR:WAVeform [<cc>,]<wave> | :CONFigure:CELLular:NR:WAVeform? [<cc>] | <wave> |
| UL RMC Number of RBs | :CONFigure:CELLular:NR:RBALlocation:NRB [<cc>,]<ul_rmc_rb> | :CONFigure:CELLular:NR:RBALlocation:NRB? [<cc>] | <ul_rmc_rb> |
| UL RMC Starting RB | :CONFigure:CELLular:NR:RBALlocation:ORB [<cc>,]<ulrb> | :CONFigure:CELLular:NR:RBALlocation:ORB? [<cc>] | <ulrb> |
| UL RMC Modulation | :CONFigure:CELLular:NR:MODulation:MSCHeme [<cc>,]<ul_rmc_mod> | :CONFigure:CELLular:NR:MODulation:MSCHeme? [<cc>] | <ul_rmc_mod> |
| PUSCH mapping type | :CONFigure:CELLular:NR:PUSCh:MTYPe [<cc,>]<mappingtype> | :CONFigure:CELLular:NR:PUSCh:MTYPe? [<cc>] | <mappingtype> |

NR sub-6GHz Settings (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| DMRS Duration | :CONFigure:CELLular:NR:DMRS:DURation [<cc>,]<symbol> | :CONFigure:CELLular:NR:DMRS:DURation? [<cc>] | <symbol> |
| Antenna port | :CONFigure:CELLular:NR:DMRS:PORT [<cc>,]<port> | :CONFigure:CELLular:NR:DMRS:PORT? [<cc>] | <port> |
| DMRS add pos | :CONFigure:CELLular:NR:DMRS:ADDPos [<cc>,]<rspos> | :CONFigure:CELLular:NR:DMRS:ADDPos? [<cc>] | <rspos> |
| DMRS typeA pos | :CONFigure:CELLular:NR:DMRS:TYPE:APOSition [<cc>,]<pos> | :CONFigure:CELLular:NR:DMRS:TYPE:APOSition? [<cc>] | <pos> |
| UL DMRS Config Type | :CONFigure:CELLular:NR:DMRS:TYPE [<cc>,]<type> | :CONFigure:CELLular:NR:DMRS:TYPE? [<cc>] | <type> |
| Group Hopping | :CONFigure:CELLular:NR:DMRS:GHOPping [<cc>,]<type> | :CONFigure:CELLular:NR:DMRS:GHOPping? [<cc>] | <type> |
| Sequence Hopping | :CONFigure:CELLular:NR:DMRS:SHOPping [<cc>,]<type> | :CONFigure:CELLular:NR:DMRS:SHOPping? [<cc>] | <type> |
| Pre Phase Correction | :CONFigure:CELLular:NR:PCRRection <on_off> | :CONFigure:CELLular:NR:PCRRection? | <on_off> |
| Trigger Source | :TRIGger:CELLular:NR:FUNDamental:SOURce <source> | :TRIGger:CELLular:NR:FUNDamental:SOURce? | <source> |
| Trigger Level | :TRIGger:CELLular:NR:FUNDamental:LEVel <level> | :TRIGger:CELLular:NR:FUNDamental:LEVel? | <level> |
| Trigger Delay | :TRIGger:CELLular:NR:FUNDamental:DELay <delay> | :TRIGger:CELLular:NR:FUNDamental:DELay? | <delay> |
| Trigger Timeout | :TRIGger:CELLular:NR:FUNDamental:TOUT <time> | :TRIGger:CELLular:NR:FUNDamental:TOUT? | <time> |
| Minimum Trigger Gap | :TRIGger:CELLular:NR:FUNDamental:MGAP <time> | :TRIGger:CELLular:NR:FUNDamental:MGAP? | <time> |
| Measurement Offset | :CONFigure:CELLular:NR:FUNDamental:MOFFset <time> | :CONFigure:CELLular:NR:FUNDamental:MOFFset? | <time> |

NR sub-6GHz Settings (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| RAN Operation | :CONFigure:CELLular:NR:RANoperation <ranop_type> | :CONFigure:CELLular:NR:RANoperation? | <ranop_type> |
| EN-DC Measurement Mode | :CONFigure:CELLular:NR:ENDC:MMODe <endc_mode> | :CONFigure:CELLular:NR:ENDC:MMODe? | <endc_mode> |
| E-UTRA UL Channel Bandwidth | :CONFigure:CELLular:NR:EUTRa:CBANdwidth [<cc>,]<eutra_bw> | :CONFigure:CELLular:NR:EUTRa:CBANdwidth? [<cc>] | <eutra_bw> |
| E-UTRA UL Number of RBs | :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB [<cc>,]<eutra_nrb> | :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB? [<cc>] | <eutra_nrb> |
| E-UTRA UL Starting RB | :CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB [<cc>,]<eutra_start> | :CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB? [<cc>] | <eutra_start> |
| E-UTRA Frame Structure | :CONFigure:CELLular:NR:EUTRa:FSTRucture [<cc>,]<eutra_frametype> | :CONFigure:CELLular:NR:EUTRa:FSTRucture? [<cc>] | <eutra_frametype> |
| E-UTRA Group Hopping | :CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping [<cc>,]<eutra_grouphop> | :CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping? [<cc>] | <eutra_grouphop> |
| E-UTRA Cyclic shift | :CONFigure:CELLular:NR:EUTRa:DMRS:CSHift [<cc>,]<eutra_cshift> | :CONFigure:CELLular:NR:EUTRa:DMRS:CSHift? [<cc>] | <eutra_cshift> |
| E-UTRA Cell ID | :CONFigure:CELLular:NR:EUTRa:CID [<cc>,]<eutra_cellid> | :CONFigure:CELLular:NR:EUTRa:CID? [<cc>] | <eutra_cellid> |
| E-UTRA Delta SS | :CONFigure:CELLular:NR:EUTRa:DSS [<cc>,]<eutra_dss> | :CONFigure:CELLular:NR:EUTRa:DSS? [<cc>] | <eutra_dss> |

NR sub-6GHz Settings (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| E-UTRA Uplink Channel | :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa [<cc>,]<ulchan> | :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa? [<cc>] | <ulchan> |
| E-UTRA Uplink Frequency | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa [<cc>,]<ulfreq> | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa? [<cc>] | <ulfreq> |

Fundamental Measurement Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| All Measurement Items Off | :CONFigure:CELLular:NR:FUNDamental:AMITems:OFF | ---- | ---- |
| Power Measurement On/Off and Meas. Count | :CONFigure:CELLular:NR:FUNDamental:POWer:SET <on_off>[,<avg_count>] | :CONFigure:CELLular:NR:FUNDamental:POWer:SET? | <on_off>,<avg_count> |
| OBW On/Off and Meas. Count | :CONFigure:CELLular:NR:FUNDamental:OBW:SET <on_off>[,<avg_count>] | :CONFigure:CELLular:NR:FUNDamental:OBW:SET? | <on_off>,<avg_count> |
| SEM On/Off and Meas. Count | :CONFigure:CELLular:NR:FUNDamental:SEMask:SET <on_off>[,<avg_count>] | :CONFigure:CELLular:NR:FUNDamental:SEMask:SET? | <on_off>,<avg_count> |
| ACLR On/Off and Meas. Count | :CONFigure:CELLular:NR:FUNDamental:ACLR:SET <on_off>[,<avg_count>] | :CONFigure:CELLular:NR:FUNDamental:ACLR:SET? | <on_off>,<avg_count> |
| Modulation Analysis On/Off and Meas. Count | :CONFigure:CELLular:NR:FUNDamental:MODulation:SET <on_off>[,<avg_count>] | :CONFigure:CELLular:NR:FUNDamental:MODulation:SET? | <on_off>,<avg_count> |

Result (Power Measurement, Occupied Bandwidth)

| Function | Command | Query | Response |
|---|---|---|---|
| Tx Power Result | ---- | :FETCh:CELLular:NR:FUNDamental:POWer:TXPower? [<mode>] | <pwr> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)> <mode>=IND<br>AVG when mode is omitted |
| Channel Power Result | ---- | :FETCh:CELLular:NR:FUNDamental:POWer:CHPower? [<mode>] | <pwr> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)> <mode=IND<br>AVG when mode is omitted |
| OBW Result | ---- | :FETCh:CELLular:NR:FUNDamental:OBW? | <bw> |
| OBW Frequency Result | ---- | :FETCh:CELLular:NR:FUNDamental:OBW:FREQuency? <pos> | <freq> |

Result (Spectrum Emission Mask)

| Function | Command | Query | Response |
|---|---|---|---|
| SEM Worst Value | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel? <range> | <level>,<freq> |
| SEM Worst Value (All range) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:TTL? | <level(-1)>,<freq(-1)>,…,<level(-4)>,<freq(-4)>,<br><level(1)>,freq(1)>,…,level(4)>,freq(4)> |
| SEM Worst Value (Detail) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail? <range> | <level>,<freq> |
| SEM Worst Value (Detail) (All range) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail:TTL? | <level(-1)>,<freq(-1)>,…,<level(-18)>,<freq(-18)>,<br><level(1)>,<freq(1)>,…,<level(18)>,<freq(18)> |
| SEM Mask Margin | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin? <range> | <margin>,<freq> |
| SEM Mask Margin (All range) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:TTL? | <margin(-1)>,<freq(-1)>,…,<margin(-4)>,<freq(-4)>,<margin(1)>,<freq(1)>,…,<margin(4)>,<freq(4)> |
| SEM Mask Margin (Detail) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail? <range> | <margin>,<freq> |
| SEM Mask Margin (Detail) (All range) | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail:TTL? | <margin(-1)>,<freq(-1)>,…,<margin(-23)>,<br><freq(-23)>,<margin(1)>,<freq(1)>,…,<margin(23)>,<freq(23)> |
| SEM Template Judgement | ---- | :FETCh:CELLular:NR:FUNDamental:SEMask:JUDGement? | <judge> |

Result (Adjacent Channel Power)

| Function | Command | Query | Response |
|---|---|---|---|
| ACLR Result | ---- | :FETCh:CELLular:NR:FUNDamental:ACLR? <mode> | <aclr(NR_LOW)>, <aclr(NR_UP)>, <aclr(LOW2)>, <aclr(LOW1)>, <aclr(UP1)>, <aclr(UP2)><br><mode>=AVG,MAX,MIN,DVT<br><avg(NR_LOW)>, <avg(NR_UP)>, <avg(LOW2)>, <avg(LOW1)>, <avg(UP1)>, <avg(UP2)>,<br><max(NR_LOW)>, <max(NR_UP)>, <max(LOW2)>, <max(LOW1)>, <max(UP1)>, <max(UP2)>,<br><min(NR_LOW)>, <min(NR_UP)>, <min(LOW2)>, <min(LOW1)>, <min(UP1)>, <min(UP2)>,<br><mode>=TTL |

Result (Modulation Analysis)

| Function | Command | Query | Response |
|---|---|---|---|
| Carrier Frequency Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:CFRequency? [<mode>] | <freq><br>AVG when <mode> is omitted. |
| Carrier Frequency Error Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:FERRor? [<mode>] | <freq_ppm>,<freq_Hz><br><mode>=AVG,MAX,MIN,DVT<br><avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<br><min_ppm>,<min_Hz><br><mode>=TTL<br>Worst value when <mode> is omitted. |
| Worst Carrier Frequency Error Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:FERRor:WORSt? | <freq_ppm>,<freq_Hz> |
| EVM Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:EVM? [<mode>] | <evm> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<evm(1)>,…,<evm[s]><br><mode>=IND<br>AVG when <mode> is omitted. |

Result (Modulation Analysis) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Peak EVM Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:PEVM? [<mode>] | <pevm> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>AVG when <mode> is omitted. |
| Reference Signal EVM Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:RSEVm? [<mode>] | <rsevm> <mode=>AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<rsevm(1)>,…,<rsevm[s]> <mode>=IND<br>AVG when <mode> is omitted. |
| Rho Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:RHO? [<mode>] | <rho> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>AVG when <mode> is omitted. |
| Phase Error Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:PHERror? [<mode>] | <phase> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>AVG when <mode> is omitted. |
| Magnitude Error Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:MERRor? [<mode>] | <magnitude> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>AVG when <mode> is omitted. |
| Carrier Leakage Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:CARLeakage? [<mode>] | <cleakage> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>AVG when <mode> is omitted. |

Result (In-band emissions for non allocated RB)

| Function | Command | Query | Response |
|---|---|---|---|
| In-Band Emissions Measured Item | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:ITEM? | <flag> |
| In-Band Emissions (General) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:GENeral? [<mode>] | <ibe> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<ibe(1)>,…,<ibe[s]> <mode>=IND<br>MAX when <mode> is omitted. |
| In-Band Emissions (IQ Image) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:IQIMage? [<mode>] | <ibe> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<ibe(1)>,…,<ibe[s]> <mode>=IND<br>MAX when <mode> is omitted. |
| In-Band Emissions (Carrier Leakage) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:CARLeakage? [<mode>] | <ibe> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<ibe(1)>,…,<ibe[s]> <mode>=IND<br>MAX when <mode> is omitted. |
| E-UTRA In-Band Emissions (General) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:GENeral? [<mode>] | <ibe> <mode> = AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode> = TTL<br><s>,<ibe(1)>,…,<ibe(s)> <mode> = IND<br>MAX when <mode> is omitted. |
| E-UTRA In-Band Emissions (IQ Image) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:IQIMage? [<mode>] | <ibe> <mode> = AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode> = TTL<br><s>,<ibe(1)>,…,<ibe(s)> <mode> = IND<br>MAX when <mode> is omitted. |
| E-UTRA In-Band Emissions (Carrier Leakage) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:CARLeakage? [<mode>] | <ibe> <mode = AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode> = TTL<br><s>,<ibe(1)>,…,<ibe(s)> <mode> = IND<br>MAX when <mode> is omitted. |

Result (In-band emissions for non allocated RB) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| E-UTRA In-Band Emissions Measured Item | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:ITEM? | <flag> |
| In-Band Emissions Judgement | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:JUDGement? | <judge> |
| In-Band Emissions (General) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:GENeral? | <level> |
| In-Band Emissions (IQ Image) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:IQIMage? | <level> |
| In-Band Emissions (Carrier Leakage) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage? | <level> |
| In-Band Emission margin | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:MARGin? | <margin> |
| E-UTRA In-Band Emissions Judgement | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:JUDGement? | <judge> |
| E-UTRA In-Band Emissions (General) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:GENeral? | <level> |
| E-UTRA In-Band Emissions (IQ Image) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:IQIMage? | <level> |
| E-UTRA In-Band Emissions (Carrier Leakage) limit | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:CARLeakage? | <level> |
| E-UTRA In-Band Emission margin | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:MARGin? | <margin> |

Result (Spectrum flatness)

| Function | Command | Query | Response |
|---|---|---|---|
| Spectrum Flatness Measured Item | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:ITEM? | <flag> |
| Spectrum Flatness Judgement | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:JUDGement? | <judge> |
| Spectrum Flatness (≥ 3 MHz (RP1)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP1? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<sflatness(1)>,…,<sflatness(s)> <mode>=IND<br>MAX when <mode> is omitted. |
| Spectrum Flatness (RP12) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP12? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<sflatness(1)>,…,<sflatness(s)> <mode>=IND<br>MAX when <mode> is omitted. |
| Spectrum Flatness (< 3 MHz (RP2)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP2? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<sflatness(1)>,…,<sflatness(s)> <mode>=IND<br>MAX when <mode> is omitted. |
| Spectrum Flatness (RP21) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP21? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br><s>,<sflatness(1)>,…,<sflatness(s)> <mode>=IND<br>MAX when <mode> is omitted. |

Result (Spectrum flatness) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Spectrum Flatness (≥ 3 MHz (R1 –)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1M? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>MIN when <mode> is omitted. |
| Spectrum Flatness (≥ 3 MHz (R1 +)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1P? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>MAX when <mode> is omitted. |
| Spectrum Flatness (< 3 MHz (R2 –)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2M? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>MIN when <mode> is omitted. |
| Spectrum Flatness (< 3 MHz (R2 +)) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2P? [<mode>] | <sflatness> <mode>=AVG,MAX,MIN,DVT<br><avg>,<max>,<min> <mode>=TTL<br>MAX when <mode> is omitted. |
| Spectrum Flatness (RP Total) Result | ---- | :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP? [<mode>] | <sflat(RP1)>,<sflat(RP2)>,<sflat(RP12)>,<br><sflat(RP21)> <mode>=AVG,MAX,MIN,DVT<br><avg(RP1)>,<avg(RP2)>,<avg(RP12)>,<avg(RP21)>,<br><max(RP1)>,<max(RP2)>,<max(RP12)>,<max(RP21)>,<br><min(RP1)>,<min(RP2)>,<min(RP12)>,<min(RP21)><br><mode>=TTL<br><s>,<sflat(RP1)(1)>,<sflat(RP2)(1)>,<sflat(RP12)(1)>,<sflat(RP21)(1)>,…,<sflat(RP1)(s)>,<sflat(RP2)(s)>,<sflat(RP12)(s)>,<sflat(RP21)(s)><br><mode>=IND<br>MAX when <mode> is omitted. |

Result (Spectrum flatness) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| All Results | ---- | :FETCh:CELLular:NR:FUNDamental:TX? <index> | <result(1)>,<result(2)>,…,<result(x)><br>When <index> = 1: x = 71<br>When <index> = 2: x = 94<br>When <index> = 3: x = 28<br>When <index> = 4: x = 81<br>When <index> = 5: x = 92<br>When <index> = 6: x = 169<br>When <index> = 102: x = 139 |

Result (Waveform)

| Function | Command | Query | Response |
|---|---|---|---|
| Waveform | ---- | :FETCh:CELLular:NR:FUNDamental:TRACe? <format>,<position>,<length>[,<symbol>] | <data(1)>,…,<data(length)> |

### 4.1.3 Sequence measurement commands

Common Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| Input Level | :CONFigure:CELLular:MEASurement:RFSettings:LEVel <level> | :CONFigure:CELLular:MEASurement:RFSettings:LEVel? | <level> |
| Output Level | :CONFigure:CELLular:GENerator:RFSettings:LEVel <level> | :CONFigure:CELLular:GENerator:RFSettings:LEVel? | <level> |
| Downlink Frequency | :CONFigure:CELLular:GENerator:RFSettings:FREQuency <dl_freq> | :CONFigure:CELLular:GENerator:RFSettings:FREQuency? | <dl_freq> |
| Uplink Frequency | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency <ul_freq> | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency? | <ul_freq> |

Sequence Measurement

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Measurement Status | ----- | :FETCh:CELLular:SEQuence:STATe? | <m_status>,<n>,<s(0)>,<s(1)>,…,<s(n-1)> |
| Sequence Progress | ----- | :FETCh:CELLular:SEQuence:PROGress? | <p>,<cur>,<start>,<stop> |
| Specified Segment Status | ----- | :FETCh:CELLular:SEQuence:SEG:STATe? <seg> | <stat> |

Sequence Control Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Control Parameter - Sequence Control | :CONFigure:CELLular:SEQuence:CONTrol <start>,<end> | :CONFigure:CELLular:SEQuence:CONTrol? | <start>,<end> |
| | :CONFigure:CELLular:SEQuence:CONTrol:TX <start>,<end> | :CONFigure:CELLular:SEQuence:CONTrol:TX? | <start>,<end> |
| Start Signal Analyzer Measurement Only | :INITiate:CELLular:SEQuence:EXECute:TX | ----- | ----- |
| Sequence Control Parameter - Sequence End State Reinitialization | :CONFigure:CELLular:SEQuence:RFSettings:REINit <sw> | :CONFigure:CELLular:SEQuence:RFSettings:REINit? | <sw> |
| Sequence Control Parameter - Sequence Table | :CONFigure:CELLular:SEQuence:TABLe <table> | :CONFigure:CELLular:SEQuence:TABLe? | <table> |
| Trigger Timeout | :TRIGger:CELLular:MEASurement:TOUT <time> | :TRIGger:CELLular:MEASurement:TOUT? | <time> |

Sequence Parameter Information

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Parameter Information - Error Check | ----- | :FETCh:CELLular:SEQuence:ERRor? [<item>] | {<n>,<err(0)>,…,<err(n-1)>}\|{<ns>,<seg(0)>,…,<seg(ns-1)>}\|{<e>,<mem>,<exe>,<set>}\|{<e>,<exe>,<set>} |
| | ----- | :FETCh:CELLular:SEQuence:ERRor2? <format> | <n>,<err(0)>,…,<err(n-1)> |

Sequence Table Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Table Parameter - SG Output Port | :CONFigure:CELLular:SEQuence:RXPort <seg>,<port>[,<port>,…,<port>] | :CONFigure:CELLular:SEQuence:RXPort? <seg> | <port>[,<port>,…,<port>] |
| | :CONFigure:CELLular:SEQuence:PORT:RX <seg>,<port>[,<port>,…,<port>] | :CONFigure:CELLular:SEQuence:PORT:RX? <seg> | <port>[,<port>,…,<port>] |
| Sequence Table Parameter - SA Input Port | :CONFigure:CELLular:SEQuence:PORT:TX <seg>,<port> | :CONFigure:CELLular:SEQuence:PORT:TX? <seg> | <port> |
| Sequence Table Parameter - Measurement | :CONFigure:CELLular:SEQuence:SETup <seg>,<mode>,<step>,<mcond> | :CONFigure:CELLular:SEQuence:SETup? <seg> | <mode>,<step>,<mcond> |
| Sequence Table Parameter - Trigger | :TRIGger:CELLular:SEQuence <seg>,<src>,<slope>,<level>,<delay> | :TRIGger:CELLular:SEQuence? <seg> | <src>,<slope>,<level>,<delay> |
| Sequence Table Parameter - Trigger | :TRIGger:CELLular:SEQuence:EXTension <seg>,<index>,<src>,<slope>,<level>,<delay>,<mgap> | :TRIGger:CELLular:SEQuence:EXTension? <seg>,<index> | <src>,<slope>,<level>,<delay>,<mgap> |
| Sequence Table Parameter - TRX Control | :CONFigure:CELLular:SEQuence:RFSettings:TRX <seg>,<ul_freq>,<ref>,<dl_freq>,<level>,<pat> | :CONFigure:CELLular:SEQuence:RFSettings:TRX? <seg> | <ul_freq>,<ref>,<dl_freq>,<level>,<pat> |
| Sequence Table Parameter - Uplink Frequency, Input Level | :CONFigure:CELLular:SEQuence:RFSettings:TX <seg>,<ul_freq>,<ref> | :CONFigure:CELLular:SEQuence:RFSettings:TX? <seg> | <ul_freq>,<ref> |

Measurement Condition Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| NR Parameter | When <index> = 1:<br>:CONFigure:CELLular:SEQuence:NR:SETup<br><mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal><br>When <index> = 2:<br>:CONFigure:CELLular:SEQuence:NR:SETup<br><mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal><br>When <index> = 3:<br>:CONFigure:CELLular:SEQuence:NR:SETup<br><mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>,<ranop_type>,<endc_mode>,<eutra_ulfreq>,<eutra_bw>,<eutra_nrb>,<eutra_start>,<eutra_frametype>,<eutra_grouphop>,<eutra_cshift>,<eutra_cellid>,<eutra_dss> | :CONFigure:CELLular:SEQuence:NR:SETup?<br><mcond>,[<cc>,]<index> | When <index> = 1:<br><band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal><br>When <index> = 2:<br><band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal><br>When <index> = 3:<br><band>,<frametype>,<chconfig>,cellid>,<wave>,<bw>,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>,<ranop_type>,<endc_mode>,<eutra_ulfreq>,<eutra_bw>,<eutra_nrb>,<eutra_start>,<eutra_frametype>,<eutra_grouphop>,<eutra_cshift>,<eutra_cellid>,<eutra_dss> |







Measurement Condition Parameter (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Turn Off All Measurement Items | :CONFigure:CELLular:SEQuence:NR:AMITems:OFF <mcond> | ----- | ----- |
| Measurement Enable and Count | :CONFigure:CELLular:SEQuence:NR:AMITems <mcond>,<PWRonoff>,<PWRcount>,<MODonoff>,<MODcount>,<OBWonoff>,<OBWcount>,<SEMonoff>,<SEMcount>,<ACLRonoff>,<ACLRcount> | :CONFigure:CELLular:SEQuence:NR:AMITems? <mcond> | <PWRonoff>,<PWRcount>,<MODonoff>,<MODcount>,<OBWonoff>,<OBWcount>,<SEMonoff>,<SEMcount>,<ACLRonoff>,<ACLRcount> |

Result

| Function | Command | Query | Response |
|---|---|---|---|
| All Results | ---- | :FETCh:CELLular:SEQuence:NR:TX? <seg>,<index> | <result(1)>,<result(2)>,…,<result(x)><br>When <index> = 1, x = 71<br>When <index> = 2, x = 94<br>When <index> = 3, x = 28<br>When <index> = 4, x = 81<br>When <index> = 5, x = 92<br>When <index> = 6, x = 169<br>When <index> = 102, x = 139 |

# 4.2 Details of Commands

This section describes the commands in alphabetical order.

■ Terms in this command list

EX ..... Command name (header)

Example ..... Command function name

Function ..... Command function

Command ..... Programming command syntax

Query ..... Query syntax

Response ..... Response syntax

Parameter ..... Parameter definition

Details ..... Command restrictions and others

Example of Use ..... Command usage example

Related Commands ..... Introduction of related commands

■ Suffix Code list

| Suffix Code | Unit | Suffix Code | Unit |
|---|---|---|---|
| DB | dB | MHZ | MHz |
| DBM | dBm | MS | ms |
| GHZ | GHz | MZ | MHz |
| GZ | GHz | NS | ns |
| HZ | Hz | S | s |
| KHZ | kHz | US | μs |
| KZ | kHz | | |

### 4.2.1 Common commands

## :ABORt:CELLular:MEASurement

Measurement Stop

Function

Stops the current measurement.

Command

```
:ABORt:CELLular:MEASurement
```

Example of Use

To stop the current measurement:

```
:ABOR:CELL:MEAS
```

## :CONFigure:CELLular:GENerator:ARB:PACKage:SELect

Waveform File Select

### Function

Selects and queries the waveform file for arbitrary waveform signal used at Downlink signal.

### Command

```
:CONFigure:CELLular:GENerator:ARB:PACKage:SELect <pac>
```

### Query

```
:CONFigure:CELLular:GENerator:ARB:PACKage:SELect?
```

### Response

```
<pac>
```

### Parameter

<pac> Waveform file

### Details

The name of the file used from the waveform files loaded into waveform memory is set by this command.

### Example of Use

To set the waveform file 1 from waveform files loaded in waveform memory:

```
:CONF:CELL:GEN:ARB:PACK:SEL "PAC1"
:CONF:CELL:GEN:ARB:PACK:SEL?
> PAC1
```

### Related command

Use the following command to load the waveform file into waveform memory.
SOUR:GPRF:GEN:ARB:FILE:LOAD
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.
:SOURce:GPRF:GENerator:ARB:FILE:LOAD
The following command can be used to query the names of waveform files that have been loaded into waveform memory.
SOUR:GPRF:GEN:ARB:WAV:NAME?
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.
:SOURce:GPRF:GENerator:ARB:WAVeform:NAME?

Use the following commands to select a waveform pattern to use from the waveform patterns included in the waveform file configured using the command described in this section.
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC
:CONFigure:CELLular:SEQuence:RFSettings:TRX

## :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect

Waveform Pattern Select

### Function

Selects a waveform pattern to use from patterns included in waveform file.
When the command received, the signal is immediately switched regardless of the frame cycle of signal, so the frame cycle is not continued.
This command is also used to query the currently selected waveform pattern.

### Command

```
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect <pat>
```

### Query

```
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect?
```

### Response

```
<pat>
```

### Parameter

| | | |
|---|---|---|
| <pat> | | Waveform pattern |
| | PAT1 to PATn | Waveform pattern number (n: waveform information file group range) |
| | Default | PAT1 |

### Details

Select the waveform pattern for RF output signal in waveform file.
The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

### Example of Use

To output the waveform pattern to 1:

```
:CONF:CELL:GEN:ARB:WAV:PATT:SEL PAT1
:CONF:CELL:GEN:ARB:WAV:PATT:SEL?
> PAT1
```

### Related command

Waveform file for arbitrary waveform signal selection or query
:CONFigure:CELLular:GENerator:ARB:PACKage:SELect

### Remarks

The group number depends on the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

## :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC

Waveform Pattern Select (SYNC)

### Function

Selects a waveform pattern to use from patterns included in waveform file.
When the command received, the signal is switched according to the frame cycle of signal so that the frame cycle is continued.
This command is also used to query the currently selected waveform pattern.

### Command

```
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC <pat>
```

### Query

```
:CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect:SYNC?
```

### Response

```
<pat>
```

### Parameter

| | |
|---|---|
| <pat> | Waveform pattern |
| PAT1 to PATn | Waveform pattern number (n: waveform information file group range) |
| Default | PAT1 |

### Details

Select the waveform pattern for RF output signal in waveform file.
The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

### Example of Use

To output the waveform pattern to 1:

```
:CONF:CELL:GEN:ARB:WAV:PATT:SEL:SYNC PAT1
:CONF:CELL:GEN:ARB:WAV:PATT:SEL:SYNC?
> PAT1
```

### Related command

Waveform file for arbitrary waveform signal selection or query
:CONFigure:CELLular:GENerator:ARB:PACKage:SELect

### Remarks

The group number depends on the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

## :CONFigure:CELLular:GENerator:BBMode

Output Signal Modulation

### Function

Sets or queries RF output signal modulation.

### Command

```
:CONFigure:CELLular:GENerator:BBMode <on_off>
```

### Query

```
:CONFigure:CELLular:GENerator:BBMode?
```

### Response

```
<on_off>
```

### Parameter

| | | |
|---|---|---|
| <on_off> | | Enables/disables modulation. |
| | ON | Enables RF output signal modulation. |
| | OFF | Disables RF output signal modulation. |
| | Default | ON |

### Example of Use

To modulate the RF output signal:

```
:CONF:CELL:GEN:BBM ON
:CONF:CELL:GEN:BBM?
> ON
```

## :CONFigure:CELLular:GENerator:RFSettings:STATe

Output Level On/Off

### Function

Sets or queries RF signal output ON/OFF.

### Command

```
:CONFigure:CELLular:GENerator:RFSettings:STATe <on_off>
```

### Query

```
:CONFigure:CELLular:GENerator:RFSettings:STATe?
```

### Response

```
<on_off>
```

### Parameter

| | |
|---|---|
| <on_off> | Enables/disables RF signal output. |
| ON | Enables RF signal output. |
| OFF | Disables RF signal output. |
| Default | ON |

### Example of Use

To enable RF signal output at Test port:

```
:CONF:CELL:GEN:RFS:STAT ON
:CONF:CELL:GEN:RFS:STAT?
> ON
```

## :CONFigure:CELLular:MEASurement:STANdard

Standard Select

### Function

Sets or queries the measurement standard.

### Command

```
:CONFigure:CELLular:MEASurement:STANdard <std>
```

### Query

```
:CONFigure:CELLular:MEASurement:STANdard?
```

### Response

```
<std>
```

### Parameter

| <std> | Measurement standard | |
|---|---|---|
| COMMON | Common measurement | (requires MX887010A) |
| WCDMA | W-CDMA | (requires MX887011A) |
| GSM | GSM | (requires MX887012A) |
| LTE | LTE | (requires MX887013A or MX887014A) |
| CDMA2000 | CDMA2000 1x | (requires MX887015A) |
| EVDO | CDMA2000 1xEVDO | (requires MX887016A) |
| TDSCDMA | TD-SCDMA | (requires MX887017A) |
| NR | NR sub-6GHz | (requires MX887018A or MX887019A) |
| CATM | Category M | (requires MX887065A) |
| NBIOT | NB-IoT | (requires MX887067A) |
| LTEV2X | LTE-V2X | (requires MX887068A) |
| SEQUENCE | Sequence measurement | (requires MX887010A) |
| SEQ | Sequence measurement | (requires MX887010A) |
| Default | COMMON | |

### Example of Use

To switch the measurement standard to SEQUENCE:

```
:CONF:CELL:MEAS:STAN SEQUENCE
:CONF:CELL:MEAS:STAN?
> SEQUENCE
```

### Remarks

This parameter must be set to NR to execute the commands described in Section 4.2.2 “Fundamental measurement commands”.

This parameter must be set to SEQUENCE to use the commands described in Section 4.2.3 “Sequence measurement commands”.

## :FETCh:CELLular:MEASurement:STATe?

Measurement Status

### Function

Queries the measurement status.

### Query

```
:FETCh:CELLular:MEASurement:STATe?
```

### Response

```
<m_status>
```

### Parameter

| | |
|---|---|
| <m_status> | Measurement status |
| 0 | Completed measurement |
| 2 | Over level |
| 5 | Synchronization word not detected |
| 9 | Measurement in progress or not measured |
| 12 | Tx measurement timeout |
| 20 | Measurement cannot be performed |

### Details

This command can be used while measurement is in progress or suspended.

### Example of Use

To query current measurement status:

```
:FETC:CELL:MEAS:STAT?
> 0
```

## :INITiate:CELLular:MEASurement:SINGle

Measurement Start

### Function

Sets the parameters for both specified measurement and signal transmission and executes measurement.

### Command

```
:INITiate:CELLular:MEASurement:SINGle
```

### Details

Sending this command executes one measurement execution.
Sending this command during measurement, aborts measurement once and restarts it.
ESR2 must be polled or sync processing via *WAI is required to determine the timing of measurement completion.

### Example of Use

To start measurement:

```
:INIT:CELL:MEAS:SING
```

### Related command

:STATus:OPERation:MEASure[:EVENt]?
For the details of the event status register, refer to Chapter 3 “Fundamental Operation” in the *MU887000A TRX Test Module Operation Manual*.

## :INSTrument[:SELect]

Application Select

### Function

Sets or queries the type of application software to execute.

### Command

```
:INSTrument[:SELect] <app>
```

### Query

```
:INSTrument[:SELect]?
```

### Response

```
<app>
```

### Parameter

| | |
|---|---|
| <app> | Type of application software |
| CELLULAR | Cellular Application<br>When using MX887010A, MX887011A, MX887012A, MX887013A, MX887014A, MX887015A, MX887016A, MX887017A, MX887018A, MX887019A, MX887065A, MX887067A, or MX887068A |
| SRW | Short Range Wireless application<br>When using MX887030A, MX887031A, MX887032A, MX887033A, MX887040A, or MX887050A |
| LRWPAN | IEEE 802.15.4 application<br>When using MX887060A |
| ZWAVE | Z-Wave application<br>When using MX887061A |
| FMAUDIO | FM AUDIO application<br>When using MX887070A |

***Note:***

MU887002A does not support MX887070A.

### Details

Set the parameter to CELLULAR and send the command before using the MX887018A/19A.

### Example of Use

To set the application software to CELLULAR:

```
:INST CELLULAR
:INST?
> CELLULAR
```

### Remarks

When using the MX887018A/19A, set the application to CELLULAR using the SYSSEL command, and then set the standard to NR using the STDSEL command.

## :ROUTe:PORT:CONNect:DIRection

Set Connect Port Direction

### Function

Sets or queries the test ports for inputting and outputting RF signals.
Multiple output test port can be set for MU887002A.

### Command

`:ROUTe:PORT:CONNect:DIRection <input>,<output>` MU887000A, MU887001A

`:ROUTe:PORT:CONNect:DIRection <input>,<output>[,<output>,…,<output>]` MU887002A

### Query

`:ROUTe:PORT:CONNect:DIRection?`

### Response

| | |
|---|---|
| <input>,<output> | MU887000A, MU887001A |
| <input>,<output>[,<output>,…,<output>] | MU887002A |

### Parameters

| | | |
|---|---|---|
| <input> | Input Test Port No. | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | OFF, Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| OFF | No any Input Test Ports | (MU887002A) |
| Default | PORT1 | |
| <output> | Output Test Port No. | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| Default | PORT1 | |

### Details

MU887000A

- Test Port 1 and Test Port 2 can be set for both input and output.
- Test Port 3 and Test Port 4 can be set for either input or output.

For MU887001A, Test Port 1 to Test Port 4 can be set for both input and output.
For MU887002A, Test Port 1 to Test Port 12 can be set for both input and output.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

Example of Use

To set Test Port1 as RF signal input test port and Test Port2 as RF signal output test port:

```
:ROUT:PORT:CONN:DIR PORT1,PORT2
:ROUT:PORT:CONN:DIR?
> PORT1,PORT2
```

To set No any Input Test Ports and Test Port 4, Test Port 6, Test Port 10 as RF signal output test ports:

```
:ROUT:PORT:CONN:DIR OFF,PORT10,PORT4,PORT6
:ROUT:PORT:CONN:DIR?
> OFF,PORT4,PORT6,PORT10
```

## :STATus:OPERation:MEASure[:EVENt]?

Measurement Operation Status Register Query

### Function

Queries content of measurement operation status register.
The event occurrence can be identified using the retrieved value.

### Query

```
:STATus:OPERation:MEASure[:EVENt]?
```

### Response

```
<mosr>
```

### Parameter

| | |
|---|---|
| <mosr> | Measurement operation status register |
| Range | 0 to 65535 |
| Value = bit0 + bit1 + … + bit15 | |
| bit0 = $2^0$ = 1 | Measurement in progress |
| bit1 = $2^1$ = 2 | Preparing trigger |
| bit2 = $2^2$ = 4 | Unused |
| bit3 = $2^3$ = 8 | Unused |
| bit4 = $2^4$ = 16 | Unused |
| bit5 = $2^5$ = 32 | Unused |
| bit6 = $2^6$ = 64 | Unused |
| bit7 = $2^7$ = 128 | Unused |
| bit8 = $2^8$ = 256 | Unused |
| bit9 = $2^9$ = 512 | Unused |
| bit10 = $2^{10}$ = 1024 | Unused |
| bit11 = $2^{11}$ = 2048 | Unused |
| bit12 = $2^{12}$ = 4096 | Unused |
| bit13 = $2^{13}$ = 8192 | Unused |
| bit14 = $2^{14}$ = 16384 | Unused |
| bit15 = $2^{15}$ = 32768 | Unused |

### Details

The sum of the values for bits of the occurring event from the values $2^0$ = 1, $2^1$ = 2 to $2^{15}$ = 32768, that correspond to the measurement operation status register bits 0, 1 to 15 becomes the response.

### Example of Use

To query content of measurement status event register:

```
:STAT:OPER:MEAS?
> 1
```

## :STATus:QUEStionable:MEASure[:EVENt]?

Measurement Questionable Status Register Query

### Function

Queries content of measurement questionable status register. The event occurrence can be identified using the retrieved value.

### Query

```
:STATus:QUEStionable:MEASure[:EVENt]?
```

### Response

```
<mqsr>
```

### Parameter

| | |
|---|---|
| <mqsr> | Measurement questionable status register |
| Range | 0 to 65535 |
| Value = bit0 + bit1 + … + bit15 | |
| bit0 = $2^0$ = 1 | Over level |
| bit1 = $2^1$ = 2 | Under level |
| bit2 = $2^2$ = 4 | Timeout |
| bit3 = $2^3$ = 8 | Unused |
| bit4 = $2^4$ = 16 | Unused |
| bit5 = $2^5$ = 32 | Unused |
| bit6 = $2^6$ = 64 | Unused |
| bit7 = $2^7$ = 128 | Unused |
| bit8 = $2^8$ = 256 | Unused |
| bit9 = $2^9$ = 512 | Unused |
| bit10 = $2^{10}$ = 1024 | Unused |
| bit11 = $2^{11}$ = 2048 | Unused |
| bit12 = $2^{12}$ = 4096 | Unused |
| bit13 = $2^{13}$ = 8192 | Unused |
| bit14 = $2^{14}$ = 16384 | Unused |
| bit15 = $2^{15}$ = 32768 | Unused |

### Details

The sum of the values for bits of the occurring event from the values $2^0$ = 1, $2^1$ = 2 to $2^{15}$ = 32768, that correspond to the measurement questionable status register bits 0, 1 to 15 becomes the response.

### Example of Use

To query content of measurement questionable status register:

```
:STAT:QUES:MEAS?
> 0
```

## :SYSTem:LANGuage

Language Selection of Remote Command

### Function

Switches the language mode of remote control commands.

### Command

```
:SYSTem:LANGuage <mode>
```

### Query

```
:SYSTem:LANGuage?
```

### Response

```
<mode>
```

### Parameter

| | |
|---|---|
| <mode> | Language mode |
| NAT | Native |
| SCPI | SCPI |
| Default | NAT |

### Example of Use

To switch the language mode of remote control commands to SCPI:

```
:SYST:LANG SCPI
:SYST:LANG?
> SCPI
```

## 4.2.2 Fundamental measurement commands

### :CONFigure:CELLular:GENerator:RFSettings:FREQuency

Downlink Frequency

Function

Sets or queries the downlink frequency.

Command

```
:CONFigure:CELLular:GENerator:RFSettings:FREQuency [<cc>,]<dl_freq>
```

Query

```
:CONFigure:CELLular:GENerator:RFSettings:FREQuency? [<cc>]
```

Response

```
<dl_fleq>
```

Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <dl_fleq> | Downlink frequency |
| Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 3750 000 000 Hz |
| Unit | Hz |

Details

This sets the Rx frequency for the mobile station.
Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

Example of Use

To set the downlink frequency to 3750 MHz:

```
:CONF:CELL:GEN:RFS:FREQ PCC,3750MHZ
:CONF:CELL:GEN:RFS:FREQ? PCC
> 3750000000
```

## :CONFigure:CELLular:GENerator:RFSettings:LEVel

Output Level (Cell Total)

### Function

Sets or queries the total output level of all channels.

### Command

```
:CONFigure:CELLular:GENerator:RFSettings:LEVel <level>
```

### Query

```
:CONFigure:CELLular:GENerator:RFSettings:LEVel?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | Output level | |
| Range | | |
| MU887000A | 600 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1/Port 2) |
| | –120.0 to 0.0 dBm | (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1/Port 2) |
| | –120.0 to –8.0 dBm | (Port 3/Port 4) |
| MU887001A | 600 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm | (Port 1 to Port 12) |
| Resolution | 0.1 dB | |
| Suffix Code | DBM (uses dBm when omitted) | |
| Default | –50.0 dBm | |
| Unit | dBm | |

### Details

For MU887000A, the setting range varies with the output test port setting.
If cable loss correction is set to ON, the setting range of the output level is the range of values with subtracted cable loss.
If the cable loss is 5 dB, Frequency ≤ 3800 MHz.
MU887000A Port 1/Port 2 setting range is –135.0 to –15.0 dBm.

| | | |
|---|---|---|
| Range | –130.0 – Cable loss to –10.0 – Cable loss [dBm] | (Port 1/Port 2) |
| | –120.0 – Cable loss to 0.0 – Cable loss [dBm] | (Port 3/Port 4) |

### Example of Use

To set the output level to –50.0 dBm:

```
:CONF:CELL:GEN:RFS:LEV -50.0
:CONF:CELL:GEN:RFS:LEV?
> -50.0
```

### Related Commands

[:ROUTe]:EXTLoss:TABLe:SWITch
:CALCulate:EXTLoss:TABLe:SETTing
:CALCulate:EXTLoss:TABLe:VALue
For details of the commands, refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## :CONFigure:CELLular:MEASurement:RFSettings:DLCHannel

Downlink Channel

### Function

Sets or queries the Downlink Channel.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel [<cc>,]<dl_ch>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel? [<cc>]
```

### Response

```
<dl_ch>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <dl_ch> | Downlink Channel |
| Range | 120000 to 653333 (MU887000A01/A)<br>120000 to 800000 (with MU887000A/01A-001)<br>120000 to 800000 (MU887002A)<br>120000 to 800000 (with MU887002A-007, Port 1 to 4)<br>120000 to 886666 (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 |
| Default | 650000 |
| Suffix code | None |

### Details

When the Downlink Channel is updated, Operation Band, Frame Structure, Uplink Channel, Downlink Frequency and Uplink Frequency are changed accordingly.
For the relationship between the channel and frequency settings refer to Table 2.1.6-1 “Relationship between Uplink Channel Number and Downlink Channel Number” and Table 2.1.6-3 “NR channel numbers and TX-RX frequency separation”.

### Example of Use

To set the Downlink Channel to 650000:

```
:CONF:CELL:MEAS:RFS:DLCH PCC,650000
:CONF:CELL:MEAS:RFS:DLCH? PCC
> 650000
```

## :CONFigure:CELLular:MEASurement:RFSettings:FREQuency

Uplink Frequency

### Function

Sets or queries the uplink frequency.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency [<cc>,]<ul_freq>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency? [<cc>]
```

### Response

```
<ul_freq>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ul_freq> | Uplink frequency |
| Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 3750 000 000 Hz |
| Unit | Hz |

### Details

This sets the Tx frequency for the mobile station.
Updating this Uplink frequency does not affect the Uplink Channel parameters.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

### Example of Use

To set the Uplink frequency to 3750 MHz:

```
:CONF:CELL:MEAS:RFS:FREQ PCC,3750MHZ
:CONF:CELL:MEAS:RFS:FREQ? PCC
> 3750000000
```

## :CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa

E-UTRA Uplink Frequency

### Function

Sets or queries the E-UTRA Uplink frequency.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa
[<cc>,]<ulfreq>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa? [<cc>]
```

### Response

```
<ulfreq>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ulfreq> | Uplink frequency |
| Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (With MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 2593 000 000 Hz |
| Unit | 1 Hz |

### Details

This sets the Tx frequency for the mobile station.
Updating this Uplink frequency does not affect the Uplink Channel parameters.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

### Example of Use

To set the E-UTRA Uplink frequency to 2593 MHz:

```
:CONF:CELL:MEAS:RFS:FREQ:EUTR PCC,2593MHZ
:CONF:CELL:MEAS:RFS:FREQ:EUTR? PCC
> 2593000000
```

## :CONFigure:CELLular:MEASurement:RFSettings:LEVel

Input Level

### Function

Sets or queries the input level of the input test port.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:LEVel [<cc>,]<level>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:LEVel? [<cc>]
```

### Response

```
<level>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <level> | Input level of PCC |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix Code | DBM, (uses dBm when omitted) |
| Default | –10.0 dBm |
| Unit | dBm |

### Details

For MU887000A, the setting range varies according to the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, MU887000A Port 1/Port 2 setting range is –60.0 to +40.0 dBm.

| | | |
|---|---|---|
| Range | –65.0 + Cable loss to +35.0 + Cable loss [dBm] | (Port 1/Port 2) |
| | –65.0 + Cable loss to +25.0 + Cable loss [dBm] | (Port 3/Port 4) |

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

Example of Use

To set the input level to –10.0 dBm:

```
:CONF:CELL:MEAS:RFS:LEV PCC,-10.0
:CONF:CELL:MEAS:RFS:LEV? PCC
> -10.0
```

Related Commands

[:ROUTe]:EXTLoss:TABLe:SWITch
:CALCulate:EXTLoss:TABLe:SETTing
:CALCulate:EXTLoss:TABLe:VALue

For details of the commands, refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel

Uplink Channel

### Function

Sets or queries the Uplink Channel.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel [<cc>,]<ul_ch>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel? [<cc>]
```

### Response

```
<ul_ch>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ul_ch> | Uplink Channel |
| Range | 120000 to 653333 (MU887000A01/A)<br>120000 to 800000 (with MU887000A/01A-001)<br>120000 to 800000 (MU887002A)<br>120000 to 800000 (with MU887002A-007, Port 1 to 4)<br>120000 to 886666 (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 |
| Suffix code | None |
| Default | 650000 |

### Details

When the Uplink Channel is updated, the related Operation Band, Frame Structure, Downlink Channel, Uplink Frequency, and Downlink Frequency are changed accordingly. For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-1 “Relationship between Uplink Channel Number and Downlink Channel Number” and to Table 2.1.6-3 “NR channel numbers and TX-RX frequency separation”.

### Example of Use

To set the Uplink Channel to 120000:

```
:CONF:CELL:MEAS:RFS:ULCH PCC,120000
:CONF:CELL:MEAS:RFS:ULCH? PCC
> 120000
```

## :CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa

E-UTRA Uplink Channel

### Function

Sets or queries the E-UTRA Uplink Channel.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa
[<cc>,]<ulchan>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel:EUTRa? [<cc>]
```

### Response

```
<ulchan>
```

### Parameter

| | | |
|---|---|---|
| <cc> | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| <ulchan> | | Uplink Channel |
| | Range | 0 to 262143 |
| | Resolution | 1 |
| | Default | 40620 |
| | Suffix code | None |

### Details

When the E-UTRA Uplink Channel is updated, the Uplink Frequency and Frame Structure are changed accordingly.

For the relationship between the channel and frequency settings refer to Table 2.1.6-5 “E-UTRA channel numbers and Default UE TX-RX frequency separation” and to Table 2.1.6-6 “Relationship between Band and Frame Structure”.

### Example of Use

To set the E-UTRA Uplink Channel to 40620:

```
:CONF:CELL:MEAS:RFS:ULCH:EUTR PCC,40620
:CONF:CELL:MEAS:RFS:ULCH:EUTR? PCC
> 40620
```

## :CONFigure:CELLular:NR:CBANdwidth

UL Channel Bandwidth

### Function

Sets or queries the UL Channel Bandwidth.

### Command

```
:CONFigure:CELLular:NR:CBANdwidth [<cc>,]<ch_bw>
```

### Query

```
:CONFigure:CELLular:NR:CBANdwidth? [<cc>]
```

### Response

```
<ch_bw>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ch_bw> | Bandwidth |
| 5MHZ | 5 MHz |
| 10MHZ | 10 MHz |
| 15MHZ | 15 MHz |
| 20MHZ | 20 MHz |
| 25MHZ | 25 MHz |
| 30MHZ | 30 MHz |
| 40MHZ | 40 MHz |
| 50MHZ | 50 MHz |
| 60MHZ | 60 MHz |
| 70MHZ | 70 MHz |
| 80MHZ | 80 MHz |
| 90MHZ | 90 MHz |
| 100MHZ | 100 MHz |
| Default | 100MHZ |

### Example of Use

To set the channel bandwidth to 100 MHz:

```
:CONF:CELL:NR:CBAN PCC,100MHZ
:CONF:CELL:NR:CBAN? PCC
> 100MHZ
```

### Remarks

When the UL Channel Bandwidth is updated, UL RMC Number of RBs and UL RMC Starting RB are changed accordingly.

UL RMC Number of RBs is reset to the maximum and UL RMC Starting RB is reset to 0.

When editing UL Channel Bandwidth makes UL Subcarrier Spacing outside the setting range, Subcarrier Spacing is set to 30 kHz.

## :CONFigure:CELLular:NR:CID

Cell ID

### Function

Sets or queries the Cell ID.

### Command

```
:CONFigure:CELLular:NR:CID [<cc>,]<id>
```

### Query

```
:CONFigure:CELLular:NR:CID? [<cc>]
```

### Response

```
<id>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <id> | Cell ID |
| Range | 0 to 1007 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Example of Use

To set the Cell ID to 0:

```
:CONF:CELL:NR:CID PCC,0
:CONF:CELL:NR:CID? PCC
> 0
```

## :CONFigure:CELLular:NR:CTYPe

RMC Configuration

### Function

Sets or queries the channel configuration of uplink signal.

### Command

```
:CONFigure:CELLular:NR:CTYPe <val>
```

### Query

```
:CONFigure:CELLular:NR:CTYPe?
```

### Response

```
<val>
```

### Parameter

| <val> | RMC channel configuration |
|---|---|
| PUSCH | PUSCH |
| Default | PUSCH |

### Example of Use

To set the channel configuration of uplink signal to PUSCH:

```
:CONF:CELL:NR:CTYP PUSCH
:CONF:CELL:NR:CTYP?
> PUSCH
```

## :CONFigure:CELLular:NR:DLUL:PERiod

DL/UL Periodicity

### Function

Sets or queries the periods of DL/UL signals.

### Command

```
:CONFigure:CELLular:NR:DLUL:PERiod [<cc>,]<periodicity>
```

### Query

```
:CONFigure:CELLular:NR:DLUL:PERiod? [<cc>]
```

### Response

```
<periodicity>
```

### Parameter

| | | |
|---|---|---|
| <cc> | Component Carrier | |
| PCC | PCC (Default) | |
| Omitted | PCC | |
| <periodicity> | periods | |
| 1MS | 1 ms | (Only when SCS = 30 kHz, 60 kHz) |
| 2_500MS | 2.5 ms | (Only when SCS = 30 kHz, 60 kHz) |
| 5MS | 5 ms | |
| 10MS | 10 ms | |
| Default | 10MS | |

### Details

The setting range varies with the Subcarrier Spacing (SCS) setting.
This command is available when trigger source is set to VIDEO or FRAME.

### Example of Use

To set the periods of DL/UL signals to 10 ms:

```
:CONF:CELL:NR:DLUL:PER PCC,10MS
:CONF:CELL:NR:DLUL:PER? PCC
> 10MS
```

### Remarks

When editing UL Subcarrier Spacing makes DL/UL Periodicity outside the setting range, DL/UL Periodicity is set to 10 ms.

## :CONFigure:CELLular:NR:DMRS:PORT

Antenna port

### Function

Sets or queries the PUSCH Antenna port.

### Command

```
:CONFigure:CELLular:NR:DMRS:PORT [<cc>,]<port>
```

### Query

```
:CONFigure:CELLular:NR:DMRS:PORT? [<cc>]
```

### Response

```
<port>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <port> | Antenna port |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Example of Use

To set the Antenna port to 0:

```
:CONF:CELL:NR:DMRS:PORT PCC,0
:CONF:CELL:NR:DMRS:PORT? PCC
> 0
```

## :CONFigure:CELLular:NR:DMRS:ADDPos

DMRS add pos

### Function

Sets or queries the PUSCH DMRS UL-DMRS-add-pos.

### Command

```
:CONFigure:CELLular:NR:DMRS:ADDPos [<cc>,]<rspos>
```

### Query

```
:CONFigure:CELLular:NR:DMRS:ADDPos? [<cc>]
```

### Response

```
<rspos>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <rspos> | UL-DMRS-add-pos |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |

### Example of Use

To set the UL-DMRS-add-pos to 0:

```
:CONF:CELL:NR:DMRS:ADDP PCC,0
:CONF:CELL:NR:DMRS:ADDP? PCC
> 0
```

## :CONFigure:CELLular:NR:DMRS:TYPE:APOSition

DMRS typeA pos

### Function

Sets or queries the PUSCH DMRS Starting position (typeA-pos).

### Command

```
:CONFigure:CELLular:NR:DMRS:TYPE:APOSition [<cc>,]<pos>
```

### Query

```
:CONFigure:CELLular:NR:DMRS:TYPE:APOSition? [<cc>]
```

### Response

```
<pos>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <pos> | UL-DMRS-add-pos |
| 2 | 2 |
| 3 | 3 |
| Default | 2 |

### Example of Use

To set the Starting position (typeA-pos) to 2:

```
:CONF:CELL:NR:DMRS:TYPE:APOS PCC,2
:CONF:CELL:NR:DMRS:TYPE:APOS? PCC
> 2
```

## :CONFigure:CELLular:NR:DMRS:DURation

DMRS Duration

### Function

Sets or queries the PUSCH DMRS duration.

### Command

```
:CONFigure:CELLular:NR:DMRS:DURation [<cc>,]<symbol>
```

### Query

```
:CONFigure:CELLular:NR:DMRS:DURation? [<cc>]
```

### Response

```
<symbol>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <symbol> | DM-RS duration |
| SINGLE | single-symbol DM-RS |
| Default | SINGLE |

### Example of Use

To set the DMRS duration to single-symbol DM-RS:

```
:CONF:CELL:NR:DMRS:DUR PCC,SINGLE
:CONF:CELL:NR:DMRS:DUR? PCC
> SINGLE
```

# :CONFigure:CELLular:NR:DMRS:GHOPping

Group Hopping

## Function

Sets or queries the Group Hopping.

## Command

```
:CONFigure:CELLular:NR:DMRS:GHOPping [<cc>,]<type>
```

## Query

```
:CONFigure:CELLular:NR:DMRS:GHOPping? [<cc>]
```

## Response

```
<type>
```

## Parameters

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <type> | PUSCH DM-RS Group Hopping On/Off |
| ON | On |
| OFF | Off |
| Default | OFF |

## Details

This is available only when UL RMC Waveform is set to DFT-s-OFDM.

When Group Hopping is set to On, Sequence Hopping is set to Off.

## Example of Use

To enable Group hopping:

```
:CONF:CELL:NR:DMRS:GHOP PCC,ON
:CONF:CELL:NR:DMRS:GHOP? PCC
> ON
```

## :CONFigure:CELLular:NR:DMRS:SHOPping

Sequence Hopping

### Function

Sets or queries the Sequence Hopping.

### Command

```
:CONFigure:CELLular:NR:DMRS:SHOPping [<cc>,]<type>
```

### Query

```
:CONFigure:CELLular:NR:DMRS:SHOPping? [<cc>]
```

### Response

```
<type>
```

### Parameters

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <type> | PUSCH DM-RS Sequence Hopping On/Off |
| ON | On |
| OFF | Off |
| Default | OFF |

### Details

This is available only when UL RMC Waveform is set to DFT-s-OFDM.
When Sequence Hopping is set to On, Group Hopping is set to Off.

### Example of Use

To enable Sequence hopping:

```
:CONF:CELL:NR:DMRS:SHOP PCC,ON
:CONF:CELL:NR:DMRS:SHOP? PCC
> ON
```

# :CONFigure:CELLular:NR:DMRS:TYPE

UL DMRS Config Type

## Function

Sets or queries the PUSCH DMRS UL-DMRS-config-type.

## Command

```
:CONFigure:CELLular:NR:DMRS:TYPE [<cc>,]<type>
```

## Query

```
:CONFigure:CELLular:NR:DMRS:TYPE? [<cc>]
```

## Response

```
<type>
```

## Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <type> | PUSCH DM-RS configuration type |
| TYPE1 | Type 1 |
| Default | TYPE1 |

## Example of Use

To set the UL-DMRS-config-type to Type1:

```
:CONF:CELL:NR:DMRS:TYPE PCC,TYPE1
:CONF:CELL:NR:DMRS:TYPE? PCC
> TYPE1
```

## :CONFigure:CELLular:NR:ENDC:MMODe

EN-DC Measurement Mode

### Function

Sets the EN-DC Measurement Mode.

### Command

```
:CONFigure:CELLular:NR:ENDC:MMODe <endc_mode>
```

### Query

```
:CONFigure:CELLular:NR:ENDC:MMODe?
```

### Response

<endc_mode>

### Parameter

| | |
|---|---|
| <endc_mode> | EN-DC Measurement Mode |
| NR | NR only |
| CONT | Contiguous |
| Default | NR |

### Details

This is available only when RANOP is set to ENDC.
When RANOP is changed to NONE, ENDCMEASMODE is set to NR.
When this is CONT, the measurement performs EN-DC Intra-band contiguous measurement.

### Example of Use

To set the EN-DC Measurement Mode to NR:

```
:CONF:CELL:NR:ENDC:MMOD NR
:CONF:CELL:NR:ENDC:MMOD?
> NR
```

# :CONFigure:CELLular:NR:EUTRa:CBANdwidth

E-UTRA UL Channel Bandwidth

## Function

Sets or queries the E-UTRA UL Channel Bandwidth.

## Command

```
:CONFigure:CELLular:NR:EUTRa:CBANdwidth [<cc>,]<eutra_bw>
```

## Query

```
:CONFigure:CELLular:NR:EUTRa:CBANdwidth? [<cc>]
```

## Response

```
<eutra_bw>
```

## Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_bw> | Bandwidth |
| 1.4MHZ | 1.4 MHz (Default) |
| 3MHZ | 3 MHz |
| 5MHZ | 5 MHz |
| 10MHZ | 10 MHz |
| 15MHZ | 15 MHz |
| 20MHZ | 20 MHz |

## Example of Use

To set the E-UTRA UL channel bandwidth to 10 MHz:

```
:CONF:CELL:NR:EUTR:CBAN PCC,10MHZ
:CONF:CELL:NR:EUTR:CBAN? PCC
> 10MHZ
```

## :CONFigure:CELLular:NR:EUTRa:CID

E-UTRA Cell ID

### Function

Sets or queries the E-UTRA Cell ID.

### Command

```
:CONFigure:CELLular:NR:EUTRa:CID [<cc>,]<eutra_cellid>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:CID? [<cc>]
```

### Response

```
<eutra_cellid>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_cellid> | Cell ID |
| Range | 0 to 503 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Example of Use

To set the E-UTRA Cell ID to 0.

```
:CONF:CELL:NR:EUTR:CID PCC,0
:CONF:CELL:NR:EUTR:CID? PCC
> 0
```

## :CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping

E-UTRA Group Hopping

### Function

Sets or queries the E-UTRA PUSCH DMRS Group Hopping On/Off.

### Command

```
:CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping [<cc>,]<eutra_grouphop>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping? [<cc>]
```

### Response

```
<eutra_grouphop>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_grouphop> | PUSCH DM-RS Group Hopping On/Off |
| ON | On |
| OFF | Off (Default) |

### Example of Use

To set the E-UTRA PUSCH DMRS Group Hopping to On:

```
:CONF:CELL:NR:EUTR:DMRS:GHOP PCC,ON
:CONF:CELL:NR:EUTR:DMRS:GHOP? PCC
> ON
```

## :CONFigure:CELLular:NR:EUTRa:DMRS:CSHift

E-UTRA Cyclic shift

### Function

Sets or queries the E-UTRA Cyclic shift.

### Command

```
:CONFigure:CELLular:NR:EUTRa:DMRS:CSHift [<cc>,]<eutra_cshift>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:DMRS:CSHift? [<cc>]
```

### Response

```
<eutra_cshift>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_cshift> | Cyclic shift |
| ON | On (Default) |
| OFF | Off |
| FIX1 | Fixed |

### Example of Use

To set the E-UTRA Cyclic shift to On:

```
:CONF:CELL:NR:EUTR:DMRS:CSH PCC,ON
:CONF:CELL:NR:EUTR:DMRS:CSH? PCC
> ON
```

# :CONFigure:CELLular:NR:EUTRa:DSS

E-UTRA Delta SS

## Function

Sets or queries the E-UTRA Delta SS.

## Command

```
:CONFigure:CELLular:NR:EUTRa:DSS [<cc>,]<eutra_dss>
```

## Query

```
:CONFigure:CELLular:NR:EUTRa:DSS? [<cc>]
```

## Response

```
<eutra_dss>
```

## Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_dss> | Delta SS |
| Range | 0 to 29 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

## Example of Use

To set the E-UTRA Delta SS to 0:

```
:CONF:CELL:NR:EUTR:DSS PCC,0
:CONF:CELL:NR:EUTR:DSS? PCC
> 0
```

## :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB

E-UTRA UL Number of RBs

### Function

Sets or queries the number of RBs (Resource Blocks) assigned to E-UTRA channel.

### Command

```
:CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB [<cc>,]<eutra_nrb>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB? [<cc>]
```

### Response

```
<eutra_nrb>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ul_rmc_rb> | Number of RBs |
| Range | 0 to Rbmax_eutra |
| Resolution | 1 |
| Default | 6 |
| Suffix code | None |

### Details

The E-UTRA UL RMC Starting RB is reset to 0 accordingly when the E-UTRA UL Number of RBs is changed.
E-UTRA UL Number of RBs upper limit (RBmax_eutra) is changed depending on the setting of E-UTRA UL Channel Bandwidth (eutra_bw).

E-UTRA UL Number of RBs upper limit (RBmax_eutra)

| eutra_bw (MHz) | 1.4 | 3 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|
| RBmax_eutra | 6 | 15 | 25 | 50 | 75 | 100 |

Settable Value: The following values less than or equal to RBmax_eutra in above table.
0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 27, 30, 32, 36, 40, 45, 48, 50, 54, 60, 64, 72, 75, 80, 81, 90, 96, 100

### Example of Use

To set the number of RBs assigned to E-UTRA channel to 6:

```
:CONF:CELL:NR:EUTR:RBAL:NRB PCC,6
:CONF:CELL:NR:EUTR:RBAL:NRB? PCC
> 6
```

## :CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB

E-UTRA UL Starting RB

### Function

Sets or queries the starting RB number for Uplink signal assigned to E-UTRA channel.

### Command

```
:CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB [<cc>,]<eutra_start>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB? [<cc>]
```

### Response

```
<eutra_start>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_start> | Starting RB number |
| Range | 0 to (RBmax_eutra – RBn_eutra)<br>For RBmax_eutra, refer to Details of :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB command.<br>RBn_eutra is set using the :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB command. |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Details

E-UTRA UL Starting RB is reset to 0 when the setting value of E-UTRA UL Channel Bandwidth or E-UTRA UL Number of RBs is updated.

### Example of Use

To set the starting RB number for Uplink signal assigned to E-UTRA channel to 0:

```
:CONF:CELL:NR:EUTR:RBAL:ORB PCC,0
:CONF:CELL:NR:EUTR:RBAL:ORB? PCC
> 0
```

## :CONFigure:CELLular:NR:EUTRa:FSTRucture

E-UTRA Frame Structure

### Function

Sets or queries the E-UTRA Frame Structure.

### Command

```
:CONFigure:CELLular:NR:EUTRa:FSTRucture [<cc>,]<eutra_frametype>
```

### Query

```
:CONFigure:CELLular:NR:EUTRa:FSTRucture? [<cc>]
```

### Response

```
<eutra_frametype>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <eutra_frametype> | Frame Structure |
| TDD | TDD |
| FDD | FDD (Default) |

### Example of Use

To set the E-UTRA Frame Structure to TDD:

```
:CONF:CELL:NR:EUTR:FSTR PCC,TDD
:CONF:CELL:NR:EUTR:FSTR? PCC
> TDD
```

## :CONFigure:CELLular:NR:FREQuency:RANGe

Frequency Range

### Function

Sets or queries the frequency range.

### Command

```
:CONFigure:CELLular:NR:FREQuency:RANGe [<cc>,]<fr>
```

### Query

```
:CONFigure:CELLular:NR:FREQuency:RANGe? [<cc>]
```

### Response

```
<fr>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <fr> | Frequency Range |
| FR1 | FR1 |
| Default | FR1 |

### Example of Use

To set the frequency range to FR1:

```
:CONF:CELL:NR:FREQ:RANG PCC,FR1
:CONF:CELL:NR:FREQ:RANG? PCC
> FR1
```

## :CONFigure:CELLular:NR:FSTRucture

Frame Structure

### Function

Sets or queries the frame structure.

### Command

```
:CONFigure:CELLular:NR:FSTRucture [<cc>,]<mode>
```

### Query

```
:CONFigure:CELLular:NR:FSTRucture? [<cc>]
```

### Response

```
<mode>
```

### Parameter

| | | |
|---|---|---|
| <cc> | Component Carrier | |
| PCC | PCC (Default) | |
| Omitted | PCC | |
| <mode> | Frame Structure | |
| TDD | Time Division Multiplexing | (MX887019A is required) |
| FDD | Frequency Division Multiplexing | (MX887018A is required) |
| Default | TDD | |

### Details

Only TDD is available, when only MX887019A is installed.
Only FDD is available, when only MX887018A is installed, and Default is FDD.

### Example of Use

To set the frame structure to TDD:

```
:CONF:CELL:NR:FSTR PCC,TDD
:CONF:CELL:NR:FSTR? PCC
> TDD
```

# :CONFigure:CELLular:NR:FUNDamental:ACLR:SET

ACLR On/Off and Meas. Count

## Function

Sets or queries the ACLR measurement On/Off state and measurement count.

## Command

```
:CONFigure:CELLular:NR:FUNDamental:ACLR:SET <on_off>[,<avg_count>]
```

## Query

```
:CONFigure:CELLular:NR:FUNDamental:ACLR:SET?
```

## Response

```
<on_off>,<avg_count>
```

## Parameters

| | |
|---|---|
| <on_off> | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| <avg_count> | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

## Examples of Use

To set the ACLR measurement to ON and the measurement count to 100:

```
:CONF:CELL:NR:FUND:ACLR:SET ON,100
:CONF:CELL:NR:FUND:ACLR:SET?
> ON,100
```

## Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

## :CONFigure:CELLular:NR:FUNDamental:AMITems:OFF

All Measurement Items Off

### Function

Sets all fundamental measurement items to off at one time.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:AMITems:OFF
```

### Example of Use

To set all fundamental measurement items to off at one time:

```
:CONF:CELL:NR:FUND:AMIT:OFF
```

## :CONFigure:CELLular:NR:FUNDamental:BAND

Operation Band

### Function

Sets or queries the operation band.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:BAND [<cc>,]<band>
```

### Query

```
:CONFigure:CELLular:NR:FUNDamental:BAND? [<cc>]
```

### Response

```
<band>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <band> | Operation band |
| Range | 1 to 79 |
| Resolution | 1 |
| Default | 77 |

### Details

When the Operation Band is updated, Frame Structure, Downlink Channel, Uplink Channel, Downlink Frequency, and Uplink Frequency are changed accordingly.
For the Operation Band and Frame Structure refer to Table 2.1.6-3 “NR Channel Numbers and TX-RX Frequency Separation” and Table 2.1.6-4 “Relationship between Operation Band and Frame Structure”.

### Example of Use

To set the operation band to 77:

```
:CONF:CELL:NR:FUND:BAND PCC,77
:CONF:CELL:NR:FUND:BAND? PCC
> 77
```

Remarks

"0" is returned when the uplink or downlink channel number is set, but the set band is not found in Table 2.1.6-3.

When setting the operation band, change UL and DL channels as the following table.

| Operation Band | Channels when setting Operation Band | | Operation Band | Channels when setting Operation Band | |
|---|---|---|---|---|---|
| | UL Channel | DL Channel | | UL Channel | DL Channel |
| 1 | 390000 | 428000 | 39 | 380000 | 380000 |
| 2 | 376000 | 392000 | 40 | 470000 | 470000 |
| 3 | 349500 | 368500 | 41 | 518600 | 518600 |
| 5 | 167300 | 176300 | 50 | 294900 | 294900 |
| 7 | 507000 | 531000 | 51 | 285900 | 285900 |
| 8 | 179500 | 188500 | 66 | 349000 | 429000 |
| 12 | 141500 | 147500 | 70 | 340500 | 400500 |
| 20 | 169400 | 161200 | 71 | 136100 | 126900 |
| 25 | 376500 | 392500 | 74 | 289700 | 299300 |
| 28 | 145100 | 156100 | 77 | 650000 | 294900 |
| 34 | 403500 | 403500 | 78 | 636666 | 636666 |
| 38 | 519000 | 519000 | 79 | 713333 | 713333 |

# :CONFigure:CELLular:NR:FUNDamental:MODulation:SET

Modulation Analysis On/Off and Meas. Count

## Function

Sets or queries the Modulation Analysis On/Off state and measurement count.

## Command

```
:CONFigure:CELLular:NR:FUNDamental:MODulation:SET <on_off>[,<avg_count>]
```

## Query

```
:CONFigure:CELLular:NR:FUNDamental:MODulation:SET?
```

## Response

```
<on_off>,<avg_count>
```

## Parameters

| | |
|---|---|
| <on_off> | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| <avg_count> | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

## Example of Use

To set the Modulation Analysis to On and measurement count to 100:

```
:CONF:CELL:NR:FUND:MOD:SET ON,100
:CONF:CELL:NR:FUND:MOD:SET?
> ON,100
```

## Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

## :CONFigure:CELLular:NR:FUNDamental:MOFFset

Measurement Offset

### Function

Sets or queries the offset of the analysis start time in symbol unit when Trigger Source is set to VIDEO.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:MOFFset <time>
```

### Query

```
:CONFigure:CELLular:NR:FUNDamental:MOFFset?
```

### Response

```
<time>
```

### Parameters

| | |
|---|---|
| <time> | Measurement Offset |
| Range | 0.0 to 13.0 |
| Resolution | 0.1 |
| Suffix code | None |
| Default | 0.0 |
| Unit | Symbol |

### Details

This parameter is valid only when Trigger Source is set to VIDEO.

### Example of Use

To set the offset of the analysis start time to 1 symbol:

```
:CONF:CELL:NR:FUND:MOFF 1
:CONF:CELL:NR:FUND:MOFF?
> 1
```

# :CONFigure:CELLular:NR:FUNDamental:OBW:SET

OBW On/Off and Meas. Count

### Function

Sets or queries the OBW (Occupied Bandwidth) measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:OBW:SET <on_off>[,<avg_count>]
```

### Query

```
:CONFigure:CELLular:NR:FUNDamental:OBW:SET?
```

### Response

```
<on_off>,<avg_count>
```

### Parameters

| | |
|---|---|
| <on_off> | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| <avg_count> | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

### Example of Use

To set OBW measurement on and set the measurement count to 50:

```
:CONF:CELL:NR:FUND:OBW:SET ON,50
:CONF:CELL:NR:FUND:OBW:SET?
> ON,50
```

### Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

## :CONFigure:CELLular:NR:FUNDamental:POWer:SET

Power Measurement On/Off and Meas. Count

### Function

Sets or queries the Tx Power Measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:POWer:SET <on_off>[,<avg_count>]
```

### Query

```
:CONFigure:CELLular:NR:FUNDamental:POWer:SET?
```

### Response

```
<on_off>,<avg_count>
```

### Parameters

| | |
|---|---|
| <on_off> | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| <avg_count> | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

### Example of Use

To set Tx Power measurement ON and set the measurement count to 100:

```
:CONF:CELL:NR:FUND:POW:SET ON,100
:CONF:CELL:NR:FUND:POW:SET?
> ON,100
```

### Remarks

Restrictions on measurement count

When the UL Channel Bandwidth is 60 MHz or above and SEM, OBW or ACLR measurement is On, or when EN-DC Measurement Mode is CONT, SEM, OBW or ACLR measurement is On, and the total of UL Channel Bandwidth and E-UTRA UL Channel Bandwidth is 54 MHz or above, an execution error occurs if the following condition is not met at SNGLS execution.

(Longest capture length [ms] in all measurements) + (Longest capture length [ms] in SEM/OBW/ACLR measurements) × 2 < 1312.5 [ms]

Capture length [ms] of each measurement is calculated by the following expression.

L [ms] represents DL/UL Periodicity, D represents UL Duration, and N represents Measurement Count.
Function FLOOR(x): Maximum integer equal to x (actual number) or under
Function CEILING(x): Minimum integer equal to x (actual number) or above

■ Modulation Analysis

When D ≥ 2, D' = D – 1. When D < 2, D' = D.

| SCS [kHz] | Trigger Source | |
|---|---|---|
| | Freerun | Other than Freerun |
| 15 | N+3 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 1 + 2<br>Rounded up value in 1 ms units of the above. |
| 30 | CEILING(N / 2) + 2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 0.5 + 2<br>Rounded up value in 1 ms units of the above. |
| 60 | CEILING(N / 4) + 2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 0.25 + 2<br>Rounded up value in 1 ms units of the above. |

■ Other than Modulation Analysis

| SCS [kHz] | Trigger Source | |
|---|---|---|
| | Freerun | Other than Freerun |
| 15<br>D' = FLOOR(D / 1.0) | N+2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D'} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |
| 30<br>When D ≥ 2,<br>D' = FLOOR(D / 2.0) | | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D'} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |
| 60<br>When D ≥ 4,<br>D' = FLOOR(D / 4.0) | | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D'} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |

## :CONFigure:CELLular:NR:FUNDamental:SEMask:SET

SEM On/Off and Meas. Count

### Function

Sets or queries the SEM (Spectrum Emission Mask) Measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:NR:FUNDamental:SEMask:SET <on_off>[,<avg_count>]
```

### Query

```
:CONFigure:CELLular:NR:FUNDamental:SEMask:SET?
```

### Response

```
<on_off>,<avg_count>
```

### Parameters

| | |
|---|---|
| <on_off> | Enables/disables the measurement. |
| ON | Enables the measurement. |
| OFF | Disables the measurement. |
| Default | OFF |
| <avg_count> | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

### Example of Use

To set the SEM measurement to On and set the measurement count to 100:

```
:CONF:CELL:NR:FUND:SEM:SET ON,100
:CONF:CELL:NR:FUND:SEM:SET?
> ON,100
```

### Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

# :CONFigure:CELLular:NR:MODulation:MSCHeme

UL RMC Modulation

## Function

Sets or queries the Modulation scheme of uplink signal.

## Command

```
:CONFigure:CELLular:NR:MODulation:MSCHeme [<cc>,]<ul_rmc_mod>
```

## Query

```
:CONFigure:CELLular:NR:MODulation:MSCHeme? [<cc>]
```

## Response

```
<ul_rmc_mod>
```

## Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ul_rmc_mod> | Modulation scheme |
| PI2BPSK | π/2-BPSK (When UL RMC Waveform is DFT-s-OFDM) |
| QPSK | QPSK |
| 16QAM | 16QAM |
| 64QAM | 64QAM |
| Default | QPSK |

## Details

This parameter is changed to QPSK if this parameter is PI2BPSK and you change UL RMC Waveform to CP-OFDM.

## Example of Use

To set the Modulation scheme to QPSK:

```
:CONF:CELL:NR:MOD:MSCH PCC,QPSK
:CONF:CELL:NR:MOD:MSCH? PCC
> QPSK
```

## :CONFigure:CELLular:NR:PCRRection

Pre Phase Correction

### Function

Sets or queries the Pre Phase Correction.

### Command

```
:CONFigure:CELLular:NR:PCRRection <on_off>
```

### Query

```
:CONFigure:CELLular:NR:PCRRection?
```

### Response

```
<on_off>
```

### Parameters

| | |
|---|---|
| <on_off> | Enables/disables Pre Phase Correction |
| ON | On |
| OFF | Off |
| Default | OFF |

### Example of Use

To enable the Pre Phase Correction:

```
:CONF:CELL:NR:PCRR ON
:CONF:CELL:NR:PCRR?
> ON
```

## :CONFigure:CELLular:NR:PUSCh:MTYPe

PUSCH mapping type

### Function

Sets or queries the PUSCH mapping type.

### Command

```
:CONFigure:CELLular:NR:PUSCh:MTYPe [<cc>,]<mappingtype>
```

### Query

```
:CONFigure:CELLular:NR:PUSCh:MTYPe? [<cc>]
```

### Response

```
<mappingtype>
```

### Parameters

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <mappingtype> | PUSCH mapping type |
| TYPEA | Type A |
| TYPEB | Type B |
| Default | TYPEA |

### Example of Use

To set the PUSCH mapping type to Type B:

```
:CONF:CELL:NR:PUSC:MTYP PCC,TYPEB
:CONF:CELL:NR:PUSC:MTYP? PCC
> TYPEB
```

## :CONFigure:CELLular:NR:RANoperation

RAN Operation

### Function

Sets the operation mode of Radio Access Network.

### Command

```
:CONFigure:CELLular:NR:RANoperation <ranop_type>
```

### Query

```
:CONFigure:CELLular:NR:RANoperation?
```

### Response

```
<ranop_type>
```

### Parameter

| | |
|---|---|
| <ranop_type> | RAN Operation |
| NONE | None (Default) |
| ENDC | EN-DC |

### Details

When :CONFigure:CELLular:NR:RANoperation is changed to NONE, :CONFigure:CELLular:NR:ENDC:MMODe is set to NR.

### Example of Use

To set the operation mode of Radio Access Network to EN-DC:

```
:CONF:CELL:NR:RAN ENDC
:CONF:CELL:NR:RAN?
> ENDC
```

## :CONFigure:CELLular:NR:RBALlocation:NRB

UL RMC Number of RBs

### Function

Sets or queries the number of assigned RBs (Resource Blocks) at Uplink RMC.

### Command

```
:CONFigure:CELLular:NR:RBALlocation:NRB [<cc>,]<ul_rmc_rb>
```

### Query

```
:CONFigure:CELLular:NR:RBALlocation:NRB? [<cc>]
```

### Response

```
<ul_rmc_rb>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <ul_rmc_rb> | Number of RBs |
| Range | 0 to RBmax |
| Resolution | 1 |
| Default | 273 |
| Suffix code | None |

### Details

The UL RMC Starting RB is reset to 0 accordingly when the UL RMC Number of RBs is changed.
When UL RMC Number of RBs is set to 0, the measurement result of Modulation Analysis will not be measured.
UL RMC Number of RBs upper limit (RBmax) is changed depending on the setting of UL Channel Bandwidth (CBW) and UL Subcarrier Spacing (SCS).

UL RMC Number of RBs upper limit (RBmax)

| SCS | CBW (MHz) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 15 kHz | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 | – | – | – | – | – |
| 30 kHz | 11 | 24 | 38 | 51 | 65 | 78 | 106 | 133 | 162 | 189 | 217 | 245 | 273 |
| 60 kHz | – | 11 | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 93 | 107 | 121 | 135 |

Settable Value
When UL RMC Waveform is CP-OFDM: 1 to RBmax
When UL RMC Waveform is DFT-s-OFDM: The following values less than or equal to RBmax.

1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 27, 30, 32, 36, 40, 45, 48, 50, 54, 60, 64, 72, 75, 80, 81, 90, 96, 100, 108, 120, 125, 128, 135, 144, 150, 160, 162, 180, 192, 200, 216, 225, 240, 243, 250, 256, 270

Example of Use

To set the number of RBs to 273:

```
:CONF:CELL:NR:RBAL:NRB PCC,273
:CONF:CELL:NR:RBAL:NRB? PCC
> 273
```

Remarks

When UL RMC Waveform is set to DFT-s-OFDM, the number of RBs that can be set is the number defined by equation of (2^X) × (3^Y) × (5^Z) where (X, Y, Z ≥ 0, integer).

## :CONFigure:CELLular:NR:RBALlocation:ORB

UL RMC Starting RB

### Function

Sets or queries the starting RB number for Uplink signal.

### Command

```
:CONFigure:CELLular:NR:RBALlocation:ORB [<cc>,]<ulrb>
```

### Query

```
:CONFigure:CELLular:NR:RBALlocation:ORB? [<cc>]
```

### Response

```
<ulrb>
```

### Parameter

| | | |
|---|---|---|
| <cc> | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| <ulrb> | | Starting RB number |
| | Range | 0 to (RBmax – RBn)<br>For RBmax, refer to Details of :CONFigure:CELLular:NR:RBALlocation:NRB command.<br>RBn is set using the :CONFigure:CELLular:NR:RBALlocation:NRB command. |
| | Resolution | 1 |
| | Default | 0 |
| | Suffix code | None |

### Details

UL RMC Starting RB is reset to 0 when the setting value of UL Channel Bandwidth, Subcarrier Spacing, or UL RMC Number of RBs is updated.

### Example of Use

To set the starting RB number to 0:

```
:CONF:CELL:NR:RBAL:ORB PCC,0
:CONF:CELL:NR:RBAL:ORB? PCC
> 0
```

## :CONFigure:CELLular:NR:SCS

UL Subcarrier Spacing

### Function

Sets or queries the Subcarrier Spacing.

### Command

```
:CONFigure:CELLular:NR:SCS [<cc>,]<scs>
```

### Query

```
:CONFigure:CELLular:NR:SCS? [<cc>]
```

### Response

```
<scs>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <scs> | Subcarrier Spacing |
| 15KHZ | 15 kHz (when UL Channel Bandwidth ≤ 50 MHz) |
| 30KHZ | 30 kHz |
| 60KHZ | 60 kHz (when UL Channel Bandwidth ≥ 10 MHz) |
| Default | 30KHZ |

### Example of Use

To set the Subcarrier Spacing to 30 kHz:

```
:CONF:CELL:NR:SCS PCC,30KHZ
:CONF:CELL:NR:SCS? PCC
> 30KHZ
```

### Remarks

When the UL Subcarrier Spacing is updated, UL RMC Number of RBs and UL RMC Starting RB are changed accordingly.

UL RMC Number of RBs is reset to the maximum, UL RMC Starting RB is reset to 0.

The setting range varies depending on the UL Channel Bandwidth.
When editing UL Channel Bandwidth makes UL Subcarrier Spacing outside the setting range, Subcarrier Spacing is set to 30 kHz.

When editing UL Subcarrier Spacing makes DL/UL Periodicity outside the setting range, DL/UL Periodicity is set to 10 ms.

## :CONFigure:CELLular:NR:UL:DURation

UL Duration

### Function

Sets or queries the UL signal period of DL/UL Periodicity by slot.

### Command

```
:CONFigure:CELLular:NR:UL:DURation [<cc>,]<duration>
```

### Query

```
:CONFigure:CELLular:NR:UL:DURation? [<cc>]
```

### Response

```
<duration>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <duration> | UL signal period of DL/UL Periodicity by slot |
| Range | 1 to 39 |
| Resolution | 1 |
| Default | 10 |
| Suffix code | None |

### Details

The setting range varies according to the setting value of DL/UL Periodicity and UL Subcarrier Spacing.

UL Duration setting range

| UL Subcarrier Spacing | DL/UL Periodicity | | | |
|---|---|---|---|---|
| | 1 ms | 2.5 ms | 5 ms | 10 ms |
| 15 kHz | – | – | 1 to 4 | 1 to 9 |
| 30 kHz | 1 | 1 to 4 | 1 to 9 | 1 to 19 |
| 60 kHz | 1 to 3 | 1 to 9 | 1 to 19 | 1 to 39 |

The slots including burst signal rise are out of the measurement target,
"the maximum settable value – 1" is the upper limit of the setting range.

This command is available when trigger source is set to VIDEO or FRAME.

### Example of Use

To set the UL signal period to 10 slots:

```
:CONF:CELL:NR:UL:DUR PCC,10
:CONF:CELL:NR:UL:DUR? PCC
> 10
```

## :CONFigure:CELLular:NR:WAVeform

UL RMC Waveform

### Function

Sets or queries the PUSCH Waveform.

### Command

```
:CONFigure:CELLular:NR:WAVeform [<cc>,]<wave>
```

### Query

```
:CONFigure:CELLular:NR:WAVeform? [<cc>]
```

### Response

```
<wave>
```

### Parameter

| | |
|---|---|
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <wave> | Waveform |
| CPOFDM | CP-OFDM |
| DFTOFDM | DFT-s-OFDM |
| Default | CPOFDM |

### Example of Use

To set the Waveform of PUSCH to CP-OFDM:

```
:CONF:CELL:NR:WAV PCC,CPOFDM
:CONF:CELL:NR:WAV? PCC
> CPOFDM
```

### Remarks

When UL RMC Waveform is changed, UL RMC Number of RBs is set to maximum and UL RMC Starting RB is set to 0.

# :FETCh:CELLular:NR:FUNDamental:ACLR?

ACLR Result

## Function

Queries the result of ACLR (Adjacent Channel Leakage Power Ratio) measurement.

## Query

```
:FETCh:CELLular:NR:FUNDamental:ACLR? [<mode>]
```

## Response

When <mode> = AVG, MAX, MIN, DVT,

<aclr(NR_LOW)>,<aclr(NR_UP)>,<aclr(LOW2)>,<aclr(LOW1)>,<aclr(UP1)>,<aclr(UP2)>

When <mode> = TTL,

<avg(NR_LOW)>,<avg(NR_UP)>,<avg(LOW2)>,<avg(LOW1)>,<avg(UP1)>,<avg(UP2)>,
<max(NR_LOW)>,<max(NR_UP)>,<max(LOW2)>,<max(LOW1)>,<max(UP1)>,<max(UP2)>,
<min(NR_LOW)>,<min(NR_UP)>,<min(LOW2)>,<min(LOW1)>,<min(UP1)>,<min(UP2)>

## Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <aclr(offset)> | Result of Adjacent Channel Leakage Power Ratio measurement in specified Storage mode |
| <avg(offset)> | ACLR measurement result (Average) |
| <max(offset)> | ACLR measurement result (Maximum) |
| <min(offset)> | ACLR measurement result (Minimum) |
| Resolution | 0.01 dB |
| Response unit | dB |

## Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.

## Example of Use

To query the average of ACLR measurement result:

```
:FETC:CELL:NR:FUND:ACLR? AVG
> -61.23,-30.06,-65.68,-62.44,-65.68,-62.44
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:CARLeakage?

Carrier Leakage Result

### Function

Queries the Carrier Leakage (Origin offset) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:CARLeakage? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT

```
<cleakage>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <cleakage> | Carrier Leakage measurement result in specified Storage mode |
| <avg> | Carrier Leakage measurement result (Average) |
| <max> | Carrier Leakage measurement result (Maximum) |
| <min> | Carrier Leakage measurement result (Minimum) |
| Resolution | 0.01 dB |
| Unit | dBc |

### Example of Use

To query the average of Carrier Leakage measurement result:

```
:FETC:CELL:NR:FUND:MOD:CARL? AVG
> 20.00
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:CFRequency?

Carrier Frequency Result

### Function

Queries the Carrier Frequency measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:CFRequency? <mode>
```

### Response

```
<freq>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| Omitted | Average |
| <freq> | Carrier frequency |
| Resolution | 1 Hz |
| Unit | Hz |

### Example of Use

To query the result of Carrier Frequency measurement:

```
:FETC:CELL:NR:FUND:MOD:CFR? AVG
> 1951000000
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:ITEM?

Spectrum Flatness Measured Item

### Function

Queries whether a spectrum flatness measurement item(s) is measured or not.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:ITEM?
```

### Response

```
<flag>
```

### Parameter

| | |
|---|---|
| <flag> | Measured/Not measured flag (0 to 3)<br>Returns the sum of the following measurement items. |
| 0 | Not measured |
| 1 | ≥ 3 MHz area |
| 2 | < 3 MHz area |
| Unit | None |

### Example of Use

To query whether each spectrum flatness measurement items is measured or not:

```
:FETC:CELL:NR:FUND:MOD:ESFL:ITEM?
> 2
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:JUDGement?

Spectrum Flatness Judgement

### Function

Queries the judgement of Spectrum Flatness measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:JUDGement?
```

### Response

```
<judge>
```

### Parameter

| | |
|---|---|
| <judge> | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on Spectrum Flatness measurement result:

```
:FETC:CELL:NR:FUND:MOD:ESFL:JUDG?
> PASS
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1M?

Spectrum Flatness (≥ 3 MHz (R1 –)) Result

### Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 1.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1M? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Minimum |
| <sflatness> | Minimum value in Range 1 in specified Storage mode. |
| <avg> | Minimum value in Range 1 (Average) |
| <max> | Minimum value in Range 1 (Maximum) |
| <min> | Minimum value in Range 1 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of minimum value in the Spectrum Flatness measurement result in Range 1:

```
:FETC:CELL:NR:FUND:MOD:ESFL:R1M? AVG
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1P?

Spectrum Flatness (≥ 3 MHz (R1 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 1.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R1P? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Maximum |
| <sflatness> | Maximum value in Range 1 in specified Storage mode. |
| <avg> | Maximum value in Range 1 (Average) |
| <max> | Maximum value in Range 1 (Maximum) |
| <min> | Maximum value in Range 1 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of maximum value in the Spectrum Flatness measurement result in Range 1:

```
:FETC:CELL:NR:FUND:MOD:ESFL:R1P? AVG
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2M?

Spectrum Flatness (< 3 MHz (R2 –)) Result

### Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 2.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2M? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Minimum |
| <sflatness> | Minimum value in Range 2 in specified Storage mode. |
| <avg> | Minimum value in Range 2 (Average) |
| <max> | Minimum value in Range 2 (Maximum) |
| <min> | Minimum value in Range 2 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of minimum value in the Spectrum Flatness measurement result in Range 2:

```
:FETC:CELL:NR:FUND:MOD:ESFL:R2M? AVG
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2P?

Spectrum Flatness (< 3 MHz (R2 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 2.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:R2P? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Maximum |
| <sflatness> | Maximum value in Range 2 in specified Storage mode. |
| <avg> | Maximum value in Range 2 (Average) |
| <max> | Maximum value in Range 2 (Maximum) |
| <min> | Maximum value in Range 2 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of maximum value in the Spectrum Flatness measurement result in Range 2:

```
:FETC:CELL:NR:FUND:MOD:ESFL:R2P? AVG
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP?

Spectrum Flatness (RP Total) Result

### Function

Queries all ripple values in the Spectrum Flatness measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflat(RP1)>,<sflat(RP2)>,<sflat(RP12)>,<sflat(RP21)>
```

<mode> = TTL

```
<avg(RP1)>,<avg(RP2)>,<avg(RP12)>,<avg(RP21)>,
<max(RP1)>,<max(RP2)>,<max(RP12)>,<max(RP21)>,
<min(RP1)>,<min(RP2)>,<min(RP12)>,<min(RP21)>
```

<mode> = IND

```
<s>,<sflat(RP1)(1)>,<sflat(RP2)(1)>,<sflat(RP12)(1)>,<sflat(RP21)(1)>,
…,<sflat(RP1)(s)>,<sflat(RP2)(s)>,<sflat(RP12)(s)>,<sflat(RP21)(s)>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <sflat> | Ripple value in specified Storage mode. |
| <avg> | Ripple value (Average) |
| <max> | Ripple value (Maximum) |
| <min> | Ripple value (Minimum) |
| <sflat(n)> | Nth ripple value (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Measurement count |

### Example of Use

To query the average of every ripple values in the Spectrum Flatness measurement result:

```
:FETC:CELL:NR:FUND:MOD:ESFL:RP? AVG
> 0.04,0.03,0.06,0.05
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP1?

Spectrum Flatness (≥ 3 MHz (RP1)) Result

### Function

Queries the ripple values in the Spectrum Flatness measurement result in Range 1.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP1? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

<mode> = IND

```
<s>,<sflatness(1)>,<sflatness(2)>,…,<sflatness(s)>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <sflatness> | Ripple value in Range 1 in specified Storage mode. |
| <avg> | Ripple value in Range 1 (Average) |
| <max> | Ripple value in Range 1 (Maximum) |
| <min> | Ripple value in Range 1 (Minimum) |
| <sflatness(n)> | Nth ripple value in Range 1 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Measurement count |

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 1:

```
:FETC:CELL:NR:FUND:MOD:ESFL:RP1? AVG
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP12?

Spectrum Flatness (RP12) Result

### Function

Queries the difference between the maximum value in Range 1 and the minimum value in Range 2 of the Spectrum Flatness measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP12? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

<mode> = IND

```
<s>,<sflatness(1)>,<sflatness(2)>,…,<sflatness(s)>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <sflatness> | Difference between the maximum value in Range 1 and the minimum value in Range 2 in specified Storage mode. |
| <avg> | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Average) |
| <max> | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Maximum) |
| <min> | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Minimum) |
| <sflatness(n)> | Nth difference between the maximum value in Range 1 and the minimum value in Range 2 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Measurement count |

Example of Use

To query the average of difference between the maximum value in Range 1 and the minimum value in Range 2:

```
:FETC:CELL:NR:FUND:MOD:ESFL:RP12? AVG
> 0.04
```

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP2?

Spectrum Flatness (< 3 MHz (RP2)) Result

### Function

Queries the ripple values in the Spectrum Flatness measurement result in Range 2.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP2? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

<mode> = IND

```
<s,<sflatness(1)>,<sflatness(2)>,…,<sflatness(s)>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <sflatness> | Ripple value in Range 2 in specified Storage mode. |
| <avg> | Ripple value in Range 2 (Average) |
| <max> | Ripple value in Range 2 (Maximum) |
| <min> | Ripple value in Range 2 (Minimum) |
| <sflatness(n)> | Nth ripple value in Range 2 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Measurement count |

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 2:

```
:FETC:CELL:NR:FUND:MOD:ESFL:RP2? AVG
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP21?

Spectrum Flatness (RP21) Result

### Function

Queries the difference between the maximum value in Range 2 and the minimum value in Range 1 of the Spectrum Flatness measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:ESFLatness:RP21? [<mode>]
```

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflatness>
```

<mode> = TTL

```
<avg>,<max>,<min>
```

<mode> = IND

```
<s,<sflatness(1)>,<sflatness(2)>,…,<sflatness(s)>
```

### Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <sflatness> | Difference between the maximum value in Range 2 and the minimum value in Range 1 in specified Storage mode. |
| <avg> | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Average) |
| <max> | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Maximum) |
| <min> | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Minimum) |
| <sflatness(n)> | Nth difference between the maximum value in Range 2 and the minimum value in Range 1 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Measurement count |

Example of Use

To query the average of difference between the maximum value in Range 2 and the minimum value in Range 1:

```
:FETC:CELL:NR:FUND:MOD:ESFL:RP21? AVG
> 0.04
```

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:EVM?

EVM Result

### Function

Queries the EVM (Error Vector Magnitude) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:EVM? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT

<evm>

When <mode> = TTL,

<avg>,<max>,<min>

When <mode> = IND,

<s>,<evm(1)>,<evm(2)>,…,<evm(s)>

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| <evm> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <evm(n)> | n-th EVM measurement result (n=1 to s) |
| Resolution | 0.01% |
| Unit | % |
| <s> | Number of valid measurement results |

### Example of Use

To query the average of EVM measurement result:

```
:FETC:CELL:NR:FUND:MOD:EVM? AVG
> 1.50
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:FERRor?

Carrier Frequency Error Result

### Function

Queries the Frequency Error measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:FERRor? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<freq_ppm>,<freq_Hz>
```

When <mode> = TTL,

```
<avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<min_ppm>,<min_Hz>
```

### Parameters

| | | |
|---|---|---|
| <mode> | Storage mode | |
| AVG | Average | |
| MAX | Maximum | |
| MIN | Minimum | |
| TTL | Average・Maximum・Minimum | |
| DVT | Standard deviation | |
| Omitted | Worst value | |
| <avg_ppm> | Measurement result in ppm (Average) | |
| <avg_Hz> | Measurement result in Hz (Average) | |
| <max_ppm> | Measurement result in ppm (Maximum) | |
| <max_Hz> | Measurement result in Hz (Maximum) | |
| <min_ppm> | Measurement result in ppm (Minimum) | |
| <min_Hz> | Measurement result in Hz (Minimum) | |
| <freq_ppm> | Measurement result in ppm in specified Storage mode | |
| <freq_Hz> | Measurement results in Hz in specified Storage mode | |
| Resolution | 0.01 ppm | (Measurement result in ppm) |
| | 0.1 Hz | (Measurement result in Hz) |
| Unit | ppm | (Measurement result in ppm) |
| | Hz | (Measurement result in Hz) |

### Details

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

### Example of Use

To query the average of Frequency Error measurement result:

```
:FETC:CELL:NR:FUND:MOD:FERR? AVG
> 0.03,60.0
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:FERRor:WORSt?

Worst Carrier Frequency Error Result

### Function

Queries the worst value in Frequency Error measurement results.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:FERRor:WORSt?
```

### Response

```
<freq_ppm>,<freq_Hz>
```

### Parameters

| | |
|---|---|
| <freq_ppm> | Worst value in Frequency Error measurement results in ppm |
| Resolution | 0.01 ppm |
| Unit | ppm |
| <freq_Hz> | Worst value in Frequency Error measurement results in Hz |
| Resolution | 0.1 Hz |
| Unit | Hz |

### Details

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

### Example of Use

To query the worst value in Frequency Error measurement results:

```
:FETC:CELL:NR:FUND:MOD:FERR:WORS?
> 0.03,60.0
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:CARLeakage?

In-Band Emissions (Carrier Leakage) Result

### Function

Queries the In-band emissions (Carrier Leakage) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:CARLeakage? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<ibe>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

When <mode> = IND,

```
<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in In-Band Emissions (Carrier Leakage) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

### Example of Use

To query the maximum of in-band emissions (Carrier Leakage) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:CARL? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:CARLeakage?

E-UTRA In-Band Emissions (Carrier Leakage) Result

## Function

Queries the E-UTRA In-band emissions (Carrier Leakage) measurement result.

## Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:CARLeakage?
[<mode>]
```

## Response

When <mode> = AVG, MAX, MIN, DVT

<ibe>

When <mode> = TTL

<avg>,<max>,<min>

When <mode> = IND

<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>

## Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in the measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (Carrier Leakage) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:CARL? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:IQIMage?

E-UTRA In-Band Emissions (IQ Image) Result

## Function

Queries the E-UTRA in-band emissions (IQ Image) measurement result.

## Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:IQIMage?
[<mode>]
```

## Response

When <mode> = AVG, MAX, MIN, DVT

<ibe>

When <mode> = TTL

<avg>,<max>,<min>

When <mode> = IND

<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>

## Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in Measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (IQ Image) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:IQIM? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:ITEM?

E-UTRA In-Band Emissions Measured Item

### Function

Queries whether each E-UTRA in-band emission measurement item is measured or not.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:ITEM?
```

### Response

```
<flag>
```

### Parameter

| | | |
|---|---|---|
| <flag> | | Measured/Not measured flag (0 to 7)<br>Returns the sum of the following measurement items. |
| | 0 | Not measured |
| | 1 | Measure General |
| | 2 | Measure IQ Image |
| | 4 | Measure Carrier Leakage |
| | Unit | None |

### Example of Use

To query whether each E-UTRA in-band emission measurement item is measured or not:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:ITEM?
> 4
```

# :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:GENeral?

E-UTRA In-Band Emissions (General) Result

## Function

Queries the E-UTRA in-band emissions (General) measurement result.

## Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:GENeral?
[<mode>]
```

## Response

When <mode> = AVG, MAX, MIN, DVT

<ibe>

When <mode> = TTL

<avg>,<max>,<min>

When <mode> = IND

<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>

## Parameter

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in Measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (General) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:GEN? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:JUDGement?

E-UTRA In-Band Emissions Judgement

### Function

Queries the judgement on the E-UTRA in-band emission measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:JUDGement?
```

### Response

```
<judge>
```

### Parameter

| | |
|---|---|
| <judge> | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on the E-UTRA in-band emission measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:JUDG?
> PASS
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:CARLeakage?

E-UTRA In-Band Emissions (Carrier Leakage) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (Carrier Leakage).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:CARLeakage?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | | Limit of E-UTRA In-Band Emissions (Carrier Leakage) |
| | Resolution | 0.1 dB |
| | Unit | dBc |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (Carrier Leakage):

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:LIM:CARL?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:GENeral?

E-UTRA In-Band Emissions (General) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (General).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:GENeral?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | | Limit of E-UTRA In-Band Emissions (General) |
| | Resolution | 0.1 dB |
| | Unit | dB |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (General):

```
:FETC:CELL:NR:FUN:MOD:IEM:EUTR:LIM:GEN?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:IQIMage?

E-UTRA In-Band Emissions (IQ Image) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (IQ Image).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:IQIMage?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | | Limit of E-UTRA In-Band Emissions (IQ Image) |
| | Resolution | 0.1 dB |
| | Unit | dB |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (IQ Image):

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:LIM:IQIM?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:MARGin?

E-UTRA In-Band Emission margin

### Function

Queries the worst margin in the entire bandwidth of E-UTRA in-band emission measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:EUTRa:LIMit:MARGin?
```

### Response

```
<margin>
```

### Parameter

| | |
|---|---|
| <margin> | Worst margin in the entire bandwidth |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

Queries the worst margin in the entire bandwidth of E-UTRA in-band emission measurement:

```
:FETC:CELL:NR:FUND:MOD:IEM:EUTR:LIM:MARG?
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:GENeral?

In-Band Emissions (General) Result

### Function

Queries in-band emissions (General) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:GENeral? [<mode>]
```

### Response

When <mode> =AVG, MAX, MIN, DVT,

<ibe>

When <mode> = TTL,

<avg>,<max>,<min>

When <mode> = IND,

<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in In-Band Emissions (General) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

### Example of Use

To query the maximum of in-band emissions (General) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:GEN? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:IQIMage?

In-Band Emissions (IQ Image) Result

### Function

Queries the in-band emissions (IQ Image) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:IQIMage? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<ibe>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

When <mode> = IND,

```
<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| <ibe> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <ibe(n)> | Nth value in In-Band Emissions (IQ Image) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| <s> | Number of valid measurement results |

### Example of Use

To query the maximum of in-band emissions (IQ Image) measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:IQIM? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:ITEM?

In-Band Emissions Measured Item

### Function

Queries whether each in-band emission measurement item is measured or not.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:ITEM?
```

### Response

```
<flag>
```

### Parameter

| | | |
|---|---|---|
| <flag> | | Measured/Not measured flag (0 to 7)<br>Returns the sum of the following measurement items. |
| | 0 | Not measured |
| | 1 | Measure General |
| | 2 | Measure IQ Image |
| | 4 | Measure Carrier Leakage |
| | Unit | None |

### Example of Use

To query whether each in-band emission measurement item is measured or not:

```
:FETC:CELL:NR:FUND:MOD:IEM:ITEM?
> 4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:JUDGement?

In-Band Emissions Judgement

### Function

Queries the judgement on the in-band emission measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:JUDGement?
```

### Response

```
<judge>
```

### Parameter

| | |
|---|---|
| <judge> | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on the in-band emission measurement result:

```
:FETC:CELL:NR:FUND:MOD:IEM:JUDG?
> PASS
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?

In-Band Emissions (Carrier Leakage) limit

### Function

Queries the limit of in-band emission measurement result (Carrier Leakage).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | | Limit of In-Band Emissions (Carrier Leakage) |
| | Resolution | 0.1 dB |
| | Unit | dBc |

### Example of Use

To query the limit of in-band emission measurement result (Carrier Leakage):

```
:FETC:CELL:NR:FUND:MOD:IEM:LIM:CARL?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:GENeral?

In-Band Emissions (General) limit

### Function

Queries the limit of in-band emission measurement result (General).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:GENeral?
```

### Response

```
<level>
```

### Parameter

| | | |
|---|---|---|
| <level> | | Limit of In-Band Emissions (General) |
| | Resolution | 0.1 dB |
| | Unit | dB |

### Example of Use

To query the limit of in-band emission measurement result (General):

```
:FETC:CELL:NR:FUND:MOD:IEM:LIM:GEN?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?

In-Band Emissions (IQ Image) limit

### Function

Queries the limit of in-band emission measurement result (IQ Image).

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?
```

### Response

```
<level>
```

### Parameter

| | |
|---|---|
| <level> | Limit of In-Band Emissions (IQ Image) |
| Resolution | 0.1 dB |
| Unit | dB |

### Example of Use

To query the limit of in-band emission measurement result (IQ Image):

```
:FETC:CELL:NR:FUND:MOD:IEM:LIM:IQIM?
> 0.4
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:MARGin?

In-Band Emission margin

### Function

Queries the worst margin in the entire bandwidth of in-band emission measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:IEMissions:LIMit:MARGin?
```

### Response

```
<margin>
```

### Parameter

| | |
|---|---|
| <margin> | Worst margin in the entire bandwidth |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

Queries the worst margin in the entire bandwidth of in-band emission measurement:

```
:FETC:CELL:NR:FUND:MOD:IEM:LIM:MARG?
> 0.04
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:MERRor?

Magnitude Error Result

### Function

Queries the Magnitude Error measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:MERRor? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<magnitude>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <magnitude> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| Resolution | 0.01% |
| Unit | % |

### Example of Use

To query the average of Magnitude Error measurement result:

```
:FETC:CELL:NR:FUND:MOD:MERR? AVG
> 1.05
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:PEVM?

Peak EVM Result

### Function

Queries the peak EVM (Error Vector Magnitude) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:PEVM? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

<pevm>

When <mode> = TTL,

<avg>,<max>,<min>

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <pevm> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| Resolution | 0.01% |
| Unit | % |

### Example of Use

To query the average of Peak EVM measurement result:

```
:FETC:CELL:NR:FUND:MOD:PEVM? AVG
> 1.75
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:PHERror?

Phase Error Result

### Function

Queries the Phase Error measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:PHERror? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<phase>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <phase> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| Resolution | 0.01 deg. |
| Unit | deg. |

### Example of Use

To query the average of Phase Error measurement result:

```
:FETC:CELL:NR:FUND:MOD:PHER? AVG
> 1.55
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:RHO?

Rho Result

### Function

Queries the Rho (waveform quality) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:RHO? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<rho>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| <rho> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| Resolution | 0.00001 |

### Example of Use

To query the average of Signal Quality measurement (Rho) result:

```
:FETC:CELL:NR:FUND:MOD:RHO? AVG
> 0.00004
```

## :FETCh:CELLular:NR:FUNDamental:MODulation:RSEVm?

Reference Signal EVM Result

### Function

Queries the EVM measurement result of Reference Signal.

### Query

```
:FETCh:CELLular:NR:FUNDamental:MODulation:RSEVm? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

```
<rsevm>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

When <mode> = IND,

```
<s>,<rsevm(1)>,<rsevm(2)>,…,<rsevm(s)>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| <rsevm> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <rsevm(n)> | The n-th Measurement result (n=1 to s) |
| Resolution | 0.01% |
| Unit | % |
| <s> | Number of valid measurement results |

### Example of Use

To query the average of Reference Signal EVM measurement result:

```
:FETC:CELL:NR:FUND:MOD:RSEV? AVG
> 1.51
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:OBW?

OBW Result

### Function

Queries the OBW (Occupied Bandwidth) measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:OBW?
```

### Response

```
<bw>
```

### Parameter

| | | |
|---|---|---|
| <bw> | | Occupied Bandwidth |
| | Resolution | 0.1 Hz |
| | Unit | Hz |

### Example of Use

To query the OBW measurement result:

```
:FETC:CELL:NR:FUND:OBW?
> 1080000.0
```

## :FETCh:CELLular:NR:FUNDamental:OBW:FREQuency?

OBW Frequency Result

### Function

Queries the upper, lower and center frequency of OBW (Occupied Bandwidth) measurement results.

### Query

```
:FETCh:CELLular:NR:FUNDamental:OBW:FREQuency? <pos>
```

### Response

```
<freq>
```

### Parameters

| | |
|---|---|
| <pos> | Offset type |
| UPPER | Upper frequency |
| LOWER | Lower frequency |
| CENTER | Center frequency |
| <freq> | Offset frequency |
| Resolution | 0.1 Hz |
| Unit | Hz |

### Example of Use

To query the upper frequency of OBW measurement result:

```
:FETC:CELL:NR:FUND:OBW:FREQ? UPPER
> 1951920000.0
```

## :FETCh:CELLular:NR:FUNDamental:POWer:CHPower?

Channel Power Result

### Function

Queries the Channel Power measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:POWer:CHPower? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN or DVT,

```
<pwr>
```

When <mode> = TTL,

```
<avg>,<max>,<min>
```

When <mode> = IND,

```
<s>,<pwr(1)>,<pwr(2)>,<pwr(3)>,…,<pwr(s)>
```

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| <pwr> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <pwr(n)> | The n-th measurement result (n=1 to s) |
| Resolution | 0.01 dB |
| Unit | dBm |
| <s> | Number of valid measurement results |

### Example of Use

To query the average of Channel Power measurement result:

```
:FETC:CELL:NR:FUND:POW:CHP? AVG
> -20.00
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:POWer:TXPower?

Tx Power Result

### Function

Queries the Tx Power measurement result.

### Query

```
:FETCh:CELLular:NR:FUNDamental:POWer:TXPower? [<mode>]
```

### Response

When <mode> = AVG, MAX, MIN, DVT,

<pwr>

When <mode> = TTL,

<avg>,<max>,<min>

When <mode> = IND

<s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)>

### Parameters

| | |
|---|---|
| <mode> | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| <pwr> | Measurement result in specified Storage mode |
| <avg> | Measurement result (Average) |
| <max> | Measurement result (Maximum) |
| <min> | Measurement result (Minimum) |
| <pwr(n)> | The n-th Measurement result (n=1 to s) |
| Resolution | 0.01 dB |
| Unit | dBm |
| <s> | Number of valid measurement results |

### Example of Use

To query the Tx Power measurement result:

```
:FETC:CELL:NR:FUND:POW:TXP? AVG
> -20.00
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:NR:FUNDamental:SEMask:JUDGement?

SEM Template Judgement

### Function

Queries the judgement of Spectrum Emission Mask measurement result. Fail when any part of spectrum exceeds limit, otherwise Pass.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:JUDGement?
```

### Response

```
<judge>
```

### Parameter

| | |
|---|---|
| <judge> | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on Spectrum Emission Mask measurement result:

```
:FETC:CELL:NR:FUND:SEM:JUDG?
> PASS
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel?

SEM Worst Value

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:LEVel? <range>
```

### Response

```
<level>,<freq>
```

### Parameter

| | |
|---|---|
| <range> | Frequency Range |
| Range | –4 to –1, 1 to 4 |
| Resolution | 1 |
| Suffix code | None |
| <level> | Worst spectrum level in the specified frequency range |
| Resolution | 0.01 dB |
| Unit | dB |
| <freq> | Offset frequency of the worst spectrum level in the specified frequency range |
| Resolution | 1 Hz |
| Unit | Hz |

### Details

The frequency range varies according to the channel bandwidth.
Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:LEV? 1
> -20.01,705
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail?

SEM Worst Value (Detail)

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail? <range>
```

### Response

```
<level>,<freq>
```

### Parameter

| | |
|---|---|
| <range> | Frequency Range |
| Range | –23 to –1, 1 to 23 |
| Resolution | 1 |
| Suffix code | None |
| <level> | Worst spectrum level in the specified frequency range |
| Resolution | 0.01 dB |
| Unit | dB |
| <freq> | Offset frequency of the worst spectrum level in the specified frequency range |
| Resolution | 1 Hz |
| Unit | Hz |

### Details

The frequency range varies according to the channel bandwidth.
Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:LEV:DET? 1
> -20.01,705
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail:TTL?

SEM Worst Value (Detail) (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:DETail:TTL?
```

### Response

```
<level(-1)>,<freq(-1)>,…,<level(-23)>,<freq(-23)>,<level(1)>,<freq(1)>,…,
<level(23)>,<freq(23)>
```

### Parameters

| | | |
|---|---|---|
| <level(n)> | | Worst spectrum level in each frequency range<br>(Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 0.01 dB |
| | Unit | dBm |
| <freq(n)> | | Offset frequency of the worst spectrum level in each frequency range<br>(Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:LEV:DET:TTL?
> -94.90,-855000,-79.73,-1500000,-79.82,-2300000,-78.96,-4300000,
-79.62,-5500000,-79.54,-9500000,-79.47,-14500000,-79.54,-19500000,…,
-79.42,-23500000,-93.80,735000,-77.64,2000000,-77.61,2300000,
-9.48,4500000,-72.78,5500000,-77.38,6500000,-78.50,12500000,
-78.60,16500000,-78.73,22500000
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:TTL?

SEM Worst Value (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:LEVel:TTL?
```

### Response

```
<level(-1)>,<freq(-1)>,…,<level(-4)>,<freq(-4)>,<level(1)>,<freq(1)>,…,
<level(4)>,<freq(4)>
```

### Parameters

| | | |
|---|---|---|
| <level(n)> | | Worst spectrum level in each frequency range<br>(Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 0.01 dB |
| | Unit | dBm |
| <freq(n)> | | Offset frequency of the worst spectrum level in each frequency range<br>(Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:LEV:TTL?
> -20.00, 30, -20.00, 30, -20.00, 30, -20.00, 30, -20.00, 30, -20.00, 30, -20.00,
30, -20.00, 30
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin?

SEM Mask Margin

### Function

Queries the margin from template for the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:MARGin? <range>
```

### Response

```
<margin>,<freq>
```

### Parameter

| | |
|---|---|
| <range> | Frequency Range |
| Range | –4 to –1, 1 to 4 |
| Resolution | 1 |
| Suffix code | None |
| <margin> | Margin from template for the worst spectrum level in the frequency range specified by range. |
| Resolution | 0.01 dB |
| Unit | dB |
| <freq> | Offset frequency at the spectrum level in the frequency range specified by range. |
| Resolution | 1 Hz |
| Unit | Hz |

### Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the margin from template for the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:MARG? 1
> -20.01,705
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail:TTL?

SEM Mask Margin (Detail) (All range)

### Function

Queries the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail:TTL?
```

### Response

```
<margin(-1)>,<freq(-1)>,…,<margin(-23)>,<freq(-23)>,<margin(1)>,<freq(1)>
,…,<margin(23)>,<freq(23)>
```

### Parameter

| | | |
|---|---|---|
| <level(n)> | | Margin from template for the worst spectrum level in each frequency range (Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 0.01 dB |
| | Unit | dB |
| <freq(n)> | | Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

### Example of Use

To query the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:MARG:DET:TTL?
> -10.90,-855000,-10.73,-1500000,-10.82,-2300000,-10.96,-4300000,
-10.62,-5500000,-10.54,-9500000,-10.47,-14500000,-10.54,-19500000,…,
-10.42,-23500000,-10.80,735000,-10.64,2000000,-10.61,2300000,
-10.48,4500000,-10.78,5500000,-10.38,6500000,-10.50,12500000,
-10.60,16500000,-10.73,22500000
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail?

SEM Mask Margin (Detail)

### Function

Queries the margin from template for the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:DETail? <range>
```

### Response

```
<margin>,<freq>
```

### Parameter

| | | |
|---|---|---|
| <range> | | Frequency Range |
| | Range | –23 to –1, 1 to 23 |
| | Resolution | 1 |
| | Suffix code | None |
| <level> | | Margin from template for the worst spectrum level in the frequency range specified by range. |
| | Resolution | 0.01 dB |
| | Unit | dB |
| <freq> | | Offset frequency at the spectrum level in the frequency range specified by range. |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

### Example of Use

To query the margin from template for the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:MARG:DET? 1
> -20.01,705
```

## :FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:TTL?

SEM Mask Margin (All range)

### Function

Queries the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

```
:FETCh:CELLular:NR:FUNDamental:SEMask:MARGin:TTL?
```

### Response

```
<margin(-1)>,<freq(-1)>,…,<margin(-4)>,<freq(-4)>,<margin(1)>,<freq(1)>,…
,<margin(4)>,<freq(4)>
```

### Parameter

| | | |
|---|---|---|
| <level(n)> | | Margin from template for the worst spectrum level in each frequency range (Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 0.01 dB |
| | Unit | dB |
| <freq(n)> | | Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:NR:FUND:SEM:MARG:TTL?
> -10.90,-855000,-10.73,-1500000,-10.82,-2300000,-10.96,-4300000,
-10.80,735000,-10.64,2000000,-10.61,2300000, -10.48,4500000
```

## :FETCh:CELLular:NR:FUNDamental:TRACe?

Waveform

Function

Queries the spectrum waveform data of each measurement result.

Query

```
:FETCh:CELLular:NR:FUNDamental:TRACe? <format>,<position>,<length>[,<symbol>]
```

Response

```
<data(1)>,…,<data(length)>
```

Parameter

<format> Measurement Item

| Format | Measurement Item | Format | Measurement Item |
|---|---|---|---|
| 1 | Occupied Bandwidth | 11 | In-band Emissions (dB) (average) |
| 2 | Spectrum Emission Mask | 12 | In-band Emissions (dB) (maximum) |
| 3 | Constellation (I) | 13 | In-band Emissions (dBc) (average) |
| 4 | Constellation (Q) | 14 | In-band Emissions (dBc) (maximum) |
| 5 | EVM (average) | 15 | Spectrum Flatness (average) |
| 6 | EVM (maximum) | 16 | Spectrum Flatness (maximum) |
| 7 | Phase Error (average) | 17 | Spectrum Flatness (minimum) |
| 8 | Phase Error (maximum) | 18 | In-band Emissions (E-UTRA) (dB) (average) |
| 9 | Magnitude Error (average) | 19 | In-band Emissions (E-UTRA) (dB) (maximum) |
| 10 | Magnitude Error (maximum) | 20 | In-band Emissions (E-UTRA) (dBc) (average) |
| | | 21 | In-band Emissions (E-UTRA) (dBc) (maximum) |

<position> Start point of waveform data
- Range 0 to (Number of data – 1) Number of data: Refer to Table 2.8-2, 2.8-3, 2.8-4
- Resolution 1
- Suffix code None

<length> Number of read data
- Range 1 to Number of data Number of data: Refer to Table 2.8-2, 2.8-3, 2.8-4
- Resolution 1
- Suffix code None

<symbol> Position of SC-FDMA symbol
- Range 0 to 13 (Constellation, EVM, Phase Error, Magnitude Error)
- Resolution 1

| | | |
|---|---|---|
| <data(n)> | Waveform data | |
| Resolution | 0.01 dB | (Occupied Bandwidth, Spectrum Emission Mask, In-band Emissions, Spectrum Flatness) |
| | 0.01 deg. | (Phase Error) |
| | 0.01% | (EVM, Magnitude Error) |
| | 0.0001 | (Constellation) |
| Unit | dBm | (Spectrum Emission Mask) |
| | dB | (Occupied Bandwidth, In-band Emissions (dB), Spectrum Flatness) |
| | dBc | (In-band Emissions (dBc)) |
| | degree | (Phase Error) |
| | % | (EVM, Magnitude Error) |
| | None | (Constellation) |

Details

Refer to Table 2.8-1 “Waveform Data Type and Data Interval” for Data Interval.

Example of Use

To query the Occupied Bandwidth of 20 data from 25 of each measurement:

```
:FETC:CELL:NR:FUND:TRAC? 1,25,20
> -42.12,-40.14,…,-41.22
```

## :FETCh:CELLular:NR:FUNDamental:TX?

All Results

### Function

Queries the TX measurement results.

### Query

```
:FETCh:CELLular:NR:FUNDamental:TX? <index>
```

### Response

`<result(1)>,…,<result(x)>` Tx measurement results. Refer to the details.

### Parameter

| | | |
|---|---|---|
| <index> | | Measurement results index |
| | Range | 1 to 6, 102 (Refer to Details) |
| | Resolution | 1 |

### Details

Refer to Details of :FETCh:CELLular:SEQuence:NR:TX? command in 4.2.3.

### Example of Use

To query the Tx measurement results for index 1:

```
:FETC:CELL:NR:FUND:TX? 1
> -20.00,-19.55,-20.06,…,0.04,2
```

## :TRIGger:CELLular:NR:FUNDamental:DELay

Trigger Delay

### Function

Sets or queries the Trigger Delay.

### Command

```
:TRIGger:CELLular:NR:FUNDamental:DELay <delay>
```

### Query

```
:TRIGger:CELLular:NR:FUNDamental:DELay?
```

### Response

```
<delay>
```

### Parameters

| | |
|---|---|
| <delay> | Trigger Delay |
| Range | 0.000 to 10.000 ms |
| Resolution | 0.001 ms |
| Suffix code | S MS US NS (uses ms when omitted) |
| Default | 0.000 ms |
| Unit | ms |

### Details

This command is available when trigger source is set to other than FREE.

### Example of Use

To set the Trigger Delay to 0.001 ms:

```
:TRIG:CELL:NR:FUND:DEL 0.001
:TRIG:CELL:NR:FUND:DEL?
> 0.001
```

## :TRIGger:CELLular:NR:FUNDamental:LEVel

Trigger Level

### Function

Sets or queries the Trigger Level.

### Command

```
:TRIGger:CELLular:NR:FUNDamental:LEVel <level>
```

### Query

```
:TRIGger:CELLular:NR:FUNDamental:LEVel?
```

### Response

```
<level>
```

### Parameters

| | |
|---|---|
| <level> | Trigger Level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB |
| Default | –30 dB |
| Unit | dB |

### Details

This command is available when trigger source is set to VIDEO.

### Example of Use

To set the Trigger Level to –30 dB:

```
:TRIG:CELL:NR:FUND:LEV -30
:TRIG:CELL:NR:FUND:LEV?
> -30
```

## :TRIGger:CELLular:NR:FUNDamental:MGAP

Minimum Trigger Gap

### Function

Sets or queries the minimum time the signal must be below the trigger level when the trigger source is set to VIDEO.

### Command

```
:TRIGger:CELLular:NR:FUNDamental:MGAP <time>
```

### Query

```
:TRIGger:CELLular:NR:FUNDamental:MGAP?
```

### Response

```
<time>
```

### Parameters

| | |
|---|---|
| <time> | Minimum Trigger Gap |
| Range | 0 to 10.0 ms |
| Resolution | 0.1 ms |
| Suffix code | S MS US NS (uses ms when omitted) |
| Default | 0.0 ms |
| Unit | ms |

### Details

This command is available when trigger source is set to VIDEO.

### Example of Use

To set the Minimum Trigger Gap to 1 ms:

```
:TRIG:CELL:NR:FUND:MGAP 1MS
:TRIG:CELL:NR:FUND:MGAP?
> 1
```

## :TRIGger:CELLular:NR:FUNDamental:SOURce

Trigger Source

### Function

Sets or queries the Trigger Source.

### Command

```
:TRIGger:CELLular:NR:FUNDamental:SOURce <source>
```

### Query

```
:TRIGger:CELLular:NR:FUNDamental:SOURce?
```

### Response

```
<source>
```

### Parameters

| <source> | Trigger Source |
|---|---|
| VIDEO | Power |
| FRAME | Frame |
| FREE | Freerun |
| Default | FRAME |

### Example of Use

To set the Trigger Source to FRAME:

```
:TRIG:CELL:NR:FUND:SOUR FRAME
:TRIG:CELL:NR:FUND:SOUR?
> FRAME
```

## :TRIGger:CELLular:NR:FUNDamental:TOUT

Trigger Timeout

### Function

Sets or queries the Trigger Timeout.

### Command

```
:TRIGger:CELLular:NR:FUNDamental:TOUT <time>
```

### Query

```
:TRIGger:CELLular:NR:FUNDamental:TOUT?
```

### Response

```
<time>
```

### Parameters

| | |
|---|---|
| <time> | Trigger Timeout |
| Range | 1 to 60 s |
| Unit | s |
| Resolution | 1 s |
| Suffix code | NS, US, MS, S (uses s when omitted) |
| Default | 10 s |

### Example of Use

To set the Trigger Timeout to 10 s:

```
:TRIG:CELL:NR:FUND:TOUT 10
:TRIG:CELL:NR:FUND:TOUT?
> 10
```

## 4.2.3 Sequence measurement commands

### :CONFigure:CELLular:GENerator:RFSettings:FREQuency

Downlink Frequency

#### Function

Sets or queries the downlink frequency.

#### Command

```
:CONFigure:CELLular:GENerator:RFSettings:FREQuency <dl_freq>
```

#### Query

```
:CONFigure:CELLular:GENerator:RFSettings:FREQuency?
```

#### Response

<dl_freq>

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

#### Parameters

| | |
|---|---|
| <dl_freq> | Downlink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 2140 000 000 Hz |

#### Details

This sets the Rx frequency for the mobile station.
Changing the setting of downlink frequency does not change the setting of the downlink channel.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

#### Example of Use

To set the downlink frequency to 2050 MHz:

```
:CONF:CELL:GEN:RFS:FREQ 2050MHZ
:CONF:CELL:GEN:RFS:FREQ?
> 2050000000
```

## :CONFigure:CELLular:GENerator:RFSettings:LEVel

Output Level

### Function

Sets or queries the total output level of all channels.

### Command

```
:CONFigure:CELLular:GENerator:RFSettings:LEVel <level>
```

### Query

```
:CONFigure:CELLular:GENerator:RFSettings:LEVel?
```

### Response

<level>

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

### Parameters

| | | |
|---|---|---|
| <level> | Output level | |
| Range | | |
| MU887000A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1/Port 2) |
| | –120.0 to 0.0 dBm | (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1/Port 2) |
| | –120.0 to –8.0 dBm | (Port 3/Port 4) |
| MU887001A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm | (Port 1 to Port 12) |
| Resolution | 0.1 dB | |
| Suffix code | DBM (uses dBm when omitted) | |
| Default | –60.2 dBm | |

### Details

For MU887000A, the setting range varies with the output test port setting.
If cable loss correction is set to ON, the setting range of the output level is the range of values with subtracted cable loss.
When the cable loss is 5 dB and frequency ≤ 3800 MHz,
the MU887000A Port 1/Port 2 setting range is –135.0 to –15.0 dBm.

Example of Use

To set the output level to –50.0 dBm:

```
:CONF:CELL:GEN:RFS:LEV -50.0
:CONF:CELL:GEN:RFS:LEV?
> -50.0
```

Related Commands

[:ROUTe]:EXTLoss:TABLe:SWITch
:CALCulate:EXTLoss:TABLe:SETTing
:CALCulate:EXTLoss:TABLe:VALue

For details of the commands, refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

# :CONFigure:CELLular:MEASurement:RFSettings:FREQuency

Uplink Frequency

### Function

Sets or queries the uplink frequency.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency <ul_freq>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency?
```

### Response

<ul_fleq>

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

### Parameters

| | |
|---|---|
| <ul_freq> | Uplink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 1950 000 000 Hz |

### Details

This sets the Tx frequency for the mobile station.
Changing the uplink frequency setting does not change the uplink channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

### Example of Use

To set the uplink frequency to 1950 MHz:

```
:CONF:CELL:MEAS:RFS:FREQ 1950MHZ
:CONF:CELL:MEAS:RFS:FREQ?
> 1950000000
```

## :CONFigure:CELLular:MEASurement:RFSettings:LEVel

Input Level

### Function

Sets or queries the input level of the input test port.

### Command

```
:CONFigure:CELLular:MEASurement:RFSettings:LEVel <level>
```

### Query

```
:CONFigure:CELLular:MEASurement:RFSettings:LEVel?
```

### Response

<level>

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

### Parameters

| | |
|---|---|
| <level> | Input level |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –1.0 dBm |

### Details

For MU887000A, the setting range varies according to the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, the MU887000A Port 1/Port 2 setting range is –60.0 to +40.0 dBm.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

### Example of Use

To set the input level to –10.0 dBm:

```
:CONF:CELL:MEAS:RFS:LEV -10.0
:CONF:CELL:MEAS:RFS:LEV?
```

```
> -10.0
```

Related commands

[:ROUTe]:EXTLoss:TABLe:SWITch
:CALCulate:EXTLoss:TABLe:SETTing
:CALCulate:EXTLoss:TABLe:VALue
For details of the commands, refer to Chapter 5 “SCPI Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## :CONFigure:CELLular:SEQuence:CONTrol

Sequence Control Parameter - Sequence Control

### Function

Sets or queries the start and stop segments of Sequence Table.
Sets the parameters for both measurement and signal transmission.

### Command

```
:CONFigure:CELLular:SEQuence:CONTrol <start>,<end>
```

### Query

```
:CONFigure:CELLular:SEQuence:CONTrol?
```

### Response

```
<start>,<end>
```

### Parameters

| | |
|---|---|
| <start> | Start segment |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| <end> | Stop segment |
| Range | <start> to 1999 |
| Resolution | 1 |
| Default | 199 |

### Details

<start> = 0 to 1999, <end> = 0 to 1999 where <end> ≥ <start>

Whether the set sequence table can be executed is evaluated.
Use the :FETCh:CELLular:SEQuence:ERRor? command to query the error details.

### Example of Use

To set the start segment to 20 and the stop segment to 52:

```
:CONF:CELL:SEQ:CONT 20,52
:CONF:CELL:SEQ:CONT?
> 20,52
```

# :CONFigure:CELLular:SEQuence:CONTrol:TX

Sequence Control Parameter - Sequence Control

## Function

Sets or queries start and stop segments in sequence table.

Sets the measurement parameters only, without affecting the signal transmission parameters.

## Command

```
:CONFigure:CELLular:SEQuence:CONTrol:TX <start>,<end>
```

## Query

```
:CONFigure:CELLular:SEQuence:CONTrol:TX?
```

## Response

```
<start>,<end>
```

## Parameters

| | |
|---|---|
| <start> | Start segment |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| <end> | Stop segment |
| Range | <start> to 1999 |
| Resolution | 1 |
| Default | 199 |

## Details

<start> = 0 to 1999, <end> = 0 to 1999 where <end> ≥ <start>

Whether the set sequence table can be executed is evaluated.

Use the :FETCh:CELLular:SEQuence:ERRor? command to query the error details.

## Example of Use

To set the start and stop segments to 20 and 55, respectively:

```
:CONF:CELL:SEQ:CONT:TX 20,55
:CONF:CELL:SEQ:CONT:TX?
> 20,55
```

# :CONFigure:CELLular:SEQuence:NR:AMITems

Measurement Enable and Count

## Function

Sets or queries the On /Off status of measurement items and measurement counts collectively.

## Command

```
:CONFigure:CELLular:SEQuence:NR:AMITems
<mcond>,<PWRonoff>,<PWRcount>,<MODonoff>,<MODcount>,<OBWonoff>,<OBWcount>
,<SEMonoff>,<SEMcount>,<ACLRonoff>,<ACLRcount>
```

## Query

```
:CONFigure:CELLular:SEQuence:NR:AMITems? <mcond>
```

## Response

```
<PWRonoff>,<PWRcount>,<MODonoff>,<MODcount>,<OBWonoff>,<OBWcount>,<SEMono
ff>,<SEMcount>,<ACLRonoff>,<ACLRcount>
```

## Parameters

| | |
|---|---|
| <mcond> | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |
| <PWRonoff> | Enables/disables Tx Power measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| <PWRcount> | Tx Power measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| <MODonoff> | Enables/disables Modulation analysis measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| <MODcount> | Modulation analysis measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| <OBWonoff> | Enables/disables Occupied Bandwidth measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| <OBWcount> | Occupied Bandwidth measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| <SEMonoff> | Enables/disables Spectrum Emission Mask Measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |

| | |
|---|---|
| Default | OFF |
| <SEMcount> | Spectrum Emission Mask Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| <ACLRonoff> | Enables/disablesAdjacent Channel Leakage Power Ratio measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| <ACLRcount> | Adjacent Channel Leakage Power Ratio measurement count |
| Range | 1 to 100 |
| Resolution | 1 |

### Example of Use

To set all measurement items to On and set the number of measurement to 1 for the condition number 0 in the NR measurement condition table:

```
:CONF:CELL:SEQ:NR:AMIT 0,ON,1,ON,1,ON,1,ON,1,ON,1
```

## :CONFigure:CELLular:SEQuence:NR:AMITems:OFF

Turn Off All Measurement Items

### Function

Sets all measurement items to Off collectively.

### Command

```
:CONFigure:CELLular:SEQuence:NR:AMITems:OFF <mcond>
```

### Parameters

| | |
|---|---|
| <mcond> | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |

### Example of Use

To set all measurement items of number 0 in the NR measurement condition table to Off collectively:

```
:CONF:CELL:SEQ:NR:AMIT:OFF 0
```

## :CONFigure:CELLular:SEQuence:NR:SETup

NR Parameter

### Function

Sets the NR measurement condition table.

### Command

When <index> = 1:

```
:CONFigure:CELLular:SEQuence:NR:SETup
<mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>
,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<addp
os>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>
```

When <index> = 2:

```
:CONFigure:CELLular:SEQuence:NR:SETup
<mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>
,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mapp
ingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>
,<contsignal>
```

When <index> = 3:

```
:CONFigure:CELLular:SEQuence:NR:SETup
<mcond>,[<cc>,]<index>,<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>
,<scs>,<periodicity>,<duration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mapp
ingtype>,<addpos>,<typeApos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>
,<contsignal>,<ranop_type>,<endc_mode>,<eutra_ulfreq>,<eutra_bw>,<eutra_n
rb>,<eutra_start>,<eutra_frametype>,<eutra_grouphop>,<eutra_cshift>,<eutr
a_cellid>,<eutra_dss>
```

### Query

```
:CONFigure:CELLular:SEQuence:NR:SETup? <mcond>,[<cc>,]<index>
```

### Response

When <index> = 1:

```
<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<d
uration>,<nrb>,<start>,<mod>,<symbol>,<port>,<addpos>,<typeApos>,<type>,<
grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>
```

When <index> = 2:

```
<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<d
uration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<type
Apos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>
```

When <index> = 3:

```
<band>,<frametype>,<chconfig>,<cellid>,<wave>,<bw>,<scs>,<periodicity>,<d
uration>,<nrb>,<start>,<mod>,<symbol>,<port>,<mappingtype>,<addpos>,<type
Apos>,<type>,<grouphop>,<seqhop>,<measoff>,<preph>,<contsignal>,<ranop_ty
pe>,<endc_mode>,<eutra_ulfreq>,<eutra_bw>,<eutra_nrb>,<eutra_start>,<eutr
a_frametype>,<eutra_grouphop>,<eutra_cshift>,<eutra_cellid>,<eutra_dss>
```

Parameters

| | |
|---|---|
| <mcond> | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| <cc> | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| <index> | Measurement condition list index |
| Range | 1 to 3 |
| <contsignal> | Measurement signal format |
| ON | Continuous wave (only ON is available) |
| Default | ON |

Refer to 4.2.2 “Fundamental measurement commands” for details of parameters other than the above.

The commands corresponding to the parameters are as follows:

| Parameter | Corresponding Command |
|---|---|
| <band> | :CONFigure:CELLular:NR:FUNDamental:BAND |
| <frametype> | :CONFigure:CELLular:NR:FSTRucture |
| <chconfig> | :CONFigure:CELLular:NR:CTYPe |
| <cellid> | :CONFigure:CELLular:NR:CID |
| <wave> | :CONFigure:CELLular:NR:WAVeform |
| <bw> | :CONFigure:CELLular:NR:CBANdwidth |
| <scs> | :CONFigure:CELLular:NR:SCS |
| <periodicity> | :CONFigure:CELLular:NR:DLUL:PERiod |
| <duration> | :CONFigure:CELLular:NR:UL:DURation |
| <nrb> | :CONFigure:CELLular:NR:RBALlocation:NRB |
| <start> | :CONFigure:CELLular:NR:RBALlocation:ORB |
| <mod> | :CONFigure:CELLular:NR:MODulation:MSCHeme |
| <symbol> | :CONFigure:CELLular:NR:DMRS:DURation |
| <port> | :CONFigure:CELLular:NR:DMRS:PORT |
| <mappingtype> | :CONFigure:CELLular:NR:PUSCh:MTYPe |
| <addpos> | :CONFigure:CELLular:NR:DMRS:ADDPos |
| <typeApos> | :CONFigure:CELLular:NR:DMRS:TYPE:APOSition |
| <type> | :CONFigure:CELLular:NR:DMRS:TYPE |
| <grouphop> | :CONFigure:CELLular:NR:DMRS:GHOPping |
| <seqhop> | :CONFigure:CELLular:NR:DMRS:SHOPping |
| <measoff> | :CONFigure:CELLular:NR:FUNDamental:MOFFset |
| <preph> | :CONFigure:CELLular:NR:PCRRection |
| <mappingtype> | :CONFigure:CELLular:NR:PUSCh:MTYPe |
| <ranop_type> | :CONFigure:CELLular:NR:RANoperation |
| <endc_mode> | :CONFigure:CELLular:NR:ENDC:MMODe |
| <eutra_ulfreq> | :CONFigure:CELLular:MEASurement:RFSettings:FREQuency:EUTRa |
| <eutra_bw> | :CONFigure:CELLular:NR:EUTRa:CBANdwidth |
| <eutra_nrb> | :CONFigure:CELLular:NR:EUTRa:RBALlocation:NRB |
| <eutra_start> | :CONFigure:CELLular:NR:EUTRa:RBALlocation:ORB |
| <eutra_frametype> | :CONFigure:CELLular:NR:EUTRa:FSTRucture |
| <eutra_grouphop> | :CONFigure:CELLular:NR:EUTRa:DMRS:GHOPping |
| <eutra_cshift> | :CONFigure:CELLular:NR:EUTRa:DMRS:CSHift |
| <eutra_cellid> | :CONFigure:CELLular:NR:EUTRa:CID |
| <eutra_dss> | :CONFigure:CELLular:NR:EUTRa:DSS |

Example of Use

To set the parameter for the condition number 0, index 1 in the NR measurement condition table:

```
:CONF:CELL:SEQ:NR:SET
0,PCC,1,77,TDD,PUSCH,0,CPOFDM,100MHZ,30KHZ,10MS,10,273,0,QPSK,SINGLE,0,0,
2,TYPE1,OFF,OFF,0.0,OFF,ON
```

Remarks

The following settings are ignored because the signal to be measured is fixed to continuous wave:

- DL/UL Periodicity
- UL Duration

# :CONFigure:CELLular:SEQuence:PORT:RX

Sequence Table Parameter - SG Output Port

## Function

Specifies the segment number and sets or queries the test port number for transmitting RF signals.

## Command

`:CONFigure:CELLular:SEQuence:PORT:RX <seg>,<port>` MU887000A, MU887001A

`:CONFigure:CELLular:SEQuence:PORT:RX <seg>,<port>[,<port>,…,<port>]` MU887002A

## Query

`:CONFigure:CELLular:SEQuence:PORT:RX? <seg>`

## Response

| | |
|---|---|
| `<port>` | MU887000A, MU887001A |
| <port>[,<port>,…,<port>] | MU887002A |

## Parameters

| | | |
|---|---|---|
| <seg> | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| <port> | Output test port number | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| Default | PORT1 | |

## Details

For MU887000A

Test Port 3 cannot be set when Test Port 3 is selected for RF signal input test port.

Test Port 4 cannot be set when Test Port 4 is selected for RF signal input test port.

For MU887001A and MU887002A, there are no restrictions as above.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

Example of Use

To set the test port number of segment 5 to Test Port 2:

```
:CONF:CELL:SEQ:PORT:RX 5,PORT2
:CONF:CELL:SEQ:PORT:RX? 5
> PORT2
```

To set the test port number of segment 5 to Test Port 2, Test Port 11, and Test Port 5:

```
:CONF:CELL:SEQ:PORT:RX 5,PORT2,PORT11,PORT5
:CONF:CELL:SEQ:PORT:RX? 5
> PORT2,PORT5,PORT11
```

# :CONFigure:CELLular:SEQuence:PORT:TX

Sequence Table Parameter - SA Input Port

## Function

Specifies the segment number and sets or queries the test port number for inputting RF signals.

## Command

```
:CONFigure:CELLular:SEQuence:PORT:TX <seg>,<port>
```

## Query

```
:CONFigure:CELLular:SEQuence:PORT:TX? <seg>
```

## Response

```
<port>
```

## Parameters

| | | |
|---|---|---|
| <seg> | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| <port> | Input test port number | |
| Range | COMMON, Test Port 1 to 4 | (MU887000A) |
| | COMMON, Test Port 1 to 4 | (MU887001A) |
| | OFF, COMMON, Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| OFF | No any Input Test Ports | (MU887002A) |
| COMMON | Input test port specified by :CONFigure:CELLular:SEQuence:PORT:TX command. | |
| Default | COMMON | |

## Details

For MU887000A,
Test Port 3 cannot be set when Test Port 3 is selected for RF signal output test port.
Test Port 4 cannot be set when Test Port 4 is selected for RF signal output test port.

For MU887001A and MU887002A, there are no restrictions as above.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

Example of Use

To set the test port number of segment 5 to Test Port 2:

```
:CONF:CELL:SEQ:PORT:TX 5,PORT2
:CONF:CELL:SEQ:PORT:TX? 5
> PORT2
```

# :CONFigure:CELLular:SEQuence:RFSettings:REINit

Sequence Control Parameter - Sequence End State Reinitialization

## Function

Enables and queries the automatic initialization of following items after sequence measurement completion.

- Downlink frequency
- Output level
- Output signal pattern
- Uplink frequency
- Input level

## Command

```
:CONFigure:CELLular:SEQuence:RFSettings:REINit <sw>
```

## Query

```
:CONFigure:CELLular:SEQuence:RFSettings:REINit?
```

## Response

```
<sw>
```

## Parameters

| | |
|---|---|
| <sw> | Automatic initialization after sequence measurement completion |
| ON | Enables automatic initialization |
| OFF | Disables automatic initialization |
| Default | ON |

## Details

If the parameter is set to ON, the settings are initialized to the values configured by the following commands after sequence measurement completion.

| | |
|---|---|
| Downlink frequency | :CONFigure:CELLular:GENerator:RFSettings:FREQuency |
| Output level | :CONFigure:CELLular:GENerator:RFSettings:LEVel |
| Output signal pattern | :CONFigure:CELLular:GENerator:ARB:WAVeform:PATTern:SELect |
| Uplink frequency | :CONFigure:CELLular:MEASurementRFSettings:FREQuency |
| Input level | :CONFigure:CELLular:MEASurement:RFSettings:LEVel |

If the parameter is set to OFF, the settings remain those of the sequence measurement stop segment.

## Example of Use

To reset the target parameters:

```
:CONF:CELL:SEQ:RFS:REIN ON
:CONF:CELL:SEQ:RFS:REIN?
> ON
```

# :CONFigure:CELLular:SEQuence:RFSettings:TRX

Sequence Table Parameter - TRX Control

## Function

Sets or queries the following items in the specific segment of the sequence table.

- Downlink frequency
- Output Level
- Output signal pattern
- Uplink frequency
- Input level

## Command

```
:CONFigure:CELLular:SEQuence:RFSettings:TRX
<seg>,<ul_freq>,<ref>,<dl_freq>,<level>,<pat>
```

## Query

```
:CONFigure:CELLular:SEQuence:RFSettings:TRX? <seg>
```

## Response

```
<ul_freq>,<ref>,<dl_freq>,<level>,<pat>
```

<ul_freq>, <dl_freq>

| | |
|---|---|
| Unit | MHz |
| Resolution | 0.000001 MHz |

<ref>, <level>

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

## Parameters

| | |
|---|---|
| <seg> | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| <ul_freq> | Uplink frequency |
| Range | 400.000 000 to 3800.000 000 MHz (MU887000A/01A) |
| | 400.000 000 to 6000.000 000 MHz (With MU887000A/01A-001) |
| | 400.000 000 to 6000.000 000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 1950.000000 MHz |
| <ref> | Input level |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |

| | |
|---|---|
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –10.0 dBm |
| <dl_freq> | Downlink frequency |
| Range | 400.000 000 to 3800.000 000 MHz (MU887000A/01A) |
| | 400.000 000 to 6000.000 000 MHz (with MU887000A/01A-001) |
| | 400.000 000 to 6000.000000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 2140.000000 MHz |
| <level> | Output Level |
| Range | |
| MU887000A | 400 MHz ≤ frequency ≤ 3800 MHz |
| | –130.0 to –10.0 dBm (Port 1/Port 2) |
| | –120.0 to 0.0 dBm (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz |
| | –130.0 to –18.0 dBm (Port 1/Port 2) |
| | –120.0 to –8.0 dBm (Port 3/Port 4) |
| MU887001A | 400 MHz ≤ frequency ≤ 3800 MHz |
| | –130.0 to –10.0 dBm (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz |
| | –130.0 to –18.0 dBm (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm (Port 1 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –60.0 dBm |
| <pat> | Waveform pattern |
| PAT1 to PATn | Pattern number (n: waveform information file group range) |
| CW | Modulation turned OFF |
| OFF | Output level turned OFF |
| NC | Waveform pattern not configured in this segment (holds currently configured waveform pattern) |
| Default | CW |

Details

For MU887000A, the setting range varies with the input/output test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss and the setting range of the output level is the range of values with

subtracted cable loss.
If the cable loss is 5 dB and frequency ≤ 3800 MHz, the input and output levels are as follows:
MU887000A Port 1/Port 2 Input level –60.0 to +40.0 dBm
MU887000A Port 1/Port 2 Output level –135.0 to –15.0 dBm
In this case, if the output level is set to –10.0 dBm, an out-of-parameter setting range error occurs. (The response to :SYSTem:ERRor? returns 220, Parameter error).
Whether an out-of-parameter setting range error has occurred is determined during execution of the following commands:
:CONFigure:CELLular:SEQuence:CONTrol, :INITiate:CELLular:MEASurement:SINGle, :INITiate:CELLular:SEQuence:EXECute:TX
A measurement execution error occurs when an out-of-range error occurs.
:FETCh:CELLular:SEQuence:ERRor? is used to query the error details.

The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.
- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

### Example of Use

To set segment 0 as follows.
Uplink frequency set to 1950.0 MHz, input level to –10.0 dBm, downlink frequency to 2140.0 MHz, output level to –60.0 dBm, and no modulation:

```
:CONF:CELL:SEQ:RFS:TRX 0,1950.000000,-10.0,2140.000000,-60.0,CW
:CONF:CELL:SEQ:RFS:TRX? 0
> 1950.000000,-10.0,2140.000000,-60.0,CW
```

### Remarks

The group range is the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

# :CONFigure:CELLular:SEQuence:RFSettings:TX

Sequence Table Parameter - Uplink Frequency, Input Level

## Function

Sets or queries uplink frequency and input level of segments in sequence table.

## Command

```
:CONFigure:CELLular:SEQuence:RFSettings:TX <seg>,<ul_freq>,<ref>
```

## Query

```
:CONFigure:CELLular:SEQuence:RFSettings:TX? <seg>
```

## Response

```
<ul_freq>,<ref>
```

<ul_freq>

| | |
|---|---|
| Unit | MHz |
| Resolution | 0.000001 MHz |

<ref>

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

## Parameters

| | |
|---|---|
| <seg> | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| <ul_freq> | Rx frequency (uplink) |
| Range | 400.000000 to 3800.000000 MHz (MU887000A/01A) |
| | 400.000000 to 6000.000000 MHz (With MU887000A/01A-001) |
| | 400.000000 to 6000.000000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 1950.000000 MHz |
| <ref> | Input level |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |

Default –10.0 dBm

Details

This command sets only the uplink frequency and input level among the parameters that are set by :CONFigure:CELLular:SEQuence:RFSettings:TRX.
For MU887000A, the setting range varies with the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, the MU887000A Port 1/Port 2 setting range is –60.0 to +40.0 dBm.
Whether an out-of-parameter setting range error has occurred is determined during execution of the following commands:
:CONFigure:CELLular:SEQuence:CONTrol, :INITiate:CELLular:MEASurement:SINGle,
:INITiate:CELLular:SEQuence:EXECute:TX

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

Example of Use

To set the parameters for segment 1 as follows:
Uplink frequency: 1950 MHz, Input level: –10.0 dBm

```
:CONF:CELL:SEQ:RFS:TX 1,1950,-10.0
:CONF:CELL:SEQ:RFS:TX? 1
> 1950.000000,-10.0
```

# :CONFigure:CELLular:SEQuence:RXPort

Sequence Table Parameter - SG Output Port

## Function

Specifies the segment number and sets or queries the test port number for outputting RF signals.

## Command

`:CONFigure:CELLular:SEQuence:RXPort <seg>,<port>` MU887000A, MU887001A

`:CONFigure:CELLular:SEQuence:RXPort <seg>,<port>[,<port>,…,<port>]` MU887002A

## Query

`:CONFigure:CELLular:SEQuence:RXPort? <seg>`

## Response

| | |
|---|---|
| <port> | MU887000A, MU887001A |
| <port>[,<port>,…,<port>] | MU887002A |

## Parameters

| | | |
|---|---|---|
| <seg> | Segment number | |
| Range | 0 to 1999 | |
| <port> | Output test port number | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| Default | PORT1 | |

## Details

For MU887000A,
Test Port 3 cannot be set when Test Port 3 is selected for RF signal input test port.
Test Port 4 cannot be set when Test Port 4 is selected for RF signal input test port.

For MU887001A and MU887002A, there are no restrictions as above.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the test port number of segment 5 to Test Port 2:

```
:CONF:CELL:SEQ:RXP 5,PORT2
:CONF:CELL:SEQ:RXP? 5
> PORT2
```

To set the test port number of segment 5 to Test Port 2, Test Port 11, and Test Port 5:

```
:CONF:CELL:SEQ:RXP 5,PORT2,PORT11,PORT5
:CONF:CELL:SEQ:RXP? 5
> PORT2,PORT5,PORT11
```

# :CONFigure:CELLular:SEQuence:SETup

Sequence Table Parameter - Measurement

## Function

Sets or queries the measurement conditions of the specified segment.

## Command

```
:CONFigure:CELLular:SEQuence:SETup <seg>,<mode>,<step>,<mcond>
```

## Query

```
:CONFigure:CELLular:SEQuence:SETup? <seg>
```

## Response

```
<mode>,<step>,<mcond>
```

## Parameters

| | | |
|---|---|---|
| <seg> | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| <mode> | Measurement mode | Required software license |
| TXP | Transmit power measurement mode | MX887010A |
| WCDMA | W-CDMA measurement mode | MX887010A and MX887011A |
| GSM | GSM measurement mode | MX887010A and MX887012A |
| CDMA2K | CDMA2000 1x measurement mode | MX887010A and MX887015A |
| EVDO | CDMA2000 1xEVDO measurement mode | MX887010A and MX887016A |
| TDSCDMA | TD-SCDMA measurement mode | MX887010A and MX887017A |
| LTE | LTE measurement mode | MX887010A and MX887013A<br>or MX887010A and MX887014A |
| NR | NR sub-6GHz measurement mode | MX887010A and MX887018A<br>or MX887010A and MX887019A |
| Default | TXP | |
| <step> | Step count | |
| Range | 2 to 3000 | |
| Resolution | 1 | |
| Default | 2 | |
| <mcond> | Measurement condition number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| Default | 0 | |

## Example of Use

To set the settings for segment 2 as follows:

Measurement mode: NR, Step count: 10, Measurement condition number: 3

```
:CONF:CELL:SEQ:SET 2,NR,10,3
:CONF:CELL:SEQ:SET? 2
> NR,10,3
```

# :CONFigure:CELLular:SEQuence:TABLe

Sequence Control Parameter - Sequence Table

### Function

Sets or queries the number of sequence table to execute.

### Command

```
:CONFigure:CELLular:SEQuence:TABLe <table>
```

### Query

```
:CONFigure:CELLular:SEQuence:TABLe?
```

### Response

```
<table>
```

### Parameters

| | |
|---|---|
| <table> | Sequence table number |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |

### Example of Use

To select the sequence table 1:

```
:CONF:CELL:SEQ:TABL 1
:CONF:CELL:SEQ:TABL?
> 1
```

## :FETCh:CELLular:SEQuence:ERRor?

Sequence Parameter Information - Error Check

### Function

Queries the setting error information of sequence table.

### Query

```
:FETCh:CELLular:SEQuence:ERRor? [<item>]
```

### Response

When nothing is set to <item>:

```
<n>,<err(0)>,…,<err(n-1)>
```

| | | |
|---|---|---|
| <n> | | Number of errors |
| | Range | 0 to 4 |
| <err(n–1)> | | Parameter with error |
| | ILVL | Input level |
| | OLVL | Output level |
| | STEP | Step count |
| | LEN | Capture memory length |

When <item> is ILVL, OLVL, STEP, DLPAT, or PORT:

```
<ns>,<seg(0)>,…,<seg(ns-1)>
```

| | | |
|---|---|---|
| <ns> | | Number of segments with errors |
| | Range | 0 to 2000 |
| <seg(ns–1)> | | Segment number with errors |
| | Range | 0 to 1999 |

When <item> is LEN:

```
<e>,<mem>,<exe>,<set>
```

| | | |
|---|---|---|
| <e> | | Presence of errors |
| | Range | 0 No error, executable |
| | | 1 Errors found, not executable |
| <mem> | | Memory utilization |
| | Range | 0.0 to 100.0% |
| | Resolution | 0.1% |
| <exe> | | Number of segments capable of executing capture in number of configured segments |
| | Range | 0 to 2000 |
| <set> | | Number of segments with capture configured |
| | Range | 0 to 2000 |

When <item> is OLVLNUM, PATNUM, or STDNUM:

```
<e>,<exe>,<set>
```

| | | |
|---|---|---|
| <e> | | Presence of errors |
| | Range | 0 No error, executable |
| | | 1 Errors found, not executable |
| <exe> | | Number of segments capable of executing capture in number of |

| | |
|---|---|
| | configured segments |
| Range | 0 to 2000 |
| <set> | Number of segments with capture configured |
| Range | 0 to 2000 |

If no error is found in the sequence table, the response returns 0.

### Parameters

| | |
|---|---|
| <item> | Parameter in sequence table |
| ILVL | Input level |
| OLVL | Output level |
| STEP | Step count |
| DLPAT | Waveform pattern |
| PORT | Test port |
| LEN | Capture memory length |
| OLVLNUM | Output level change count |
| PATNUM | Waveform pattern change count |
| STDNUM | Measurement mode change count |

### Details

This command can check error presence of input level, output level, step count, and capture memory length.

To query error presence of the following parameters,
use :FETCh:CELLular:SEQuence:ERRor2? command.

Waveform pattern, test port, output level change count, waveform pattern change count, measurement mode change count.

To set parameters for sequence table using the following commands, errors are not checked.

:CONFigure:CELLular:SEQuence:RFSettings:TRX
:CONFigure:CELLular:SEQuence:RFSettings:TX
:CONFigure:CELLular:SEQuence:SETup

### Example of Use

To query the presence of errors:

```
:FETC:CELL:SEQ:ERR?
> 1,ILVL
```

To query the input level setting error information:

```
:FETC:CELL:SEQ:ERR? ILVL
> 2,3,12
```

To query the capture memory error information:

```
:FETC:CELL:SEQ:ERR? LEN
> 0,25.0,20,20
```

Here, the capture memory utilization is 25.0%, so all captures configured in 20 segments are executable.

Remarks

Sequence measurement cannot be started if there are errors.
However, the sequence can be started if segment numbers with errors are excluded from the execution range using the :CONFigure:CELLular:SEQuence:CONTrol command.

# :FETCh:CELLular:SEQuence:ERRor2?

Sequence Parameter Information - Error Check

## Function

Queries setting error information of sequence table.

## Query

```
:FETCh:CELLular:SEQuence:ERRor2? <format>
```

## Response

```
<n>,<err(0)>,…,<err(n-1)>
```

| | |
|---|---|
| <n> | Number of errors |
| Range | 0 to 7 |
| <err(n-1)> | Parameter with errors |
| ILVL | Input level |
| OLVL | Output level |
| STEP | Step count |
| DLPAT | Waveform pattern |
| PORT | Test port |
| LEN | Capture memory length |
| OLVLNUM | Output level change count |
| PATNUM | Waveform pattern change count |
| STDNUM | Measurement mode change count |

If no error is found in the sequence table, the response returns 0.

## Parameters

| | |
|---|---|
| <format> | Format |
| 1 | Error Check 1 |

## Details

Parameter setting errors can be checked up to seven types.
Only one of output level change count, waveform pattern change count, or measurement mode change count has an error. Two or three of them cannot have an error simultaneously.

To set parameters for sequence table using the following commands, errors are not checked.
:CONFigure:CELLular:SEQuence:RXPort
:CONFigure:CELLular:SEQuence:RFSettings:TRX
:CONFigure:CELLular:SEQuence:RFSettings:TX
:CONFigure:CELLular:SEQuence:SETup
To query error details per parameter, use :FETCh:CELLular:SEQuence:ERRor command.

## Example of Use

To query the presence of errors:

```
:FETC:CELL:SEQ:ERR2? 1
> 2,ILVL,DLPAT
```

Remarks

Sequence measurement cannot be started if there are errors.
However, sequence measurement can be started if segment numbers with errors are excluded from the execution range using the :CONFigure:CELLular:SEQuence:CONTrol command.

## :FETCh:CELLular:SEQuence:NR:TX?

All Results

### Function

Queries the Tx measurement result.

### Query

```
:FETCh:CELLular:SEQuence:NR:TX? <seg>,<index>
```

### Response

<result(1)>,…,<result(x)> Tx measurement results. Refer to Details.

### Parameters

| | |
|---|---|
| <seg> | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| <index> | Measurement results index |
| Range | 1 to 6, 102 (Refer to Details.) |
| Resolution | 1 |

### Details

By setting the index, the number and value of the response change as follows. For details of each response refer to 4.2.2 “Fundamental measurement commands”.

<index> = 1 (Tx Power Result + Modulation Analysis Result), Response number = 71

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. Carrier Frequency[Hz]
8. Carrier Frequency Error Avg[ppm]
9. Carrier Frequency Error Avg[Hz]
10. Carrier Frequency Error Max[ppm]
11. Carrier Frequency Error Max[Hz]
12. Carrier Frequency Error Min[ppm]
13. Carrier Frequency Error Min[Hz]
14. Carrier Frequency Error Worst[ppm]
15. Carrier Frequency Error Worst[Hz]
16. EVM Avg [%]
17. EVM Max [%]
18. EVM Min [%]
19. Peak EVM Avg [%]
20. Peak EVM Max [%]
21. Peak EVM Min [%]

22. Reference Signal EVM Avg [%]
23. Reference Signal EVM Max [%]
24. Reference Signal EVM Min [%]
25. Rho Avg
26. Rho Max
27. Rho Min
28. Phase Error Avg [deg]
29. Phase Error Max [deg]
30. Phase Error Min [deg]
31. Magnitude Error Avg [%]
32. Magnitude Error Max [%]
33. Magnitude Error Min [%]
34. Carrier Leakage Avg[dBc]
35. Carrier Leakage Max[dBc]
36. Carrier Leakage Min[dBc]
37. In Band Emission(General) Avg[dB]
38. In Band Emission(General) Max[dB]
39. In Band Emission(General) Min[dB]
40. In Band Emission(Image) Avg[dB]
41. In Band Emission(Image) Max[dB]
42. In Band Emission(Image) Min[dB]
43. In Band Emission(Carrier Leakage) Avg[dB]
44. In Band Emission(Carrier Leakage) Max[dB]
45. In Band Emission(Carrier Leakage) Min[dB]
46. In Band Emission(Measured Item)
47. Spectrum Flatness(>3M(R1+)) Avg[dB]
48. Spectrum Flatness(>3M(R1+)) Max[dB]
49. Spectrum Flatness(>3M(R1+)) Min[dB]
50. Spectrum Flatness(>3M(R1-)) Avg[dB]
51. Spectrum Flatness(>3M(R1-)) Max[dB]
52. Spectrum Flatness(>3M(R1-)) Min[dB]
53. Spectrum Flatness(>3M(RP1)) Avg[dB]
54. Spectrum Flatness(>3M(RP1)) Max[dB]
55. Spectrum Flatness(>3M(RP1)) Min[dB]
56. Spectrum Flatness(<3M(R2+)) Avg[dB]
57. Spectrum Flatness(<3M(R2+)) Max[dB]
58. Spectrum Flatness(<3M(R2+)) Min[dB]
59. Spectrum Flatness(<3M(R2-)) Avg[dB]
60. Spectrum Flatness(<3M(R2-)) Max[dB]
61. Spectrum Flatness(<3M(R2-)) Min[dB]
62. Spectrum Flatness(<3M(RP2)) Avg[dB]
63. Spectrum Flatness(<3M(RP2)) Max[dB]
64. Spectrum Flatness(<3M(RP2)) Min[dB]
65. Spectrum Flatness(RP12) Avg[dB]

66. Spectrum Flatness(RP12) Max[dB]
67. Spectrum Flatness(RP12) Min[dB]
68. Spectrum Flatness(RP21) Avg[dB]
69. Spectrum Flatness(RP21) Max[dB]
70. Spectrum Flatness(RP21) Min[dB]
71. Spectrum Flatness(Measured Item)

<index> = 2 (Tx Power Result + Spectrum Emission Mask Result), Response number = 94

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]
35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]

37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]
40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R1(Upper)[dBm]
60. SEM Detail Freq R1(Upper)[Hz]
61. SEM Detail Level R2(Upper)[dBm]
62. SEM Detail Freq R2(Upper)[Hz]
63. SEM Detail Level R3(Upper)[dBm]
64. SEM Detail Freq R3(Upper)[Hz]
65. SEM Detail Level R4(Upper)[dBm]
66. SEM Detail Freq R4(Upper)[Hz]
67. SEM Detail Level R5(Upper)[dBm]
68. SEM Detail Freq R5(Upper)[Hz]
69. SEM Detail Level R6(Upper)[dBm]
70. SEM Detail Freq R6(Upper)[Hz]
71. SEM Detail Level R7(Upper)[dBm]
72. SEM Detail Freq R7(Upper)[Hz]
73. SEM Detail Level R8(Upper)[dBm]
74. SEM Detail Freq R8(Upper)[Hz]
75. SEM Detail Level R9(Upper)[dBm]
76. SEM Detail Freq R9(Upper)[Hz]
77. SEM Detail Level R10(Upper)[dBm]
78. SEM Detail Freq R10(Upper)[Hz]
79. SEM Detail Level R11(Upper)[dBm]
80. SEM Detail Freq R11(Upper)[Hz]

81. SEM Detail Level R12(Upper)[dBm]
82. SEM Detail Freq R12(Upper)[Hz]
83. SEM Detail Level R13(Upper)[dBm]
84. SEM Detail Freq R13(Upper)[Hz]
85. SEM Detail Level R14(Upper)[dBm]
86. SEM Detail Freq R14(Upper)[Hz]
87. SEM Detail Level R15(Upper)[dBm]
88. SEM Detail Freq R15(Upper)[Hz]
89. SEM Detail Level R16(Upper)[dBm]
90. SEM Detail Freq R16(Upper)[Hz]
91. SEM Detail Level R17(Upper)[dBm]
92. SEM Detail Freq R17(Upper)[Hz]
93. SEM Detail Level R18(Upper)[dBm]
94. SEM Detail Freq R18(Upper)[Hz]

<index> = 3 (Tx Power Result + OBW Result + ACLR Result), Response number = 28

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. Occupied Band Width [Hz]
8. Occupied Band Width Freq (LOWER) [Hz]
9. Occupied Band Width Freq (UPPER) [Hz]
10. Occupied Band Width Freq (CENTER) [Hz]
11. ACLR NR Lower Avg[dB]
12. ACLR NR Upper Avg[dB]
13. ACLR Lower2 Avg[dB]
14. ACLR Lower1 Avg[dB]
15. ACLR Upper1 Avg[dB]
16. ACLR Upper2 Avg[dB]
17. ACLR NR Lower Max[dB]
18. ACLR NR Upper Max[dB]
19. ACLR Lower2 Max[dB]
20. ACLR Lower1 Max[dB]
21. ACLR Upper1 Max[dB]
22. ACLR Upper2 Max[dB]
23. ACLR NR Lower Min[dB]
24. ACLR NR Upper Min[dB]
25. ACLR Lower2 Min[dB]
26. ACLR Lower1 Min[dB]
27. ACLR Upper1 Min[dB]
28. ACLR Upper2 Min[dB]

<index> = 4 (Tx Power Result + Modulation Analysis Result) Response number = 81

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. Carrier Frequency[Hz]
8. Carrier Frequency Error Avg[ppm]
9. Carrier Frequency Error Avg[Hz]
10. Carrier Frequency Error Max[ppm]
11. Carrier Frequency Error Max[Hz]
12. Carrier Frequency Error Min[ppm]
13. Carrier Frequency Error Min[Hz]
14. Carrier Frequency Error Worst[ppm]
15. Carrier Frequency Error Worst[Hz]
16. EVM Avg [%]
17. EVM Max [%]
18. EVM Min [%]
19. Peak EVM Avg [%]
20. Peak EVM Max [%]
21. Peak EVM Min [%]
22. Reference Signal EVM Avg [%]
23. Reference Signal EVM Max [%]
24. Reference Signal EVM Min [%]
25. Rho Avg
26. Rho Max
27. Rho Min
28. Phase Error Avg [deg]
29. Phase Error Max [deg]
30. Phase Error Min [deg]
31. Magnitude Error Avg [%]
32. Magnitude Error Max [%]
33. Magnitude Error Min [%]
34. Carrier Leakage Avg[dBc]
35. Carrier Leakage Max[dBc]
36. Carrier Leakage Min[dBc]
37. In Band Emission(General) Avg[dB]
38. In Band Emission(General) Max[dB]
39. In Band Emission(General) Min[dB]
40. In Band Emission(Image) Avg[dB]
41. In Band Emission(Image) Max[dB]
42. In Band Emission(Image) Min[dB]
43. In Band Emission(Carrier Leakage) Avg[dB]

44. In Band Emission(Carrier Leakage) Max[dB]
45. In Band Emission(Carrier Leakage) Min[dB]
46. In Band Emission(Measured Item)
47. Spectrum Flatness(>3M(R1+)) Avg[dB]
48. Spectrum Flatness(>3M(R1+)) Max[dB]
49. Spectrum Flatness(>3M(R1+)) Min[dB]
50. Spectrum Flatness(>3M(R1-)) Avg[dB]
51. Spectrum Flatness(>3M(R1-)) Max[dB]
52. Spectrum Flatness(>3M(R1-)) Min[dB]
53. Spectrum Flatness(>3M(RP1)) Avg[dB]
54. Spectrum Flatness(>3M(RP1)) Max[dB]
55. Spectrum Flatness(>3M(RP1)) Min[dB]
56. Spectrum Flatness(<3M(R2+)) Avg[dB]
57. Spectrum Flatness(<3M(R2+)) Max[dB]
58. Spectrum Flatness(<3M(R2+)) Min[dB]
59. Spectrum Flatness(<3M(R2-)) Avg[dB]
60. Spectrum Flatness(<3M(R2-)) Max[dB]
61. Spectrum Flatness(<3M(R2-)) Min[dB]
62. Spectrum Flatness(<3M(RP2)) Avg[dB]
63. Spectrum Flatness(<3M(RP2)) Max[dB]
64. Spectrum Flatness(<3M(RP2)) Min[dB]
65. Spectrum Flatness(RP12) Avg[dB]
66. Spectrum Flatness(RP12) Max[dB]
67. Spectrum Flatness(RP12) Min[dB]
68. Spectrum Flatness(RP21) Avg[dB]
69. Spectrum Flatness(RP21) Max[dB]
70. Spectrum Flatness(RP21) Min[dB]
71. Spectrum Flatness(Measured Item)
72. E-UTRA In Band Emission(General) Avg[dB]
73. E-UTRA In Band Emission(General) Max[dB]
74. E-UTRA In Band Emission(General) Min[dB]
75. E-UTRA In Band Emission(Image) Avg[dB]
76. E-UTRA In Band Emission(Image) Max[dB]
77. E-UTRA In Band Emission(Image) Min[dB]
78. E-UTRA In Band Emission(Carrier Leakage) Avg[dB]
79. E-UTRA In Band Emission(Carrier Leakage) Max[dB]
80. E-UTRA In Band Emission(Carrier Leakage) Min[dB]
81. E-UTRA In Band Emission(Measured Item)

<index> = 5 (Tx Power Result + Modulation Analysis Result),
Response number = 92 (with the following list added to the index = 4 list)

82. In Band Emission Judgement
83. In Band Emission Limit (General) [dB]
84. In Band Emission Limit (Image) [dB]

85. In Band Emission Limit (Carrier Leakage) [dB]
86. In Band Emission Margin [dB]
87. E-UTRA In Band Emission Judgement
88. E-UTRA In Band Emission Limit (General) [dB]
89. E-UTRA In Band Emission Limit (Image) [dB]
90. E-UTRA In Band Emission Limit (Carrier Leakage) [dB]
91. E-UTRA In Band Emission Margin [dB]
92. Spectrum Flatness Judgement

<index> = 6 (Tx Power Result + Spectrum Emission Mask Result), Response number = 169

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]

35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]
37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]
40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R19(Lower)[dBm]
60. SEM Detail Freq R19(Lower)[Hz]
61. SEM Detail Level R20(Lower)[dBm]
62. SEM Detail Freq R20(Lower)[Hz]
63. SEM Detail Level R21(Lower)[dBm]
64. SEM Detail Freq R21(Lower)[Hz]
65. SEM Detail Level R22(Lower)[dBm]
66. SEM Detail Freq R22(Lower)[Hz]
67. SEM Detail Level R23(Lower)[dBm]
68. SEM Detail Freq R23(Lower)[Hz]
69. SEM Detail Level R1(Upper)[dBm]
70. SEM Detail Freq R1(Upper)[Hz]
71. SEM Detail Level R2(Upper)[dBm]
72. SEM Detail Freq R2(Upper)[Hz]
73. SEM Detail Level R3(Upper)[dBm]
74. SEM Detail Freq R3(Upper)[Hz]
75. SEM Detail Level R4(Upper)[dBm]
76. SEM Detail Freq R4(Upper)[Hz]
77. SEM Detail Level R5(Upper)[dBm]
78. SEM Detail Freq R5(Upper)[Hz]

79. SEM Detail Level R6(Upper)[dBm]
80. SEM Detail Freq R6(Upper)[Hz]
81. SEM Detail Level R7(Upper)[dBm]
82. SEM Detail Freq R7(Upper)[Hz]
83. SEM Detail Level R8(Upper)[dBm]
84. SEM Detail Freq R8(Upper)[Hz]
85. SEM Detail Level R9(Upper)[dBm]
86. SEM Detail Freq R9(Upper)[Hz]
87. SEM Detail Level R10(Upper)[dBm]
88. SEM Detail Freq R10(Upper)[Hz]
89. SEM Detail Level R11(Upper)[dBm]
90. SEM Detail Freq R11(Upper)[Hz]
91. SEM Detail Level R12(Upper)[dBm]
92. SEM Detail Freq R12(Upper)[Hz]
93. SEM Detail Level R13(Upper)[dBm]
94. SEM Detail Freq R13(Upper)[Hz]
95. SEM Detail Level R14(Upper)[dBm]
96. SEM Detail Freq R14(Upper)[Hz]
97. SEM Detail Level R15(Upper)[dBm]
98. SEM Detail Freq R15(Upper)[Hz]
99. SEM Detail Level R16(Upper)[dBm]
100. SEM Detail Freq R16(Upper)[Hz]
101. SEM Detail Level R17(Upper)[dBm]
102. SEM Detail Freq R17(Upper)[Hz]
103. SEM Detail Level R18(Upper)[dBm]
104. SEM Detail Freq R18(Upper)[Hz]
105. SEM Detail Level R19(Upper)[dBm]
106. SEM Detail Freq R19(Upper)[Hz]
107. SEM Detail Level R20(Upper)[dBm]
108. SEM Detail Freq R20(Upper)[Hz]
109. SEM Detail Level R21(Upper)[dBm]
110. SEM Detail Freq R21(Upper)[Hz]
111. SEM Detail Level R22(Upper)[dBm]
112. SEM Detail Freq R22(Upper)[Hz]
113. SEM Detail Level R23(Upper)[dBm]
114. SEM Detail Freq R23(Upper)[Hz]
115. SEM Margin Level R1(Lower)[dB]
116. SEM Margin Level R2(Lower)[dB]
117. SEM Margin Level R3(Lower)[dB]
118. SEM Margin Level R4(Lower)[dB]
119. SEM Margin Level R1(Upper)[dB]
120. SEM Margin Level R2(Upper)[dB]
121. SEM Margin Level R3(Upper)[dB]
122. SEM Margin Level R4(Upper)[dB]

123. SEM Margin Detail Level R1(Lower)[dB]
124. SEM Margin Detail Level R2(Lower)[dB]
125. SEM Margin Detail Level R3(Lower)[dB]
126. SEM Margin Detail Level R4(Lower)[dB]
127. SEM Margin Detail Level R5(Lower)[dB]
128. SEM Margin Detail Level R6(Lower)[dB]
129. SEM Margin Detail Level R7(Lower)[dB]
130. SEM Margin Detail Level R8(Lower)[dB]
131. SEM Margin Detail Level R9(Lower)[dB]
132. SEM Margin Detail Level R10(Lower)[dB]
133. SEM Margin Detail Level R11(Lower)[dB]
134. SEM Margin Detail Level R12(Lower)[dB]
135. SEM Margin Detail Level R13(Lower)[dB]
136. SEM Margin Detail Level R14(Lower)[dB]
137. SEM Margin Detail Level R15(Lower)[dB]
138. SEM Margin Detail Level R16(Lower)[dB]
139. SEM Margin Detail Level R17(Lower)[dB]
140. SEM Margin Detail Level R18(Lower)[dB]
141. SEM Margin Detail Level R19(Lower)[dB]
142. SEM Margin Detail Level R20(Lower)[dB]
143. SEM Margin Detail Level R21(Lower)[dB]
144. SEM Margin Detail Level R22(Lower)[dB]
145. SEM Margin Detail Level R23(Lower)[dB]
146. SEM Margin Detail Level R1(Upper)[dB]
147. SEM Margin Detail Level R2(Upper)[dB]
148. SEM Margin Detail Level R3(Upper)[dB]
149. SEM Margin Detail Level R4(Upper)[dB]
150. SEM Margin Detail Level R5(Upper)[dB]
151. SEM Margin Detail Level R6(Upper)[dB]
152. SEM Margin Detail Level R7(Upper)[dB]
153. SEM Margin Detail Level R8(Upper)[dB]
154. SEM Margin Detail Level R9(Upper)[dB]
155. SEM Margin Detail Level R10(Upper)[dB]
156. SEM Margin Detail Level R11(Upper)[dB]
157. SEM Margin Detail Level R12(Upper)[dB]
158. SEM Margin Detail Level R13(Upper)[dB]
159. SEM Margin Detail Level R14(Upper)[dB]
160. SEM Margin Detail Level R15(Upper)[dB]
161. SEM Margin Detail Level R16(Upper)[dB]
162. SEM Margin Detail Level R17(Upper)[dB]
163. SEM Margin Detail Level R18(Upper)[dB]
164. SEM Margin Detail Level R19(Upper)[dB]
165. SEM Margin Detail Level R20(Upper)[dB]
166. SEM Margin Detail Level R21(Upper)[dB]

167. SEM Margin Detail Level R22(Upper)[dB]
168. SEM Margin Detail Level R23(Upper)[dB]
169. SEM Template Judgement

<index> = 102 (Tx Power Result + Spectrum Emission Mask Result), Response number = 139

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]
35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]
37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]

40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R1(Upper)[dBm]
60. SEM Detail Freq R1(Upper)[Hz]
61. SEM Detail Level R2(Upper)[dBm]
62. SEM Detail Freq R2(Upper)[Hz]
63. SEM Detail Level R3(Upper)[dBm]
64. SEM Detail Freq R3(Upper)[Hz]
65. SEM Detail Level R4(Upper)[dBm]
66. SEM Detail Freq R4(Upper)[Hz]
67. SEM Detail Level R5(Upper)[dBm]
68. SEM Detail Freq R5(Upper)[Hz]
69. SEM Detail Level R6(Upper)[dBm]
70. SEM Detail Freq R6(Upper)[Hz]
71. SEM Detail Level R7(Upper)[dBm]
72. SEM Detail Freq R7(Upper)[Hz]
73. SEM Detail Level R8(Upper)[dBm]
74. SEM Detail Freq R8(Upper)[Hz]
75. SEM Detail Level R9(Upper)[dBm]
76. SEM Detail Freq R9(Upper)[Hz]
77. SEM Detail Level R10(Upper)[dBm]
78. SEM Detail Freq R10(Upper)[Hz]
79. SEM Detail Level R11(Upper)[dBm]
80. SEM Detail Freq R11(Upper)[Hz]
81. SEM Detail Level R12(Upper)[dBm]
82. SEM Detail Freq R12(Upper)[Hz]
83. SEM Detail Level R13(Upper)[dBm]

84. SEM Detail Freq R13(Upper)[Hz]
85. SEM Detail Level R14(Upper)[dBm]
86. SEM Detail Freq R14(Upper)[Hz]
87. SEM Detail Level R15(Upper)[dBm]
88. SEM Detail Freq R15(Upper)[Hz]
89. SEM Detail Level R16(Upper)[dBm]
90. SEM Detail Freq R16(Upper)[Hz]
91. SEM Detail Level R17(Upper)[dBm]
92. SEM Detail Freq R17(Upper)[Hz]
93. SEM Detail Level R18(Upper)[dBm]
94. SEM Detail Freq R18(Upper)[Hz]
95. SEM Margin Level R1(Lower)[dB]
96. SEM Margin Level R2(Lower)[dB]
97. SEM Margin Level R3(Lower)[dB]
98. SEM Margin Level R4(Lower)[dB]
99. SEM Margin Level R1(Upper)[dB]
100. SEM Margin Level R2(Upper)[dB]
101. SEM Margin Level R3(Upper)[dB]
102. SEM Margin Level R4(Upper)[dB]
103. SEM Margin Detail Level R1(Lower)[dB]
104. SEM Margin Detail Level R2(Lower)[dB]
105. SEM Margin Detail Level R3(Lower)[dB]
106. SEM Margin Detail Level R4(Lower)[dB]
107. SEM Margin Detail Level R5(Lower)[dB]
108. SEM Margin Detail Level R6(Lower)[dB]
109. SEM Margin Detail Level R7(Lower)[dB]
110. SEM Margin Detail Level R8(Lower)[dB]
111. SEM Margin Detail Level R9(Lower)[dB]
112. SEM Margin Detail Level R10(Lower)[dB]
11. SEM Margin Detail Level R11(Lower)[dB]
114. SEM Margin Detail Level R12(Lower)[dB]
115. SEM Margin Detail Level R13(Lower)[dB]
116. SEM Margin Detail Level R14(Lower)[dB]
117. SEM Margin Detail Level R15(Lower)[dB]
118. SEM Margin Detail Level R16(Lower)[dB]
119. SEM Margin Detail Level R17(Lower)[dB]
120. SEM Margin Detail Level R18(Lower)[dB]
121. SEM Margin Detail Level R1(Upper)[dB]
122. SEM Margin Detail Level R2(Upper)[dB]
123. SEM Margin Detail Level R3(Upper)[dB]
124. SEM Margin Detail Level R4(Upper)[dB]
125. SEM Margin Detail Level R5(Upper)[dB]
126. SEM Margin Detail Level R6(Upper)[dB]
127. SEM Margin Detail Level R7(Upper)[dB]

128. SEM Margin Detail Level R8(Upper)[dB]
129. SEM Margin Detail Level R9(Upper)[dB]
130. SEM Margin Detail Level R10(Upper)[dB]
131. SEM Margin Detail Level R11(Upper)[dB]
132. SEM Margin Detail Level R12(Upper)[dB]
133. SEM Margin Detail Level R13(Upper)[dB]
134. SEM Margin Detail Level R14(Upper)[dB]
135. SEM Margin Detail Level R15(Upper)[dB]
136. SEM Margin Detail Level R16(Upper)[dB]
137. SEM Margin Detail Level R17(Upper)[dB]
138. SEM Margin Detail Level R18(Upper)[dB]
139. SEM Template Judgement

Example of Use

To query the Tx measurement results for segment 0, index 1:

```
:FETC:CELL:SEQ:NR:TX? 0,1
> -20.00,-19.55,-20.06,…,0.04,2
```

# :FETCh:CELLular:SEQuence:PROGress?

Sequence Progress

## Function

Queries the progress ratio and the executing sequence number.

## Query

```
:FETCh:CELLular:SEQuence:PROGress?
```

## Response

```
<p>,<cur>,<start>,<stop>
```

| | |
|---|---|
| <p> | Progress ratio in Sequence Measurement mode |
| Range | 0 to 100% |
| <cur> | Current segment number being executed |
| Range | 0 to 1999 |
| <start> | First segment number |
| Range | 0 to 1999 |
| <stop> | Last segment number |
| Range | 0 to 1999 |

## Example of Use

To query the progress ratio and the executing sequence number in Sequence Measurement mode:

```
:FETC:CELL:SEQ:PROG?
> 65,23,11,30
```

## Remarks

The first and last segment numbers are the same as the start and end segment numbers specified using the :CONFigure:CELLular:SEQuence:CONTrol command.

# :FETCh:CELLular:SEQuence:SEG:STATe?

Specified Segment Status

## Function

Queries the measurement status of the specified segment.

## Query

```
:FETCh:CELLular:SEQuence:SEG:STATe? <seg>
```

## Response

| <stat> | Segment status |
|---|---|
| 0 | Measurement completed successfully |
| 2 | Over level |
| 3 | Under level |
| 4 | Measurement failed |
| 5 | Synchronization word not detected |
| 9 | Measurement in progress or not measured |
| 10 | Segment not measured |
| 12 | Tx measurement timeout |

The value received from MX887018A/19A is 0, 2, 5, 9, 10, or 12.

## Parameters

| <seg> | Segment number |
|---|---|
| Range | 0 to 1999 |

## Example of Use

To query the measurement status of segment 16:

```
:FETC:CELL:SEQ:SEG:STAT? 16
> 0
```

# :FETCh:CELLular:SEQuence:STATe?

Sequence Measurement Status

## Function

Queries the status of sequence measurement.

## Query

```
:FETCh:CELLular:SEQuence:STATe?
```

## Response

```
<m_status>,<n>,<s(0)>,<s(1)>,…,<s(n-1)>
```

| | | |
|---|---|---|
| <m_status> | | Measurement execution status |
| | 0 | Measurement completed successfully |
| | 2 | Over level |
| | 3 | Under level |
| | 4 | Measurement failed |
| | 5 | Synchronization word not detected |
| | 9 | Measurement in progress or not measured |
| | 12 | Tx measurement timeout |
| | The value received from MX887018A/19A is 0, 2, 5, 9, or 12. | |
| <n> | | Number of measured segments |
| | Range | 0 to 2000 |
| <s(n–1)> | | Measurement status of specified segment |
| | 0 | Measurement completed successfully |
| | 2 | Over level |
| | 3 | Under level |
| | 4 | Measurement failed |
| | 5 | Synchronization word not detected |
| | 9 | Measurement in progress or not measured |
| | 10 | Segment not measured |
| | 12 | Tx measurement timeout |
| | The value received from MX887018A/19A is 0, 2, 5, 9, or 12. | |

## Example of Use

To query the status of sequence measurement:

```
:FETC:CELL:SEQ:STAT?
> 2,6,0,0,0,0,2,0
```

The results shows that six segments are measured segments and the fifth segment is over level.

## Related Commands

:FETCh:CELLular:MEASurement:STATe
:FETCh:CELLular:SEQuence:SEG:STATe

## :INITiate:CELLular:SEQuence:EXECute:TX

Start Signal Analyzer Measurement Only

### Function

Sets only the parameters for the specified measurement and executes measurement, without affecting the signal transmission parameters.

### Command

```
:INITiate:CELLular:SEQuence:EXECute:TX
```

## :TRIGger:CELLular:MEASurement:TOUT

Trigger Timeout

### Function

Sets or queries the trigger timeout.

### Command

```
:TRIGger:CELLular:MEASurement:TOUT <time>
```

### Query

```
:TRIGger:CELLular:MEASurement:TOUT?
```

### Response

<time>

| | |
|---|---|
| Unit | s |
| Resolution | 1 s |

### Parameters

| | |
|---|---|
| <time> | Timeout time |
| Range | 1 to 60 s |
| Resolution | 1 s |
| Suffix code | NS, US, MS, S (uses s when omitted) |
| Default | 10 s |

### Example of Use

To set the Trigger timeout to 10 seconds:

```
:TRIG:CELL:MEAS:TOUT 10
:TRIG:CELL:MEAS:TOUT?
> 10
```

# :TRIGger:CELLular:SEQuence

Sequence Table Parameter - Trigger

### Function

Sets or queries the trigger condition for starting Sequence Measurement.

### Command

```
:TRIGger:CELLular:SEQuence <seg>,<src>,<slope>,<level>,<delay>
```

### Query

```
:TRIGger:CELLular:SEQuence? <seg>
```

### Response

```
<src>,<slope>,<level>,<delay>
```

### Parameters

| | |
|---|---|
| <seg> | Segment number |
| Range | 0 to 1999 |
| <src> | Trigger source |
| FRAME | Frame |
| FREERUN | Free run |
| PWR | Input signal power |
| Default | FREERUN |
| <slope> | Trigger slope |
| RISE | Rising edge trigger |
| Default | RISE |
| <level> | Trigger level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB (uses dB when omitted) |
| Default | –30 dB |
| <delay> | Delay time |
| Range | 0 to 1000.000 ms |
| Resolution | 0.001 ms |
| Suffix code | NS, US, MS, S (uses ms when omitted) |
| Default | 0.000 ms |

### Details

The trigger slope and trigger level are enabled when trigger source is set to PWR.

### Example of Use

To set the trigger condition of segment 2 as follows: Trigger source: PWR, Trigger slope: RISE, Trigger level: –30 dB, Delay time: 0

```
:TRIG:CELL:SEQ 2,PWR,RISE,-30,0
:TRIG:CELL:SEQ? 2
> PWR,RISE,-30,0.000
```

Remarks

Trigger level is defined as the level difference from the input level specified by the following commands:
:CONFigure:CELLular:MEASurement:RFSettings:LEVel
:CONFigure:CELLular:SEQuence:RFSettings:TRX

# :TRIGger:CELLular:SEQuence:EXTension

Sequence Table Parameter - Trigger

## Function

Sets or queries the trigger condition for starting Sequence Measurement. (for functional extensions)

## Command

```
:TRIGger:CELLular:SEQuence:EXTension
<seg>,<index>,<src>,<slope>,<level>,<delay>,<mgap>
```

## Query

```
:TRIGger:CELLular:SEQuence:EXTension? <seg>,<index>
```

## Response

```
<src>,<slope>,<level>,<delay>,<mgap>
```

## Parameters

| | |
|---|---|
| <seg> | Segment number |
| Range | 0 to 1999 |
| <index> | Index number |
| Range | 1 (Fixed) |
| <src> | Trigger source |
| FRAME | Frame |
| FREERUN | Free run |
| PWR | Input signal power |
| Default | FREERUN |
| <slope> | Trigger slope |
| RISE | Rising edge trigger |
| Default | RISE |
| <level> | Trigger level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB (uses dB when omitted) |
| Default | –30 dB |
| <delay> | Delay time |
| Range | 0 to 1000.000 ms |
| Resolution | 0.001 ms |
| Suffix code | NS, US, MS, S (uses ms when omitted) |
| Default | 0.000 ms |
| <mgap> | Minimum Trigger Gap |
| Range | 0 to 80.0 ms |
| Resolution | 0.1 ms |
| Suffix code | S MS US NS (uses ms when omitted) |
| Default | 0.0 ms |
| Unit | ms |

Details

The trigger slope, trigger level and Minimum Trigger Gap are enabled when trigger source is set to PWR.

Example of Use

To set the trigger condition of segment 2 as follows: Trigger source: PWR, Trigger slope: RISE, Trigger level: –30 dB, Delay time: 0, Minimum Trigger Gap: 0.0

```
:TRIG:CELL:SEQ:EXT 2,1,PWR,RISE,-30,0,0.0
:TRIG:CELL:SEQ:EXT? 2,1
> PWR,RISE,-30,0.000,0.0
```

Remarks

Trigger level is defined as the level difference from the input level specified by the following commands:
:CONFigure:CELLular:MEASurement:RFSettings:LEVel
:CONFigure:CELLular:SEQuence:RFSettings:TRX

# Chapter 5 Native Command Reference

This chapter describes the details of Native commands.
To switch to the Native command mode, send the command SYST:LANG NAT.


5.1 List of Commands ..... 5-2
5.1.1 Common commands ..... 5-3
5.1.2 Fundamental measurement commands ..... 5-5
5.1.3 Sequence measurement commands ..... 5-20
5.2 Details of Commands ..... 5-26
5.2.1 Common commands ..... 5-27
5.2.2 Fundamental measurement commands ..... 5-42
5.2.3 Sequence measurement commands ..... 5-158

# 5.1 List of Commands

The following table shows the rules for describing messages.

| | |
|---|---|
| [ ] | Messages or parameters in square brackets can be omitted. |
| \| | Choose one of several choices.<br>A\|B\|C\|D indicates a choice of A, B, C, and D. |
| { } | Curly brackets are used to group options.<br>For A\|B({C\|D}), choose A, B(C), or B(D). |

## 5.1.1 Common commands

Common

| Function | Command | Query | Response |
|---|---|---|---|
| Standard Select | STDSEL std | STDSEL? | std |
| Set Connect Port Direction | PORT input,output[,output,…,output] | PORT? | input,output[,output,…,output] |

Measurement

| Function | Command | Query | Response |
|---|---|---|---|
| Measurement Stop | MEASSTOP | ----- | ----- |
| Measurement Status | ----- | MSTAT | m_status |
| Tx Measurement Status | ----- | TXMSTAT? | m_status |
| Measurement Start | SNGLS | ----- | ----- |
| Measurement Start (Synchronization) | SWP | SWP? | status |
| End Event Status (Measurement) Register Query | ----- | ESR2? | register |
| Error Event Status (Measurement) Register Query | ----- | ESR3? | register |

Common Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| Output Level On/Off | LVL on_off | LVL? | on_off |
| Output Signal Modulation | MOD on_off | MOD? | on_off |
| Waveform File Select | PACKAGE pac | PACKAGE? | pac |
| Waveform Pattern Select | DLPAT pat | DLPAT? | pat |
| Waveform Pattern Select (SYNC) | DLPAT_SYNC pat | DLPAT_SYNC? | pat |

System

| Function | Command | Query | Response |
|---|---|---|---|
| Application Select | SYSSEL app | SYSSEL? | app |
| Language Selection of Remote Command | SYST:LANG mode | SYST:LANG? | mode |

## 5.1.2 Fundamental measurement commands

Common Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| UL Channel Bandwidth | ULBANDWIDTH [cc,]ch_bw | BANDWIDTH? [cc] | ch_bw |
| Uplink Channel | ULCHAN [cc,]ul_ch | ULCHAN? [cc] | ul_ch |
| Uplink Frequency | ULFREQ [cc,]ul_freq<br>TXFREQ [cc,]ul_freq | ULFREQ? [cc]<br>TXFREQ? [cc] | ul_freq |
| Downlink Channel | DLCHAN [cc,]dl_ch | DLCHAN? [cc] | dl_ch |
| Downlink Frequency | DLFREQ [cc,]dl_freq<br>RXFREQ [cc,]dl_freq | DLFREQ? [cc]<br>RXFREQ? [cc] | dl_freq |
| Operation Band | BAND [cc,]band | BAND? [cc] | band |
| Input Level | ILVL [cc,]level | ILVL? [cc] | Input Level |
| Output Level (Cell Total) | OLVL level | OLVL? | level |

NR sub-6GHz Settings

| Function | Command | Query | Response |
|---|---|---|---|
| Frame Structure | FRAMETYPE [cc,]mode | FRAMETYPE? [cc] | mode |
| Frequency Range | FREQRANGE [cc,]fr | FREQRANGE? [cc] | fr |
| UL Subcarrier Spacing | ULSCS [cc,]scs | ULSCS? [cc] | scs |
| Cell ID | CELLID [cc,]id | CELLID? [cc] | id |
| DL/UL Periodicity | DLULPERIOD[cc,]periodicity | DLULPERIOD? [cc] | periodicity |
| UL Duration | ULDURATION [cc,]duration | ULDURATION? [cc] | duration |
| RMC Configuration | CHCONFIG val | CHCONFIG? | val |
| UL RMC Waveform | ULWAVEFORM [cc,]wave | ULWAVEFORM? [cc] | wave |
| UL RMC Number of RBs | ULRMC_RB [cc,]ul_rmc_rb | ULRMC_RB? [cc] | ul_rmc_rb |
| UL RMC Starting RB | ULRB_START [cc,]ulrb | ULRB_START? [cc] | ulrb |
| UL RMC Modulation | ULRMC_MOD [cc,]ul_rmc_mod | ULRMC_MOD? [cc] | ul_rmc_mod |
| PUSCH mapping type | ULMAPPINGTYPE [cc,]mappingtype | ULMAPPINGTYPE? [cc] | mappingtype |

NR sub-6GHz Settings (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| DMRS Duration | ULDMRSDURATION [cc,]symbol | ULDMRSDURATION? [cc] | symbol |
| Antenna port | ULDMRSPORT [cc,]port | ULDMRSPORT? [cc] | port |
| DMRS add pos | ULDMRSADDPOS [cc,]rspos | ULDMRSADDPOS? [cc] | rspos |
| DMRS typeA pos | ULDMRSTYPEAPOS [cc,]pos | ULDMRSTYPEAPOS? [cc] | pos |
| UL DMRS Config Type | ULDMRSTYPE [cc,]type | ULDMRSTYPE? [cc] | type |
| Group Hopping | GROUPHOPPING [cc,]type | GROUPHOPPING? [cc] | type |
| Sequence Hopping | SEQUENCEHOPPING [cc,]type | SEQUENCEHOPPING? [cc] | type |
| Pre Phase Correction | PREPHASECORR on_off | PREPHASECORR? | on_off |
| Trigger Source | TRGSRC source | TRGSRC? | source |
| Trigger Level | TRGLVL level | TRGLVL? | level |
| Trigger Delay | TRGDLY delay | TRGDLY? | delay |
| Trigger Timeout | TRGTOUT time | TRGTOUT? | time |
| Minimum Trigger Gap | TRGMGAP time | TRGMGAP? | time |
| Measurement Offset | MEASOFFSET time | MEASOFFSET? | time |

NR sub-6GHz Settings (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| RAN Operation | RANOP ranop_type | RANOP? | ranop_type |
| EN-DC Measurement Mode | ENDCMEASMODE endc_mode | ENDCMEASMODE? | endc_mode |
| E-UTRA UL Channel Bandwidth | ULBANDWIDTH_EUTRA [cc,]eutra_bw | ULBANDWIDTH_EUTRA? [cc] | eutra_bw |
| E-UTRA UL Number of RBs | ULRMC_RB_EUTRA [cc,]eutra_nrb | ULRMC_RB_EUTRA? [cc] | eutra_nrb |
| E-UTRA UL Starting RB | ULRB_START_EUTRA [cc,]eutra_start | ULRB_START_EUTRA? [cc] | eutra_start |
| E-UTRA Frame Structure | FRAMETYPE_EUTRA [cc,]eutra_frametype | FRAMETYPE_EUTRA? [cc] | eutra_frametype |
| E-UTRA Group Hopping | GROUPHOPPING_EUTRA [cc,]eutra_grouphop | GROUPHOPPING_EUTRA? [cc] | eutra_grouphop |
| E-UTRA Cyclic shift | CSHIFT_EUTRA [cc,]eutra_cshift | CSHIFT_EUTRA? [cc] | eutra_cshift |
| E-UTRA Cell ID | CELLID_EUTRA [cc,]eutra_cellid | CELLID_EUTRA? [cc] | eutra_cellid |
| E-UTRA Delta SS | DELTASS_EUTRA [cc,]eutra_dss | DELTASS_EUTRA? [cc] | eutra_dss |
| E-UTRA Uplink Channel | ULCHAN_EUTRA [cc,]ulchan | ULCHAN_EUTRA? [cc] | ulchan |
| E-UTRA Uplink Frequency | ULFREQ_EUTRA [cc,]ulfreq | ULFREQ_EUTRA? [cc] | ulfreq |

Fundamental Measurement Parameters

| Function | Command | Query | Response |
|---|---|---|---|
| All Measurement Items Off | ALLMEASITEMS_OFF | ---- | ---- |
| Power Measurement On/Off and Meas. Count | PWR_SET on_off[,avg_count] | PWR_SET? | on_off,avg_count |
| OBW On/Off and Meas. Count | OBW_SET on_off[,avg_count] | OBW_SET? | on_off,avg_count |
| SEM On/Off and Meas. Count | SEM_SET on_off[,avg_count] | SEM_SET? | on_off,avg_count |
| ACLR On/Off and Meas. Count | ACLR_SET on_off[,avg_count] | ACLR_SET? | on_off,avg_count |
| Modulation Analysis On/Off and Meas. Count | MOD_SET on_off[,avg_count] | MOD_SET? | on_off,avg_count |

Result (Power Measurement, Occupied Bandwidth)

| Function | Command | Query | Response |
|---|---|---|---|
| Tx Power Result | ---- | POWER? [mode] | pwr mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,pwr(1),pwr(2),…,pwr(s) mode = IND<br>AVG when mode is omitted |
| Channel Power Result | ---- | CHPWR? [mode] | pwr mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,pwr(1),pwr(2),…,pwr(s) mode = IND<br>AVG when mode is omitted |
| OBW Result | ---- | OBW? | bw |
| OBW Frequency Result | ---- | OBWFREQ? pos | freq |

Result (Spectrum Emission Mask)

| Function | Command | Query | Response |
|---|---|---|---|
| SEM Worst Value | ---- | WORST_SEM_LV? range | level,freq |
| SEM Worst Value (All range) | ---- | TTL_WORST_SEM_LV? | level(-1),freq(-1),…,level(-4),freq(-4),<br>level(1),freq(1),…,level(4),freq(4) |
| SEM Worst Value (Detail) | ---- | WORST_SEM_DET_LV? range | level,freq |
| SEM Worst Value<br>(Detail) (All range) | ---- | TTL_WORST_SEM_DET_LV? | level(-1),freq(-1),…,level(-23),freq(-23)<br>,level(1),freq(1),…,level(23),freq(23) |
| SEM Mask Margin | ---- | WORST_SEM? range | margin,freq |
| SEM Mask Margin (All range) | ---- | TTL_WORST_SEM? | margin(-1),freq(-1),…,margin(-4),freq(-4)<br>,margin(1),freq(1),…,margin(4),freq(4) |
| SEM Mask Margin (Detail) | ---- | WORST_SEM_DET? range | margin,freq |
| SEM Mask Margin<br>(Detail) (All range) | ---- | TTL_WORST_SEM_DET? | margin(-1),freq(-1),…,margin(-23),freq(-2<br>3),margin(1),freq(1),…,margin(23),freq(23<br>) |
| SEM Template Judgement | ---- | SEMPASS? | judge |

Result (Adjacent Channel Leakage Power Ratio)

| Function | Command | Query | Response |
|---|---|---|---|
| ACLR Result | ---- | ACLR? [mode] | aclr(NR_LOW),aclr(NR_UP),aclr(LOW2),<br>aclr(LOW1),aclr(UP1),aclr(UP2)<br>mode = AVG,MAX,MIN,DVT<br>avg(NR_LOW),avg(NR_UP),avg(LOW2),<br>avg(LOW1),avg(UP1),avg(UP2),<br>max(NR_LOW),max(NR_UP),max(LOW2),<br>max(LOW1),max(UP1),max(UP2),<br>min(NR_LOW),min(NR_UP),min(LOW2),<br>min(LOW1),min(UP1),min(UP2),<br>mode = TTL |

Result (Modulation Analysis)

| Function | Command | Query | Response |
|---|---|---|---|
| Carrier Frequency Result | ---- | CARRF? [mode] | freq<br>AVG when mode is omitted. |
| Carrier Frequency Error Result | ---- | CFERR? [mode] | freq_ppm,freq_Hz<br>mode = AVG,MAX,MIN,DVT<br>avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz<br>mode = TTL<br>Worst value when mode is omitted. |
| Worst Carrier Frequency Error Result | ---- | WORST_CARRFERR? unit | cferr |
| | | CFERR_WORST? | freq_ppm,freq_Hz |
| EVM Result | ---- | EVM? [mode] | evm mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,evm(1),…,evm[s] mode = IND<br>AVG when mode is omitted. |

Result (Modulation Analysis) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Peak EVM Result | ---- | PVECTERR? [mode] | pevm mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>AVG when mode is omitted |
| Reference Signal EVM Result | ---- | RSEVM? [mode] | rsevm mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,rsevm(1),…,rsevm[s] mode = IND<br>AVG when mode is omitted |
| Rho Result | ---- | RHO? [mode] | rho mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>AVG when mode is omitted |
| Phase Error Result | ---- | PHASEERR? [mode] | phase mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>AVG when mode is omitted |
| Magnitude Error Result | ---- | MAGTDERR? [mode] | magnitude mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>AVG when mode is omitted |
| Carrier Leakage Result | ---- | CARRLEAK? [mode] | cleakage mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>AVG when mode is omitted |

Result (In-band emissions for non allocated RB)

| Function | Command | Query | Response |
|---|---|---|---|
| In-Band Emissions Measured Item | ---- | INBANDEITEM? | flag |
| In-Band Emissions (General) Result | ---- | INBANDE_GEN? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>AVG when mode is omitted |
| In-Band Emissions (IQ Image) Result | ---- | INBANDE_IMG? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>AVG when mode is omitted |
| In-Band Emissions (Carrier Leakage) Result | ---- | INBANDE_LEAK? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>MAX when mode is omitted |
| E-UTRA In-Band Emissions (General) Result | ---- | INBANDE_GEN_EUTRA? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>MAX when mode is omitted |
| E-UTRA In-Band Emissions (IQ Image) Result | ---- | INBANDE_IMG_EUTRA? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>MAX when mode is omitted |
| E-UTRA In-Band Emissions (Carrier Leakage) Result | ---- | INBANDE_LEAK_EUTRA? [mode] | ibe mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,ibe(1),…,ibe(s) mode = IND<br>MAX when mode is omitted |

Result (In-band emissions for non allocated RB)

| Function | Command | Query | Response |
|---|---|---|---|
| E-UTRA In-Band Emissions Measured Item | ---- | INBANDEITEM_EUTRA? | flag |
| In-Band Emissions Judgement | ---- | INBANDEPASS? | judge |
| In-Band Emissions (General) limit | ---- | INBANDE_GENUL? | level |
| In-Band Emissions (IQ Image) limit | ---- | INBANDE_IMGUL? | level |
| In-Band Emissions (Carrier Leakage) limit | ---- | INBANDE_LEAKUL? | level |
| In-Band Emission margin | ---- | INBANDE_MARG? | margin |
| E-UTRA In-Band Emissions Judgement | ---- | INBANDEPASS_EUTRA? | judge |
| E-UTRA In-Band Emissions (General) limit | ---- | INBANDE_GENUL_EUTRA? | level |
| E-UTRA In-Band Emissions (IQ Image) limit | ---- | INBANDE_IMGUL_EUTRA? | level |
| E-UTRA In-Band Emissions (Carrier Leakage) limit | ---- | INBANDE_LEAKUL_EUTRA? | level |
| E-UTRA In-Band Emission margin | ---- | INBANDE_MARG_EUTRA? | margin |

Result (Spectrum flatness)

| Function | Command | Query | Response |
|---|---|---|---|
| Spectrum Flatness Measured Item | ---- | SPECFLATITEM? | flag |
| Spectrum Flatness Judgement | ---- | SPECFLATPPPASS? | judge |
| Spectrum Flatness (≥ 3 MHz (RP1)) Result | ---- | SPECFLAT_RP1? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,sflatness(1),…,sflatness(s)<br>mode = IND<br>MAX when mode is omitted |
| Spectrum Flatness (RP12) Result | ---- | SPECFLAT_RP12? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,sflatness(1),…,sflatness(s)<br>mode = IND<br>MAX when mode is omitted |
| Spectrum Flatness (< 3 MHz (RP2)) Result | ---- | SPECFLAT_RP2? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,sflatness(1),…,sflatness(s)<br>mode = IND<br>MAX when mode is omitted |
| Spectrum Flatness (RP21) Result | ---- | SPECFLAT_RP21? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>s,sflatness(1),…,sflatness(s)<br>mode = IND<br>MAX when mode is omitted |

Result (Spectrum flatness) (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Spectrum Flatness<br>(≥ 3 MHz (R1 –)) Result | ---- | SPECFLAT1_M? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>MIN when mode is omitted |
| Spectrum Flatness<br>(≥ 3 MHz (R1 +)) Result | ---- | SPECFLAT1_P? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>MAX when mode is omitted |
| Spectrum Flatness<br>(< 3 MHz (R2 –)) Result | ---- | SPECFLAT2_M? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>MIN when mode is omitted |
| Spectrum Flatness<br>(< 3 MHz (R2 +)) Result | ---- | SPECFLAT2_P? [mode] | sflatness mode = AVG,MAX,MIN,DVT<br>avg,max,min mode = TTL<br>MAX when mode is omitted |
| Spectrum Flatness<br>(RP Total) Result | ---- | SPECFLAT_RP? [mode] | sflat(RP1),sflat(RP2),sflat(RP12),sflat(RP21)<br>mode = AVG,MAX,MIN,DVT<br>avg(RP1),avg(RP2),avg(RP12),avg(RP21),<br>max(RP1),max(RP2),max(RP12),max(RP21),<br>min(RP1),min(RP2),min(RP12),min(RP21)<br>mode = TTL<br>s,sflat(RP1)(1),sflat(RP2)(1),sflat(RP12)(1),sflat(RP21)(1),…,sflat(RP1)(s),sflat(RP2)(s),sflat(RP12)(s),sflat(RP21)(s)<br>mode = IND<br>MAX when mode is omitted |

Result (All)

| Function | Command | Query | Response |
|---|---|---|---|
| All Results | ---- | TXMEASRESULT? index | result(1),result(2),…,result(x)<br>When index = 1: x = 71<br>When index = 2: x = 94<br>When index = 3: x = 28<br>When index = 4: x = 81<br>When index = 5: x = 92<br>When index = 6: x = 169<br>When index = 102: x = 139 |

Result (Waveform)

| Function | Command | Query | Response |
|---|---|---|---|
| Waveform | ---- | WAVEFMEAS? format,position,length[,symbol] | data(1),…,data(length) |

## 5.1.3 Sequence measurement commands

Common Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| Input Level | ILVL level | ILVL? | level |
| Output Level | OLVL level | OLVL? | level |
| Downlink Frequency | RXFREQ dl_freq<br>DLFREQ dl_freq | RXFREQ?<br>DLFREQ? | dl_freq |
| Uplink Frequency | TXFREQ ul_freq<br>ULFREQ ul_freq | TXFREQ?<br>ULFREQ? | ul_freq |

Sequence Measurement

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Measurement Status | ----- | SEQMSTAT? | m_status,n,s(0),s(1),…,s(n-1) |
| Sequence Progress | ----- | SEQPROGRESS? | p,cur,start,end |
| Specified Segment Status | ----- | SEQSEGSTAT? seg | stat |

Sequence Control Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Control Parameter - Sequence Control | SEQCTRL start,end | SEQCTRL? | start,end |
| | SEQCTRLTX start,end | SEQCTRLTX? | start,end |
| Start Signal Analyzer Measurement Only | SEQEXECTX | ----- | ----- |
| Sequence Control Parameter - Sequence End State Reinitialization | SEQREINIT sw | SEQREINIT? | sw |
| Sequence Control Parameter - Sequence Table | SEQTBL table | SEQTBL? | table |
| Trigger Timeout | TRGTOUT time | TRGTOUT? | time |

Sequence Parameter Information

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Parameter Information - Error Check | ----- | SEQERR? [item] | {n,err(0),err(1),…,err(n-1)}\|{ns,seg(0),seg(1),…,seg(ns-1)}\|{e,mem,exe,set} |
| | ----- | SEQERR2? format | n,err(0),…,err(n-1) |

Sequence Table Parameter

| Function | Command | Query | Response |
|---|---|---|---|
| Sequence Table Parameter - SG Output Port | SEQSGPORT seg,port[,port,…,port] | SEQSGPORT? seg | port[,port,…,port] |
| Sequence Table Parameter - SA Input Port | SEQSAPORT seg,port | SEQSAPORT? seg | port |
| Sequence Table Parameter - Measurement | SEQMEAS seg,mode,step,mcond | SEQMEAS? seg | mode,step,mcond |
| Sequence Table Parameter - Trigger | SEQTRG seg,src,slope,level,delay | SEQTRG? seg | src,slope,level,delay |
| Sequence Table Parameter - Trigger | SEQTRGEXT seg,index,src,slope,level,delay,mgap | SEQTRGEXT? seg,index | src,slope,level,delay,mgap |
| Sequence Table Parameter - TRX Control | SEQTRX seg,ul_freq,ref,dl_freq,level,pat | SEQTRX? seg | ul_freq,ref,dl_freq,level,pat |
| Sequence Table Parameter - Uplink Frequency, Input Level | SEQTX seg,ul_freq,ref | SEQTX? seg | ul_freq,ref |

| Function | Command | Query | Response |
|---|---|---|---|
| NR Parameter | When index = 1:<br>NR_SETUP mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal<br>When index = 2:<br>NR_SETUP mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal<br>When index = 3:<br>NR_SETUP mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal,ranop_type,endc_mode,eutra_ulfreq,eutra_bw,eutra_nrb,eutra_start,eutra_frametype,eutra_grouphop,eutra_cshift,eutra_cellid,eutra_dss | NR_SETUP? mcond,[cc,]index | When index = 1:<br>band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal<br>When index = 2:<br>band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal<br>When index = 3:<br>band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal,ranop_type,endc_mode,eutra_ulfreq,eutra_bw,eutra_nrb,eutra_start,eutra_frametype,eutra_grouphop,eutra_cshift,eutra_cellid,eutra_dss |

Measurement Condition Parameter (Cont'd)

| Function | Command | Query | Response |
|---|---|---|---|
| Turn Off All Measurement Items | NR_MEAS_OFF mcond | ----- | ----- |
| Measurement Enable and Count | NR_MEAS mcond,PWRonoff,PWRcount,MODonoff,MODcount,OBWonoff,OBWcount,SEMonoff,SEMcount,ACLRonoff,ACLRcount | NR_MEAS? mcond | PWRonoff,PWRcount,MODonoff,MODcount,OBWonoff,OBWcount,SEMonoff,SEMcount,ACLRonoff,ACLRcount |

Result

| Function | Command | Query | Response |
|---|---|---|---|
| All Results | ----- | NR_TXMEASRESULT? seg,index | result(1),result(2),…,result(x)<br>When index = 1, x = 71<br>When index = 2, x = 94<br>When index = 3, x = 28<br>When index = 4, x = 81<br>When index = 5, x = 92<br>When index = 6, x = 169<br>When index = 102, x = 139 |

# 5.2 Details of Commands

This section describes the commands in alphabetical order.

■ Terms in this command list

EX ..... Command name (header)

Example ..... Command function name

Function ..... Command function

Command ..... Programming command syntax

Query ..... Query syntax

Response ..... Response syntax

Parameter ..... Parameter definition

Details ..... Command restrictions and others

Example of Use ..... Command usage example

Related Commands ..... Introduction of related commands

■ Suffix Code list

| Suffix Code | Unit | Suffix Code | Unit |
|---|---|---|---|
| DB | dB | MHZ | MHz |
| DBM | dBm | MS | ms |
| GHZ | GHz | MZ | MHz |
| GZ | GHz | NS | ns |
| HZ | Hz | S | s |
| KHZ | kHz | US | μs |
| KZ | kHz | | |

## 5.2.1 Common commands

### DLPAT

Waveform Pattern Select

#### Function

Selects a waveform pattern to use from patterns included in waveform file.
When the command received, the signal is immediately switched regardless of the frame cycle of signal, so the frame cycle is not continued.
This command is also used to query the currently selected waveform pattern.

#### Command

```
DLPAT pat
```

#### Query

```
DLPAT?
```

#### Response

```
pat
```

#### Parameter

| | | |
|---|---|---|
| pat | | Waveform pattern |
| | PAT1 to PATn | Waveform pattern number (n: waveform information file group range) |
| | Default | PAT1 |

#### Details

Select the waveform pattern for RF output signal in waveform file.
The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

#### Example of Use

To output the waveform pattern to 1:

```
DLPAT PAT1
DLPAT?
> PAT1
```

#### Related command

Waveform file for arbitrary waveform signal selection or query
PACKAGE

#### Remarks

The group number depends on the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

# DLPAT_SYNC

Waveform Pattern Select (SYNC)

## Function

Selects a waveform pattern to use from patterns included in waveform file.
When the command received, the signal is switched according to the frame cycle of signal so that the frame cycle is continued.
This command is also used to query the currently selected waveform pattern.

## Command

```
DLPAT_SYNC pat
```

## Query

```
DLPAT_SYNC?
```

## Response

```
pat
```

## Parameter

| | |
|---|---|
| pat | Waveform pattern |
| PAT1 to PATn | Waveform pattern number (n: waveform information file group range) |
| Default | PAT1 |

## Details

Select the waveform pattern for RF output signal in waveform file.
The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

## Example of Use

To output the waveform pattern to 1:

```
DLPAT_SYNC PAT1
DLPAT_SYNC?
> PAT1
```

## Related command

Waveform file for arbitrary waveform signal selection or query
PACKAGE

## Remarks

The group number depends on the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual*.

# ESR2?

End Event Status (Measurement) Register Query

## Function

Queries the end event status register (measurement).
The event occurrence can be identified using the retrieved value.

## Query

```
ESR2?
```

## Response

```
register
```

| | |
|---|---|
| register | End event status register (measurement) |
| Range | 0 to 255 |
| | |
| register | Value = bit0 + bit1 + … + bit7 |
| bit0 = $2^0$ = 1 | End of measurement |
| bit1 = $2^1$ = 2 | Trigger preparation completed |
| bit2 = $2^2$ = 4 | Unused (reserved for application use) |
| bit3 = $2^3$ = 8 | Unused (reserved for application use) |
| bit4 = $2^4$ = 16 | Unused (reserved for application use) |
| bit5 = $2^5$ = 32 | Unused (reserved for application use) |
| bit6 = $2^6$ = 64 | Unused (reserved for application use) |
| bit7 = $2^7$ = 128 | Unused (reserved for application use) |

## Details

The sum of the values for bits of the occurring event from the values $2^0$ = 1, $2^1$ = 2, $2^2$ = 4, $2^3$ = 8, $2^4$ = 16, $2^5$ = 32, $2^6$ = 64, and $2^7$ = 128, that correspond to the end event status register (measurement) bits 0, 1, 2, 3, 4, 5, 6, and 7 becomes the response.

## Example of Use

To query the end event status register (measurement) value:

```
ESR2?
> 0
```

# ESR3?

Error Event Status (Measurement) Register Query

## Function

Queries the error event status register (measurement).
The event occurrence can be identified using the retrieved value.

## Query

```
ESR3?
```

## Response

```
register
```

| | |
|---|---|
| register | Error event status register (measurement) |
| Range | 0 to 255 |
| | |
| register | Value = bit0 + bit1 + … + bit7 |
| bit0 = $2^0$ = 1 | Over level |
| bit1 = $2^1$ = 2 | Under level |
| bit2 = $2^2$ = 4 | Timeout |
| bit3 = $2^3$ = 8 | Unused (reserved for application use) |
| bit4 = $2^4$ = 16 | Unused (reserved for application use) |
| bit5 = $2^5$ = 32 | Unused (reserved for application use) |
| bit6 = $2^6$ = 64 | Unused (reserved for application use) |
| bit7 = $2^7$ = 128 | Unused (reserved for application use) |

## Details

The sum of the values for bits of the occurring event from the values $2^0$ = 1, $2^1$ = 2, $2^2$ = 4, $2^3$ = 8, $2^4$ = 16, $2^5$ = 32, $2^6$ = 64, and $2^7$ = 128, that correspond to the error event status register (measurement) bits 0, 1, 2, 3, 4, 5, 6, and 7 becomes the response.

## Example of Use

To query the error event status register (measurement) value:

```
ESR3?
> 4
```

## LVL

### Output Level On/Off

#### Function

Sets or queries RF signal output ON/OFF.

#### Command

```
LVL on_off
```

#### Query

```
LVL?
```

#### Response

```
on_off
```

#### Parameter

| | |
|---|---|
| on_off | Enables/disables RF signal output. |
| ON | Enables RF signal output. |
| OFF | Disables RF signal output. |
| Default | ON |

#### Example of Use

To output RF signals at Test port:

```
LVL ON
LVL?
> ON
```

## MEASSTOP

### Measurement Stop

#### Function

Stops the current measurement.

#### Command

```
MEASSTOP
```

#### Example of Use

To stop the current measurement:

```
MEASSTOP
```

# MOD

Output Signal Modulation

### Function

Sets or queries RF output signal modulation.

### Command

```
MOD on_off
```

### Query

```
MOD?
```

### Response

```
on_off
```

### Parameter

| | | |
|---|---|---|
| on_off | | Enables/disables modulation. |
| | ON | Enables RF output signal modulation. |
| | OFF | Disables RF output signal modulation. |
| | Default | ON |

### Example of Use

To modulate the RF output signal:

```
MOD ON
MOD?
> ON
```

## MSTAT?

Measurement Status

### Function

Queries the measurement status.

### Query

```
MSTAT?
```

### Response

```
m_status
```

### Parameter

| | |
|---|---|
| m_status | Measurement status |
| 0 | Completed measurement |
| 2 | Over level |
| 5 | Synchronization word not detected |
| 9 | Measurement in progress or not measured |
| 12 | Tx measurement timeout |
| 20 | Measurement cannot be performed |

### Details

This command can be used while measurement is in progress or suspended.

### Example of Use

To query current measurement status:

```
MSTAT?
> 0
```

# PACKAGE

Waveform File Select

### Function

Selects and queries the waveform file for arbitrary waveform signal.

### Command

```
PACKAGE pac
```

### Query

```
PACKAGE?
```

### Response

```
pac
```

### Parameter

| | |
|---|---|
| pac | Waveform file |

### Details

The name of the file used from the waveform files loaded into waveform memory is set by this command.

### Example of Use

To set the waveform file 1 from waveform files loaded in waveform memory:

```
PACKAGE "PAC1"
PACKAGE?
> PAC1
```

### Related command

Use the following command to load the waveform file into waveform memory.
SOUR:GPRF:GEN:ARB:FILE:LOAD
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.
:SOURce:GPRF:GENerator:ARB:FILE:LOAD
The following command can be used to query the names of waveform files that have been loaded into waveform memory.
SOUR:GPRF:GEN:ARB:WAV:NAME?
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.
:SOURce:GPRF:GENerator:ARB:WAVeform:NAME?

Use the following commands to select a waveform pattern to use from the waveform patterns included in the waveform file configured using the command described in this section.
DLPAT, DLPAT_SYNC, SEQTRX

# PORT

Set Connect Port Direction

## Function

Sets or queries the test ports for inputting and outputting RF signals.

## Command

| | |
|---|---|
| `PORT input,output` | MU887000A, MU887001A |
| `PORT input,output[,output,…,output]` | MU887002A |

## Query

`PORT?`

## Response

| | |
|---|---|
| input,output | MU887000A, MU887001A |
| input,output[,output,...,output] | MU887002A |

## Parameters

| | | |
|---|---|---|
| input | Input Test Port No. | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | OFF, Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| OFF | No any Input Test Ports | (MU887002A) |
| Default | PORT1 | |
| output | Output Test Port No. | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| Default | PORT1 | |

## Details

For MU887000A:

- Test Port 1 and Test Port 2 can be set for both input and output.
- Test Port 3 and Test Port 4 can be set to either input or output.

For MU887001A, Test Port 1 to Test Port 4 can be set for both input and output.
For MU887002A, Test Port 1 to Test Port 12 can be set for both input and output.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.

- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

Example of Use

To set Test Port 1 as RF signal input test port and Test Port 2 as RF signal output test port:

```
PORT PORT1,PORT2
PORT?
> PORT1,PORT2
```

To set No any Input Test Ports and Test Port 4, Test Port 6, Test Port 10 as RF signal output test ports:

```
PORT OFF,PORT10,PORT4,PORT6
PORT?
> OFF,PORT4,PORT6,PORT10
```

## SNGLS

Measurement Start

Function

Sets the parameters for both specified measurement and signal transmission and executes measurement.

Command

```
SNGLS
```

Details

Sending this command executes one measurement execution.
Sending this command during measurement, aborts measurement once and restarts it.
ESR2 must be polled or sync processing via *WAI is required to determine the timing of measurement completion.

Example of Use

To start measurement:

```
SNGLS
```

Related command

ESR2
For the details of the event status register, refer to Chapter 3 “Fundamental Operation” in the *MU887000A TRX Test Module Operation Manual*.

## STDSEL

Standard Select

### Function

Sets or queries the measurement standard.

### Command

```
STDSEL std
```

### Query

```
STDSEL?
```

### Response

```
std
```

### Parameter

| | | |
|---|---|---|
| std | Measurement standard | |
| COMMON | Common measurement | (requires MX887010A) |
| WCDMA | W-CDMA | (requires MX887011A) |
| GSM | GSM | (requires MX887012A) |
| LTE | LTE | (requires MX887013A or MX887014A) |
| CDMA2000 | CDMA2000 1x | (requires MX887015A) |
| EVDO | CDMA2000 1xEVDO | (requires MX887016A) |
| TDSCDMA | TD-SCDMA | (requires MX887017A) |
| NR | NR sub-6GHz | (requires MX887018A or MX887019A) |
| CATM | Category M | (requires MX887065A) |
| NBIOT | NB-IoT | (requires MX887067A) |
| LTEV2X | LTE-V2X | (requires MX887068A) |
| SEQUENCE | Sequence measurement | (requires MX887010A) |
| SEQ | Sequence measurement | (requires MX887010A) |
| Default | COMMON | |

### Example of Use

To switch the measurement standard to SEQUENCE:

```
STDSEL SEQUENCE
STDSEL?
> SEQUENCE
```

### Remarks

This parameter must be set to NR to execute the commands described in Section 5.2.2 “Fundamental measurement commands”.

This parameter must be set to SEQUENCE to use the commands described in Section 5.2.3 “Sequence measurement commands”.

# SWP

Measurement Start (Synchronization)

## Function

Sets the parameters of the measurement and signal transmission, and executes the measurement.

The following command is not processed until the measurement ends, so the MT8870A and the controller can synchronize.

Queries the measurement end.

## Command

```
SWP
```

## Query

```
SWP?
```

## Response

```
status
```

## Parameter

| | |
|---|---|
| status | Measurement status |
| 0 | Measurement finished |
| 1 | Measurement in progress |

## Details

When this command is sent, the measurement is performed only once.

To average, the measurements are performed for the specified average count (number of measurements to average).

## Example of Use

To start the measurement:

```
SWP
SWP?
> 0
```

# SYSSEL

Application Select

## Function

Sets or queries the type of application software executing on MU887000A.

## Command

```
SYSSEL app
```

## Query

```
SYSSEL?
```

## Response

```
app
```

## Parameter

| | | |
|---|---|---|
| app | | Type of application software |
| | CELLULAR | Cellular Application<br>When using MX887010A, MX887011A, MX887012A, MX887013A, MX887014A, MX887015A, MX887016A, MX887017A, MX887018A, MX887019A, MX887065A, MX887067A, or MX887068A |
| | SRW | Short Range Wireless application<br>When using MX887030A, MX887031A, MX887032A, MX887033A, MX887040A, or MX887050A |
| | LRWPAN | IEEE 802.15.4 application<br>When using MX887060A |
| | ZWAVE | Z-Wave application<br>When using MX887061A |
| | FMAUDIO | FM AUDIO application<br>When using MX887070A |

***Note:***

MU887002A does not support MX887070A.

## Details

Set the parameter to CELLULAR and send the command before using the MX887018A/19A.

## Example of Use

To set the application software to CELLULAR:

```
SYSSEL CELLULAR
SYSSEL?
> CELLULAR
```

## Remarks

When using the MX887018A/19A, set the application to CELLULAR using the SYSSEL command, and then set the standard to NR using the STDSEL command.

## SYST:LANG

Language Selection of Remote Command

### Function

Switches the language mode of remote control commands.

### Command

```
SYST:LANG mode
```

### Query

```
SYST:LANG?
```

### Response

```
mode
```

### Parameter

| | |
|---|---|
| mode | Language mode |
| NAT | Native |
| SCPI | SCPI |
| Default | NAT |

### Example of Use

To switch the language mode of remote control commands to Native:

```
SYST:LANG NAT
SYST:LANG?
> NAT
```

# TXMSTAT?

Tx Measurement Status

## Function

Queries the Tx measurement status.

## Query

```
TXMSTAT?
```

## Response

```
m_status
```

## Parameter

| | |
|---|---|
| m_status | Measurement status |
| 0 | Measurement completed |
| 2 | Over level |
| 5 | Synchronization word not detected |
| 9 | Measurement in progress or not measured |
| 12 | Tx measurement timeout |
| 20 | Measurement cannot be performed |

## Details

This command can be used while measurement is in progress or suspended.

## Example of Use

To query current Tx measurement status:

```
TXMSTAT?
> 0
```

## 5.2.2 Fundamental measurement commands

### ACLR?

#### ACLR Result

#### Function

Queries the result of ACLR (Adjacent Channel Leakage Power Ratio) measurement.

#### Query

```
ACLR? [mode]
```

#### Response

When mode = AVG, MAX, MIN, DVT,

```
aclr(NR_LOW),aclr(NR_UP),aclr(LOW2),aclr(LOW1),aclr(UP1),aclr(UP2)
```

When mode = TTL,

```
avg(NR_LOW),avg(NR_UP),avg(LOW2),avg(LOW1),avg(UP1),avg(UP2),
max(NR_LOW),max(NR_UP),max(LOW2),max(LOW1),max(UP1),max(UP2),
min(NR_LOW),min(NR_UP),min(LOW2),min(LOW1),min(UP1),min(UP2)
```

#### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| aclr(offset) | Result of Adjacent Channel Leakage Power Ratio measurement in specified Storage mode |
| avg(offset) | ACLR measurement result (Average) |
| max(offset) | ACLR measurement result (Maximum) |
| min(offset) | ACLR measurement result (Minimum) |
| Resolution | 0.01 dB |
| Response unit | dB |

#### Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.

#### Example of Use

To query the average of ACLR measurement result:

```
ACLR? AVG
> -61.23,-30.06,-65.68,-62.44,-65.68,-62.44
```

# ACLR_SET

ACLR On/Off and Meas. Count

## Function

Sets or queries the ACLR measurement On/Off state and measurement count.

## Command

```
ACLR_SET on_off[,avg_count]
```

## Query

```
ACLR_SET?
```

## Response

```
on_off,avg_count
```

## Parameters

| | |
|---|---|
| on_off | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| avg_count | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

## Examples of Use

To set the ACLR measurement to ON and the measurement count to 100:

```
ACLR_SET ON,100
ACLR_SET?
> ON,100
```

## Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

# ALLMEASITEMS_OFF

All Measurement Items Off

## Function

Sets all fundamental measurement items to off at one time.

## Command

```
ALLMEASITEMS_OFF
```

## Example of Use

To set all fundamental measurement items to off at one time:

```
ALLMEASITEMS_OFF
```

# BAND

## Operation Band

### Function

Sets or queries the operation band.

### Command

```
BAND [cc,]band
```

### Query

```
BAND? [cc]
```

### Response

```
band
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| band | Operation band |
| Range | 1 to 79 |
| Resolution | 1 |
| Default | 77 |

### Details

When the Operation Band is updated, Frame Structure, Downlink Channel, Uplink Channel, Downlink Frequency, and Uplink Frequency are changed accordingly.
For the Operation Band and Frame Structure, refer to Table 2.1.6-3 “NR Channel Numbers and TX-RX Frequency Separation” and Table 2.1.6-4 “Relationship between Operation Band and Frame Structure”.

### Example of Use

To set the operation band to 77:

```
BAND PCC,77
BAND? PCC
> 77
```

Remarks

"0" is returned when the uplink or downlink channel number is set, but the set band is not found in Table 2.1.6-3.

When setting the operation band, change UL and DL channels as the following table.

| Operation Band | Channels when Operation Band is Changed | | Operation Band | Channels when Operation Band is Changed | |
|---|---|---|---|---|---|
| | UL Channel | DL Channel | | UL Channel | DL Channel |
| 1 | 390000 | 428000 | 39 | 380000 | 380000 |
| 2 | 376000 | 392000 | 40 | 470000 | 470000 |
| 3 | 349500 | 368500 | 41 | 518600 | 518600 |
| 5 | 167300 | 176300 | 50 | 294900 | 294900 |
| 7 | 507000 | 531000 | 51 | 285900 | 285900 |
| 8 | 179500 | 188500 | 66 | 349000 | 429000 |
| 12 | 141500 | 147500 | 70 | 340500 | 400500 |
| 20 | 169400 | 161200 | 71 | 136100 | 126900 |
| 25 | 376500 | 392500 | 74 | 289700 | 299300 |
| 28 | 145100 | 156100 | 77 | 650000 | 294900 |
| 34 | 403500 | 403500 | 78 | 636666 | 636666 |
| 38 | 519000 | 519000 | 79 | 713333 | 713333 |

## CARRF?

Carrier Frequency Result

### Function

Queries the Carrier Frequency measurement result.

### Query

```
CARRF? mode
```

### Response

```
freq
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| Omitted | Average |
| freq | Carrier frequency |
| Resolution | 1 Hz |
| Unit | Hz |

### Example of Use

To query the result of Carrier Frequency measurement:

```
CARRF?
> 1951000000
```

# CARRLEAK?

Carrier Leakage Result

## Function

Queries the Carrier Leakage (Origin offset) measurement result.

## Query

```
CARRLEAK? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT

```
cleakage
```

When mode = TTL,

```
avg,max,min
```

## Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| cleakage | Carrier Leakage measurement result in specified Storage mode |
| avg | Carrier Leakage measurement result (Average) |
| max | Carrier Leakage measurement result (Maximum) |
| min | Carrier Leakage measurement result (Minimum) |
| Resolution | 0.01 dB |
| Unit | dBc |

## Example of Use

To query the average of Carrier Leakage measurement result:

```
CARRLEAK? AVG
> 20.00
```

# CELLID

Cell ID

## Function

Sets or queries the Cell ID.

## Command

```
CELLID [cc,]id
```

## Query

```
CELLID? [cc]
```

## Response

```
id
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| id | | Cell ID |
| | Range | 0 to 1007 |
| | Resolution | 1 |
| | Default | 0 |
| | Suffix code | None |

## Example of Use

To set the Cell ID to 0:

```
CELLID PCC,0
CELLID? PCC,
> 0
```

# CELLID_EUTRA

E-UTRA Cell ID

## Function

Sets or queries the E-UTRA Cell ID.

## Command

```
CELLID_EUTRA [cc,]eutra_cellid
```

## Query

```
CELLID_EUTRA? [cc]
```

## Response

```
eutra_cellid
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_cellid | Cell ID |
| Range | 0 to 503 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

## Example of Use

To set the E-UTRA Cell ID to 0:

```
CELLID_EUTRA PCC,0
CELLID_EUTRA? PCC
> 0
```

## CFERR?

Carrier Frequency Error Result

### Function

Queries the Frequency Error measurement result.

### Query

```
CFERR? mode
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
freq_ppm,freq_Hz
```

When mode = TTL,

```
avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz
```

### Parameters

| | | |
|---|---|---|
| mode | Storage mode | |
| AVG | Average | |
| MAX | Maximum | |
| MIN | Minimum | |
| TTL | Average・Maximum・Minimum | |
| DVT | Standard deviation | |
| Omitted | Worst value | |
| avg_ppm | Measurement result in ppm (Average) | |
| avg_Hz | Measurement result in Hz (Average) | |
| max_ppm | Measurement result in ppm (Maximum) | |
| max_Hz | Measurement result in Hz (Maximum) | |
| min_ppm | Measurement result in ppm (Minimum) | |
| min_Hz | Measurement result in Hz (Minimum) | |
| freq_ppm | Measurement result in ppm in specified Storage mode | |
| freq_Hz | Measurement results in Hz in specified Storage mode | |
| Resolution | 0.01 ppm | (Measurement result in ppm) |
| | 0.1 Hz | (Measurement result in Hz) |
| Unit | ppm | (Measurement result in ppm) |
| | Hz | (Measurement result in Hz) |

### Details

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

### Example of Use

To query the average of Frequency Error measurement result:

```
CFERR? AVG
> 0.03,60.0
```

# CFERR_WORST?

Worst Carrier Frequency Error Result

### Function

Queries the worst value in Frequency Error measurement results.

### Query

```
CFERR_WORST?
```

### Response

```
freq_ppm,freq_Hz
```

### Parameters

| | |
|---|---|
| freq_ppm | Worst value in Frequency Error measurement results in ppm |
| Resolution | 0.01 ppm |
| Unit | ppm |
| freq_Hz | Worst value in Frequency Error measurement results in Hz |
| Resolution | 0.1 Hz |
| Unit | Hz |

### Details

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

### Example of Use

To query the worst value in Frequency Error measurement results:

```
CFERR_WORST?
> 0.03,60.0
```

# CHCONFIG

RMC Configuration

## Function

Sets or queries the channel configuration of uplink signal.

## Command

```
CHCONFIG val
```

## Query

```
CHCONFIG?
```

## Response

```
val
```

## Parameter

| | |
|---|---|
| val | RMC channel configuration |
| PUSCH | PUSCH |
| Default | PUSCH |

## Example of Use

To set the channel configuration of uplink signal to PUSCH:

```
CHCONFIG PUSCH
CHCONFIG?
> PUSCH
```

# CHPWR?

Channel Power Result

### Function

Queries the Channel Power measurement result.

### Query

```
CHPWR? [mode]
```

### Response

When mode = AVG, MAX, MIN or DVT,

```
pwr
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,pwr(1),pwr(2),pwr(3),…,pwr(s)
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| pwr | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| pwr(n) | The n-th measurement result (n=1 to s) |
| Resolution | 0.01 dB |
| Unit | dBm |
| s | Number of valid measurement results |

### Example of Use

To query the average of Channel Power measurement result:

```
CHPWR? AVG
> -20.00
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# CSHIFT_EUTRA

E-UTRA Cyclic shift

## Function

Sets or queries the E-UTRA Cyclic shift.

## Command

```
CSHIFT_EUTRA [cc,]eutra_cshift
```

## Query

```
CSHIFT_EUTRA? [cc]
```

## Response

```
eutra_cshift
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_cshift | Cyclic shift |
| ON | On (Default) |
| OFF | Off |
| FIX1 | Fixed |

## Example of Use

To set the E-UTRA Cyclic shift to On:

```
CSHIFT_EUTRA PCC,ON
CSHIFT_EUTRA? PCC
> ON
```

# DELTASS_EUTRA

E-UTRA Delta SS

## Function

Sets or queries the E-UTRA Delta SS.

## Command

```
DELTASS_EUTRA [cc,]eutra_dss
```

## Query

```
DELTASS_EUTRA? [cc]
```

## Response

```
eutra_dss
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_dss | Delta SS |
| Range | 0 to 29 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

## Example of Use

To set the E-UTRA Delta SS to 0:

```
DELTASS_EUTRA PCC,0
DELTASS_EUTRA? PCC
> 0
```

# DLCHAN

Downlink Channel

## Function

Sets or queries the Downlink Channel.

## Command

```
DLCHAN [cc,]dl_ch
```

## Query

```
DLCHAN? [cc]
```

## Response

```
dl_ch
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| dl_ch | Downlink Channel |
| Range | 120000 to 653333 (MU887000A/01A)<br>120000 to 800000 (with MU887000A/01A-001)<br>120000 to 800000 (MU887002A)<br>120000 to 800000 (with MU887002A-007, Port 1 to 4)<br>120000 to 886666 (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 |
| Default | 650000 |
| Suffix code | None |

## Details

When the Downlink Channel is updated, Operation Band, Frame Structure, Uplink Channel, Downlink Frequency, and Uplink Frequency are changed accordingly.
For the relationship between the channel and frequency settings refer to Table 2.1.6-1 “Relationship between Uplink Channel Number and Downlink Channel Number” and Table 2.1.6-3 “NR channel numbers and TX-RX Frequency Separation”.

## Example of Use

To set the Downlink Channel to 650000:

```
DLCHAN PCC,650000
DLCHAN? PCC
> 650000
```

# DLFREQ

Downlink Frequency

## Function

Sets or queries the downlink frequency.

## Command

```
DLFREQ [cc,]dl_freq
```

## Query

```
DLFREQ? [cc]
```

## Response

```
dl_fleq
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| dl_freq | | Downlink frequency |
| | Range | 600 000 000 to 3800.000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| | Resolution | 1 Hz |
| | Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| | Default | 3750 000 000 Hz |
| | Unit | Hz |

## Details

This sets the Rx frequency for the mobile station.
Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the downlink frequency to 3750 MHz:

```
DLFREQ PCC,3750MHZ
DLFREQ? PCC
> 3750000000
```

# DLULPERIOD

DL/UL Periodicity

## Function

Sets or queries the periods of DL/UL signals.

## Command

```
DLULPERIOD [cc,]periodicity
```

## Query

```
DLULPERIOD? [cc]
```

## Response

```
periodicity
```

## Parameter

| | | |
|---|---|---|
| cc | Component Carrier | |
| PCC | PCC (Default) | |
| Omitted | PCC | |
| periodicity | periods | |
| 1MS | 1 ms | (Only when SCS = 30 kHz, 60 kHz) |
| 2_500MS | 2.5 ms | (Only when SCS = 30 kHz, 60 kHz) |
| 5MS | 5 ms | |
| 10MS | 10 ms | |
| Default | 10MS | |

## Details

The setting range varies with the Subcarrier Spacing (SCS) setting.
This command is available when trigger source is set to VIDEO or FRAME.

## Example of Use

To set the periods of DL/UL signals to 10 ms:

```
DLULPERIOD PCC,10MS
DLULPERIOD? PCC
> 10MS
```

## Remarks

When editing UL Subcarrier Spacing makes DL/UL Periodicity outside the setting range, DL/UL Periodicity is set to 10 ms.

# ENDCMEASMODE

EN-DC Measurement Mode

## Function

Sets the EN-DC Measurement Mode.

## Command

```
ENDCMEASMODE endc_mode
```

## Query

```
ENDCMEASMODE?
```

## Response

endc_mode

## Parameter

| | |
|---|---|
| endc_mode | EN-DC Measurement Mode |
| NR | NR only |
| CONT | Contiguous |
| Default | NR |

## Details

This is available only when RANOP is set to ENDC.
When RANOP is changed to NONE, ENDCMEASMODE is set to NR.
When this command is CONT, the measurement performs EN-DC Intra-band contiguous measurement.

## Example of Use

To set the EN-DC Measurement Mode to NR:

```
ENDCMEASMODE NR
ENDCMEASMODE?
> NR
```

## EVM?

### EVM Result

#### Function

Queries the EVM (Error Vector Magnitude) measurement result.

#### Query

```
EVM? [mode]
```

#### Response

When mode = AVG, MAX, MIN, DVT

```
evm
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,evm(1),evm(2),…,evm(s)
```

#### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| evm | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| evm(n) | n-th EVM measurement result (n=1 to s) |
| Resolution | 0.01% |
| Unit | % |
| s | Number of valid measurement results |

#### Example of Use

To query the average of EVM measurement result:

```
EVM? AVG
> 1.50
```

#### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# FRAMETYPE

Frame Structure

## Function

Sets or queries the frame structure.

## Command

```
FRAMETYPE [cc,]mode
```

## Query

```
FRAMETYPE? [cc]
```

## Response

```
mode
```

## Parameter

| | | |
|---|---|---|
| cc | Component Carrier | |
| PCC | PCC (Default) | |
| Omitted | PCC | |
| mode | Frame Structure | |
| TDD | Time Division Multiplexing | (MX887019A is required) |
| FDD | Frequency Division Multiplexing | (MX887018A is required) |
| Default | TDD | |

## Details

When only MX887019A is installed, only TDD is available.
When only MX887018A is installed, only FDD is available and Default is FDD.

## Example of Use

To set the frame structure to TDD:

```
FRAMETYPE PCC,TDD
FRAMETYPE? PCC
> TDD
```

# FRAMETYPE_EUTRA

E-UTRA Frame Structure

## Function

Sets or queries the E-UTRA Frame Structure.

## Command

```
FRAMETYPE_EUTRA [cc,]eutra_frametype
```

## Query

```
FRAMETYPE_EUTRA? [cc]
```

## Response

```
eutra_frametype
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_frametype | Frame Structure |
| TDD | TDD |
| FDD | FDD (Default) |

## Example of Use

To set the E-UTRA Frame Structure to TDD:

```
FRAMETYPE_EUTRA PCC,TDD
FRAMETYPE_EUTRA? PCC
> TDD
```

# FREQRANGE

Frequency Range

## Function

Sets or queries the frequency range.

## Command

```
FREQRANGE [cc,]fr
```

## Query

```
FREQRANGE? [cc]
```

## Response

```
fr
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| fr | | Frequency Range |
| | FR1 | FR1 |
| | Default | FR1 |

## Example of Use

To set the frequency range to FR1:

```
FRAMETYPE PCC,FR1
FRAMETYPE? PCC
> FR1
```

# GROUPHOPPING

Group Hopping

### Function

Sets or queries the Group Hopping.

### Command

```
GROUPHOPPING [cc,]type
```

### Query

```
GROUPHOPPING? [cc]
```

### Response

```
type
```

### Parameters

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| type | PUSCH DM-RS Group Hopping On/Off |
| ON | On |
| OFF | Off |
| Default | OFF |

### Details

This is available only when UL RMC Waveform is set to DFT-s-OFDM.
When Group Hopping is set to On, Sequence Hopping is set to Off.

### Example of Use

To enable Group hopping:

```
GROUPHOPPING PCC,ON
GROUPHOPPING? PCC
> ON
```

# GROUPHOPPING_EUTRA

E-UTRA Group Hopping

## Function

Sets or queries the E-UTRA PUSCH DMRS Group Hopping On/Off.

## Command

```
GROUPHOPPING_EUTRA [cc,]eutra_grouphop
```

## Query

```
GROUPHOPPING_EUTRA? [cc]
```

## Response

```
eutra_grouphop
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_grouphop | PUSCH DM-RS Group Hopping On/Off |
| ON | On |
| OFF | Off (Default) |

## Example of Use

To set the E-UTRA PUSCH DMRS Group Hopping to On:

```
GROUPHOPPING_EUTRA PCC,ON
GROUPHOPPING_EUTRA? PCC
> ON
```

# ILVL

Input Level

## Function

Sets or queries the input level of the input test port.

## Command

```
ILVL [cc,]level
```

## Query

```
ILVL? [cc]
```

## Response

```
level
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| level | | Input level of PCC |
| | Range | |
| | MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | | –65.0 to +25.0 dBm (Port 3/Port 4) |
| | MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| | MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| | MU887002A-007 | |
| | | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| | Resolution | 0.1 dB |
| | Suffix Code | DBM (uses dBm when omitted) |
| | Default | –1.0 dBm |
| | Unit | dBm |

## Details

For MU887000A, the setting range varies with the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, MU887000A Port1/Port2 setting range is –60.0 to +40.0 dBm.

| | | |
|---|---|---|
| Range | –65.0 + Cable loss to +35.0 + Cable loss [dBm] | (Port 1/Port 2) |
| | –65.0 + Cable loss to +25.0 + Cable loss [dBm] | (Port 3/Port 4) |

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

### Example of Use

To set the input level to –10.0 dBm:

```
ILVL PCC,-10.0
ILVL? PCC
>-10.0
```

### Related Commands

EXTLOSSW
LOSSTBL
LOSSTBLVAL
For details of the commands, refer to Chapter 6 “Native Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## INBANDEITEM?

### In-Band Emissions Measured Item

### Function

Queries whether each in-band emission measurement item is measured or not.

### Query

```
INBANDEITEM?
```

### Response

```
flag
```

### Parameter

| | | |
|---|---|---|
| flag | | Measured/Not measured flag (0 to 7)<br>Returns the sum of the following measurement items. |
| | 0 | Not measured |
| | 1 | Measure General |
| | 2 | Measure IQ Image |
| | 4 | Measure Carrier Leakage |
| | Unit | None |

### Example of Use

To query whether each in-band emission measurement item is measured or not:

```
INBANDEITEM?
> 4
```

## INBANDEITEM_EUTRA?

E-UTRA In-Band Emissions Measured Item

### Function

Queries whether each E-UTRA in-band emission measurement item is measured or not.

### Query

```
INBANDEITEM_EUTRA?
```

### Response

```
flag
```

### Parameter

| | | |
|---|---|---|
| flag | | Measured/Not measured flag (0 to 7)<br>Returns the sum of the following measurement items. |
| | 0 | Not measured |
| | 1 | Measure General |
| | 2 | Measure IQ Image |
| | 4 | Measure Carrier Leakage |
| | Unit | None |

### Example of Use

To query whether each E-UTRA in-band emission measurement item is measured or not:

```
INBANDEITEM_EUTRA?
> 4
```

# INBANDEPASS?

In-Band Emissions Judgement

## Function

Queries the judgement on the in-band emission measurement result.

## Query

```
INBANDEPASS?
```

## Response

```
judge
```

## Parameter

| | |
|---|---|
| judge | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

## Example of Use

To query the judgement on the in-band emission measurement result:

```
INBANDEPASS?
> PASS
```

## INBANDEPASS_EUTRA?

E-UTRA In-Band Emissions Judgement

### Function

Queries the judgement on the E-UTRA in-band emission measurement result.

### Query

```
INBANDEPASS_EUTRA?
```

### Response

```
judge
```

### Parameter

| | |
|---|---|
| judge | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on the E-UTRA in-band emission measurement result:

```
INBANDEPASS_EUTRA?
> PASS
```

## INBANDE_GENUL?

In-Band Emissions (General) limit

### Function

Queries the limit of in-band emission measurement result (General).

### Query

```
INBANDE_GENUL?
```

### Response

```
level
```

### Parameter

| | | |
|---|---|---|
| level | | Limit of In-Band Emissions (General) |
| | Resolution | 0.1 dB |
| | Unit | dB |

### Example of Use

To query the limit of in-band emission measurement result (General):

```
INBANDE_GENUL?
> 0.4
```

## INBANDE_GENUL_EUTRA?

E-UTRA In-Band Emissions (General) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (General).

### Query

```
INBANDE_GENUL_EUTRA?
```

### Response

```
level
```

### Parameter

| | |
|---|---|
| level | Limit of E-UTRA In-Band Emissions(General) |
| Resolution | 0.1 dB |
| Unit | dB |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (General):

```
INBANDE_GENUL_EUTRA?
> 0.4
```

# INBANDE_GEN?

In-Band Emissions (General) Result

## Function

Queries the in-band emissions (General) measurement result.

## Query

```
INBANDE_GEN? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT,

```
ibe
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,ibe(1),ibe(2),…,ibe(s)
```

## Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in In-Band Emissions (General) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

## Example of Use

To query the maximum of in-band emissions (General) measurement result:

```
INBANDE_GEN? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# INBANDE_GEN_EUTRA?

E-UTRA In-Band Emissions (General) Result

## Function

Queries the E-UTRA in-band emissions (General) measurement result.

## Query

```
INBANDE_GEN_EUTRA? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT

```
ibe
```

When mode = TTL

```
avg,max,min
```

When mode = IND

```
s,ibe(1),ibe(2),…,ibe(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in Measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (General) measurement result:

```
INBANDE_GEN_EUTRA? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## INBANDE_IMGUL?

In-Band Emissions (IQ Image) limit

### Function

Queries the limit of in-band emission measurement result (IQ Image).

### Query

```
INBANDE_IMGUL?
```

### Response

```
level
```

### Parameter

| | |
|---|---|
| `level` | Limit of In-Band Emissions (IQ Image) |
| Resolution | 0.1 dB |
| Unit | dB |

### Example of Use

To query the limit of in-band emission measurement result (IQ Image):

```
INBANDE_IMGUL?
> 0.4
```

## INBANDE_IMGUL_EUTRA?

E-UTRA In-Band Emissions (IQ Image) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (IQ Image).

### Query

```
INBANDE_IMGUL_EUTRA?
```

### Response

```
level
```

### Parameter

| | |
|---|---|
| `level` | Limit of E-UTRA In-Band Emissions (IQ Image) |
| Resolution | 0.1 dB |
| Unit | dB |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (IQ Image):

```
INBANDE_IMGUL_EUTRA?
> 0.4
```

# INBANDE_IMG?

In-Band Emissions (IQ Image) Result

## Function

Queries the in-band emissions (IQ Image) measurement result.

## Query

```
INBANDE_IMG? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT,

```
ibe
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,ibe(1),ibe(2),…,ibe(s)
```

## Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in In-Band Emissions (IQ Image) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

## Example of Use

To query the maximum of in-band emissions (IQ Image) measurement result:

```
INBANDE_IMG? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# INBANDE_IMG_EUTRA?

E-UTRA In-Band Emissions (IQ Image) Result

## Function

Queries the E-UTRA in-band emissions (IQ Image) measurement result.

## Query

```
INBANDE_IMG_EUTRA? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT

```
ibe
```

When mode = TTL

```
avg,max,min
```

When mode = IND

```
s,ibe(1),ibe(2),…,ibe(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in Measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (IQ Image) measurement result:

```
INBANDE_IMG_EUTRA? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## INBANDE_LEAKUL?

In-Band Emissions (Carrier Leakage) limit

### Function

Queries the limit of in-band emission measurement result (Carrier Leakage).

### Query

```
INBANDE_LEAKUL?
```

### Response

```
level
```

### Parameter

| | | |
|---|---|---|
| level | | Limit of In-Band Emissions (Carrier Leakage) |
| | Resolution | 0.1 dB |
| | Unit | dBc |

### Example of Use

To query the limit of in-band emission measurement result (Carrier Leakage):

```
INBANDE_LEAKUL?
> 0.4
```

## INBANDE_LEAKUL_EUTRA?

E-UTRA In-Band Emissions (Carrier Leakage) limit

### Function

Queries the limit of E-UTRA in-band emission measurement result (Carrier Leakage).

### Query

```
INBANDE_LEAKUL_EUTRA?
```

### Response

```
level
```

### Parameter

| | | |
|---|---|---|
| level | | Limit of E-UTRA In-Band Emissions (Carrier Leakage) |
| | Resolution | 0.1 dB |
| | Unit | dBc |

### Example of Use

To query the limit of E-UTRA in-band emission measurement result (Carrier Leakage):

```
INBANDE_LEAKUL_EUTRA?
> 0.4
```

# INBANDE_LEAK?

In-Band Emissions (Carrier Leakage) Result

### Function

Queries the In-band emissions (Carrier Leakage) measurement result.

### Query

```
INBANDE_LEAK? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
ibe
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,ibe(1),ibe(2),…,ibe(s)
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in In-Band Emissions (Carrier Leakage) measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

### Example of Use

To query the maximum of in-band emissions (Carrier Leakage) measurement result:

```
INBANDE_LEAK? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# INBANDE_LEAK_EUTRA?

E-UTRA In-Band Emissions (Carrier Leakage) Result

## Function

Queries the E-UTRA In-band emissions (Carrier Leakage) measurement result.

## Query

```
INBANDE_LEAK_EUTRA? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT

```
ibe
```

When mode = TTL

```
avg,max,min
```

When mode = IND

```
s,ibe(1),ibe(2),…,ibe(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| ibe | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| ibe(n) | Nth value in the measurement result (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Number of valid measurement results |

## Example of Use

To query the maximum of E-UTRA in-band emissions (Carrier Leakage) measurement result:

```
INBANDE_LEAK_EUTRA? MAX
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# INBANDE_MARG?

In-Band Emission margin

## Function

Queries the worst margin in the entire bandwidth of in-band emission measurement.

## Query

```
INBANDE_MARG?
```

## Response

```
margin
```

## Parameter

| | |
|---|---|
| margin | Worst margin in the entire bandwidth |
| Resolution | 0.01 dB |
| Unit | dB |

## Example of Use

Queries the worst margin in the entire bandwidth of in-band emission measurement:

```
INBANDE_MARG?
> 0.04
```

## INBANDE_MARG_EUTRA?

E-UTRA In-Band Emission margin

### Function

Queries the worst margin in the entire bandwidth of E-UTRA in-band emission measurement.

### Query

```
INBANDE_MARG_EUTRA?
```

### Response

```
margin
```

### Parameter

| | |
|---|---|
| margin | Worst margin in the entire bandwidth |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

Queries the worst margin in the entire bandwidth of E-UTRA in-band emission measurement:

```
INBANDE_MARG_EUTRA?
> 0.04
```

# MAGTDERR?

Magnitude Error Result

### Function

Queries the Magnitude Error measurement result.

### Query

```
MAGERR? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
magnitude
```

When mode = TTL,

```
avg,max,min
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| magnitude | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| Resolution | 0.01% |
| Unit | % |

### Example of Use

To query the average of Magnitude Error measurement result:

```
MAGTDERR? AVG
> 1.05
```

# MEASOFFSET

Measurement Offset

## Function

Sets or queries the offset of the analysis start time in symbol unit when Trigger Source is set to VIDEO.

## Command

```
MEASOFFSET time
```

## Query

```
MEASOFFSET?
```

## Response

```
time
```

## Parameters

| | |
|---|---|
| time | Measurement Offset |
| Range | 0.0 to 13.0 |
| Resolution | 0.1 |
| Suffix code | None |
| Default | 0.0 |
| Unit | Symbol |

## Details

This parameter is valid only when Trigger Source is set to VIDEO.

## Example of Use

To set the offset of the analysis start time to 1 symbol:

```
MEASOFFSET 1
MEASOFFSET?
> 1
```

# MOD_SET

Modulation Analysis On/Off and Meas. Count

## Function

Sets or queries the Modulation Analysis On/Off state and measurement count.

## Command

```
MOD_SET on_off[,avg_count]
```

## Query

```
MOD_SET?
```

## Response

```
on_off,avg_count
```

## Parameters

| | |
|---|---|
| on_off | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| avg_count | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

## Example of Use

To set the Modulation Analysis to On and measurement count to 100:

```
MOD_SET ON,100
MOD_SET?
> ON,100
```

## Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

## OBW?

### OBW Result

#### Function

Queries the OBW (Occupied Bandwidth) measurement result.

#### Query

```
OBW?
```

#### Response

```
bw
```

#### Parameter

| | | |
|---|---|---|
| bw | | Occupied Bandwidth |
| | Resolution | 0.1 Hz |
| | Unit | Hz |

#### Example of Use

To query the OBW measurement result:

```
OBW?
> 1080000.0
```

## OBWFREQ?

OBW Frequency Result

### Function

Queries the upper, lower and center frequency of OBW (Occupied Bandwidth) measurement results.

### Query

```
OBWFREQ? pos
```

### Response

```
freq
```

### Parameters

| | |
|---|---|
| pos | Offset type |
| UPPER | Upper frequency |
| LOWER | Lower frequency |
| CENTER | Center frequency |
| freq | Offset frequency |
| Resolution | 0.1 Hz |
| Unit | Hz |

### Example of Use

To query the upper frequency of OBW measurement result:

```
OBWFREQ? UPPER
> 1951920000.0
```

# OBW_SET

OBW On/Off and Meas. Count

## Function

Sets or queries the OBW (Occupied Bandwidth) measurement On/Off state and measurement count.

## Command

```
OBW_SET on_off[,avg_count]
```

## Query

```
OBW_SET?
```

## Response

```
on_off,avg_count
```

## Parameters

| | |
|---|---|
| on_off | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| avg_count | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

## Example of Use

To set OBW measurement on and set the measurement count to 50:

```
OBW_SET ON,50
OBW_SET?
> ON,50
```

## Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

# OLVL

Output Level (Cell Total)

### Function

Sets or queries the total output level of all channels.

### Command

```
OLVL level
```

### Query

```
OLVL?
```

### Response

```
level
```

### Parameter

level Output level

Range

| | | |
|---|---|---|
| MU887000A | 600 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1/Port 2) |
| | –120.0 to 0.0 dBm | (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1/Port 2) |
| | –120.0 to –8.0 dBm | (Port 3/Port 4) |
| MU887001A | 600 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm | (Port 1 to Port 12) |
| Resolution | 0.1 dB | |
| Suffix Code | DBM (uses dBm when omitted) | |
| Default | –50.0 dBm | |
| Unit | dBm | |

### Details

For MU887000A, the setting range varies with the output test port setting.
If cable loss correction is set to ON, the setting range of the output level is the range of values with subtracted cable loss.
When the cable loss is 5 dB, Frequency ≤ 3800 MHz.
MU887000A Port1/Port2 setting range is –135.0 to –15.0 dBm.

| | | |
|---|---|---|
| Range | –130.0 – Cable loss to –10.0 – Cable loss [dBm] | (Port 1/Port 2) |
| | –120.0 – Cable loss to 0.0 – Cable loss [dBm] | (Port 3/Port 4) |

### Example of Use

To set the output level to –50.0 dBm:

```
OLVL -50.0
OLVL?
```

```
> -50.0
```

### Related Commands

EXTLOSSW
LOSSTBL
LOSSTBLVAL
For details of the commands, refer to Chapter 6 “Native Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## PHASEERR?

### Phase Error Result

### Function

Queries the Phase Error measurement result.

### Query

```
PHASEERR? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,
`phase`
When mode = TTL,
`avg,max,min`

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| phase | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| Resolution | 0.01 deg. |
| Unit | deg. |

### Example of Use

To query the average of Phase Error measurement result:

```
PHASEERR? AVG
> 1.55
```

# POWER?

Tx Power Result

### Function

Queries the Tx Power measurement result.

### Query

```
POWER? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
pwr
```

When mode = TTL,

```
avg,max,min
```

When mode = IND

```
s,pwr(1),pwr(2),…,pwr(s)
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| pwr | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| pwr(n) | The n-th Measurement result (n=1 to s) |
| Resolution | 0.01 dB |
| Unit | dBm |
| s | Number of valid measurement results |

### Example of Use

To query the Tx Power measurement result:

```
POWER? AVG
> -20.00
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# PREPHASECORR

Pre Phase Correction

### Function

Sets or queries the Pre Phase Correction.

### Command

```
PREPHASECORR on_off
```

### Query

```
PREPHASECORR?
```

### Response

```
on_off
```

### Parameters

| | |
|---|---|
| on_off | Enables/disables Pre Phase Correction |
| ON | On |
| OFF | Off |
| Default | OFF |

### Example of Use

To enable the Pre Phase Correction:

```
PREPHASECORR ON
PREPHASECORR?
> ON
```

# PVECTERR?

Peak EVM Result

## Function

Queries the peak EVM (Error Vector Magnitude) measurement result.

## Query

```
PVECTERR? [mode]
```

## Response

When mode = AVG, MAX, MIN, DVT,

```
pevm
```

When mode = TTL,

```
avg,max,min
```

## Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| pevm | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| Resolution | 0.01% |
| Unit | % |

## Example of Use

To query the average of Peak EVM measurement result:

```
PVECTERR? AVG
> 1.75
```

# PWR_SET

Power Measurement On/Off and Meas. Count

### Function

Sets or queries the Tx Power Measurement On/Off state and measurement count.

### Command

```
PWR_SET on_off[,avg_count]
```

### Query

```
PWR_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

| | |
|---|---|
| on_off | Enables/disables measurement. |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| avg_count | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

### Example of Use

To set Tx Power measurement ON and set the measurement count to 100:

```
PWR_SET ON,100
PWR_SET?
> ON,100
```

### Remarks

Restrictions on measurement count

"When the UL Channel Bandwidth is 60 MHz or more, and SEM, OBW or ACLR measurement is On", or "when EN-DC Measurement Mode is CONT, and SEM, OBW or ACLR measurement is On, and the total value of UL Channel Bandwidth and E-UTRA UL Channel Bandwidth is 54 MHz or more", an execution error occurs if the following condition is not met at SNGLS execution.

(Longest capture length [ms] in all measurements) + (Longest capture length [ms] in SEM/OBW/ACLR measurements) × 2 < 1312.5 [ms]

Capture length [ms] of each measurement is calculated by the following expression.

L [ms]: DL/UL Periodicity, D: UL Duration, and N: Measurement Count.
Function FLOOR(x): Maximum integer equal to x (actual number) or under
Function CEILING(x): Minimum integer equal to x (actual number) or above

■ Modulation Analysis

When D ≥ 2, D' = D – 1. When D < 2, D' = D.

| SCS [kHz] | Trigger Source | |
|---|---|---|
| | Freerun | Other than Freerun |
| 15 | N+3 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 1 + 2<br>Rounded up value in 1 ms units of the above. |
| 30 | CEILING(N / 2) + 2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 0.5 + 2<br>Rounded up value in 1 ms units of the above. |
| 60 | CEILING(N / 4) + 2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' + 1} × 0.25 + 2<br>Rounded up value in 1 ms units of the above. |

■ Other than Modulation Analysis

| SCS [kHz] | Trigger Source | |
|---|---|---|
| | Freerun | Other than Freerun |
| 15<br>D' = FLOOR(D / 1.0) | N+2 | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D' +1} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |
| 30<br>When D ≥ 2,<br>D' = FLOOR(D / 2.0) | | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D'} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |
| 60<br>When D ≥ 4,<br>D' = FLOOR(D / 4.0) | | [CEILING(N / D') – 1] × L<br>+ {N – [CEILING(N / D') – 1] × D'} × 1 + 2<br>Rounded up value in 1 ms unit of the above. |

# RANOP

RAN Operation

## Function

Sets the operation mode of Radio Access Network.

## Command

```
RANOP ranop_type
```

## Query

```
RANOP?
```

## Response

```
ranop_type
```

## Parameter

| | |
|---|---|
| ranop_type | RAN Operation |
| NONE | None (Default) |
| ENDC | EN-DC |

## Details

When RANOP is changed to NONE, ENDCMEASMODE is set to NR.

## Example of Use

To set the operation mode of Radio Access Network to EN-DC:

```
RANOP ENDC
RANOP?
> ENDC
```

# RHO?

## Rho Result

### Function

Queries the Rho (waveform quality) measurement result.

### Query

```
RHO? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
rho
```

When mode = TTL,

```
avg,max,min
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Average |
| rho | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| Resolution | 0.00001 |

### Example of Use

To query the average of Signal Quality measurement (Rho) result:

```
RHO? AVG
> 0.00004
```

## RSEVM?

Reference Signal EVM Result

### Function

Queries the EVM measurement result of Reference Signal.

### Query

```
RSEVM? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,

```
rsevm
```

When mode = TTL,

```
avg,max,min
```

When mode = IND,

```
s,rsevm(1),rsevm(2),…,rsevm(s)
```

### Parameters

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Average |
| rsevm | Measurement result in specified Storage mode |
| avg | Measurement result (Average) |
| max | Measurement result (Maximum) |
| min | Measurement result (Minimum) |
| rsevm(n) | The n-th Measurement result (n=1 to s) |
| Resolution | 0.01% |
| Unit | % |
| s | Number of valid measurement results |

### Example of Use

To query the average of Reference Signal EVM measurement result:

```
RSEVM? AVG
> 1.51
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# RXFREQ

Downlink Frequency

## Function

Sets or queries the downlink frequency.
This command has the same function as DLFREQ.

## Command

```
RXFREQ [cc,]dl_freq
```

## Query

```
RXFREQ? [cc]
```

## Response

```
dl_freq
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| dl_freq | Downlink frequency |
| Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 3750 000 000 Hz |
| Unit | Hz |

## Details

This sets the Rx frequency for the mobile station.
Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the downlink frequency to 3750 MHz:

```
RXFREQ PCC,3750MHZ
RXFREQ?
> 3750000000
```

## SEM_SET

SEM On/Off and Meas. Count

### Function

Sets or queries the SEM (Spectrum Emission Mask) Measurement On/Off state and measurement count.

### Command

```
SEM_SET on_off[,avg_count]
```

### Query

```
SEM_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

| | |
|---|---|
| on_off | Enables/disables the measurement. |
| ON | Enables the measurement. |
| OFF | Disables the measurement. |
| Default | OFF |
| avg_count | Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| Suffix code | None |
| Default | 1 |

### Example of Use

To set the SEM measurement to On and set the measurement count to 100:

```
SEM_SET ON,100
SEM_SET?
> ON,100
```

### Remarks

Some restrictions apply to measurement count. For details, refer to the remarks of the PWR_SET command.

## SEMPASS?

SEM Template Judgement

### Function

Queries the judgement of Spectrum Emission Mask measurement result. Fail when any part of spectrum exceeds limit, otherwise Pass.

### Query

```
SEMPASS?
```

### Response

```
judge
```

### Parameter

| | |
|---|---|
| judge | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on Spectrum Emission Mask measurement result:

```
SEMPASS?
> PASS
```

# SEQUENCEHOPPING

Sequence Hopping

### Function

Sets or queries the Sequence Hopping.

### Command

```
SEQUENCEHOPPING [cc,]type
```

### Query

```
SEQUENCEHOPPING? [cc]
```

### Response

```
type
```

### Parameters

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| type | PUSCH DM-RS Sequence Hopping On/Off |
| ON | On |
| OFF | Off |
| Default | OFF |

### Details

This is available only when UL RMC Waveform is set to DFT-s-OFDM.
When Sequence Hopping is set to On, Group Hopping is set to Off.

### Example of Use

To enable Sequence hopping:

```
SEQUENCEHOPPING PCC,ON
SEQUENCEHOPPING? PCC
> ON
```

## SPECFLAT1_M?

Spectrum Flatness (≥ 3 MHz (R1 –)) Result

### Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 1.

### Query

```
SPECFLAT1_M? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Minimum |
| sflatness | Minimum value in Range 1 in specified Storage mode. |
| avg | Minimum value in Range 1 (Average) |
| max | Minimum value in Range 1 (Maximum) |
| min | Minimum value in Range 1 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of minimum value in the Spectrum Flatness measurement result in Range 1:

```
SPECFLAT1_M? AVG
> 0.04
```

## SPECFLAT1_P?

Spectrum Flatness (≥ 3 MHz (R1 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 1.

### Query

```
SPECFLAT1_P? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Maximum |
| sflatness | Maximum value in Range 1 in specified Storage mode. |
| avg | Maximum value in Range 1 (Average) |
| max | Maximum value in Range 1 (Maximum) |
| min | Maximum value in Range 1 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of maximum value in the Spectrum Flatness measurement result in Range 1:

```
SPECFLAT1_P? AVG
> 0.04
```

# SPECFLAT2_M?

Spectrum Flatness (< 3 MHz (R2 –)) Result

## Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 2.

## Query

```
SPECFLAT2_M? [mode]
```

## Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Minimum |
| sflatness | Minimum value in Range 2 in specified Storage mode. |
| avg | Minimum value in Range 2 (Average) |
| max | Minimum value in Range 2 (Maximum) |
| min | Minimum value in Range 2 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

## Example of Use

To query the average of minimum value in the Spectrum Flatness measurement result in Range 2:

```
SPECFLAT2_M? AVG
> 0.04
```

## SPECFLAT2_P?

Spectrum Flatness (< 3 MHz (R2 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 2.

### Query

```
SPECFLAT2_P? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| Omitted | Maximum |
| sflatness | Maximum value in Range 2 in specified Storage mode. |
| avg | Maximum value in Range 2 (Average) |
| max | Maximum value in Range 2 (Maximum) |
| min | Maximum value in Range 2 (Minimum) |
| Resolution | 0.01 dB |
| Unit | dB |

### Example of Use

To query the average of maximum value in the Spectrum Flatness measurement result in Range 2:

```
SPECFLA2_P? AVG
> 0.04
```

# SPECFLATITEM?

Spectrum Flatness Measured Item

## Function

Queries whether a spectrum flatness measurement item(s) is measured or not.

## Query

```
SPECFLATITEM?
```

## Response

```
flag
```

## Parameter

| | |
|---|---|
| flag | Measured/Not measured flag (0 to 3)<br>Returns the sum of the following measurement items. |
| 0 | Not measured |
| 1 | ≥ 3 MHz area |
| 2 | < 3 MHz area |
| Unit | None |

## Example of Use

To query whether a spectrum flatness measurement item(s) is measured or not:

```
SPECFLATITEM?
> 2
```

## SPECFLATPPPASS?

Spectrum Flatness Judgement

### Function

Queries the judgement of Spectrum Flatness measurement result.

### Query

```
SPECFLATPPPASS?
```

### Response

```
judge
```

### Parameter

| | |
|---|---|
| judge | Judgement |
| PASS | Pass |
| FAIL | Fail |
| – | Not measured |

### Example of Use

To query the judgement on Spectrum Flatness measurement result:

```
SPECFLATPPPASS?
> PASS
```

# SPECFLAT_RP?

Spectrum Flatness (RP Total) Result

## Function

Queries all ripple values in the Spectrum Flatness measurement result.

## Query

```
SPECFLAT_RP? [mode]
```

## Response

mode = AVG, MAX, MIN, DVT

```
sflat(RP1),sflat(RP2),sflat(RP12),sflat(RP21)
```

mode = TTL

```
avg(RP1),avg(RP2),avg(RP12),avg(RP21),
max(RP1),max(RP2),max(RP12),max(RP21),
min(RP1),min(RP2),min(RP12),min(RP21)
```

mode = IND

```
s,sflat(RP1)(1),sflat(RP2)(1),sflat(RP12)(1),sflat(RP21)(1),
…,sflat(RP1)(s),sflat(RP2)(s),sflat(RP12)(s),sflat(RP21)(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| sflat | Ripple value in specified Storage mode. |
| avg | Ripple value (Average) |
| max | Ripple value (Maximum) |
| min | Ripple value (Minimum) |
| sflat(n) | Nth ripple value (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Measurement count |

## Example of Use

To query the average of every ripple value in the Spectrum Flatness measurement result:

```
SPECFLAT_RP? AVG
> 0.04,0.03,0.06,0.05
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## SPECFLAT_RP1?

Spectrum Flatness (≥ 3 MHz (RP1)) Result

### Function

Queries the ripple value(s) in the Spectrum Flatness measurement result in Range 1.

### Query

```
SPECFLAT_RP1? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

mode = IND

```
s,sflatness(1),sflatness(2),…,sflatness(s)
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| sflatness | Ripple value in Range 1 in specified Storage mode. |
| avg | Ripple value in Range 1 (Average) |
| max | Ripple value in Range 1 (Maximum) |
| min | Ripple value in Range 1 (Minimum) |
| sflatness(n) | Nth ripple value in Range 1 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Measurement count |

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 1:

```
SPECFLAT_RP1? AVG
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# SPECFLAT_RP12?

Spectrum Flatness (RP12) Result

## Function

Queries the difference between the maximum value in Range 1 and the minimum value in Range 2 of the Spectrum Flatness measurement result.

## Query

```
SPECFLAT_RP12? [mode]
```

## Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

mode = IND

```
s,sflatness(1),sflatness(2),…,sflatness(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| sflatness | Difference between the maximum value in Range 1 and the minimum value in Range 2 in specified Storage mode. |
| avg | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Average) |
| max | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Maximum) |
| min | Difference between the maximum value in Range 1 and the minimum value in Range 2 (Minimum) |
| sflatness(n) | Nth difference between the maximum value in Range 1 and the minimum value in Range 2 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Measurement count |

Example of Use

To query the average of difference between the maximum value in Range 1 and the minimum value in Range 2:

```
SPECFLAT_RP12? AVG
> 0.04
```

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# SPECFLAT_RP2?

Spectrum Flatness (< 3 MHz (RP2)) Result

## Function

Queries the ripple value(s) in the Spectrum Flatness measurement result in Range 2.

## Query

```
SPECFLAT_RP2? [mode]
```

## Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

mode = IND

```
s,sflatness(1),sflatness(2),…,sflatness(s)
```

## Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| sflatness | Ripple value in Range 2 in specified Storage mode. |
| avg | Ripple value in Range 2 (Average) |
| max | Ripple value in Range 2 (Maximum) |
| min | Ripple value in Range 2 (Minimum) |
| sflatness(n) | Nth ripple value in Range 2 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Measurement count |

## Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 2:

```
SPECFLAT_RP2? AVG
> 0.04
```

## Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## SPECFLAT_RP21?

Spectrum Flatness (RP21) Result

### Function

Queries the difference between the maximum value in Range 2 and the minimum value in Range 1 of the Spectrum Flatness measurement result.

### Query

```
SPECFLAT_RP21? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflatness
```

mode = TTL

```
avg,max,min
```

mode = IND

```
s,sflatness(1),sflatness(2),…,sflatness(s)
```

### Parameter

| | |
|---|---|
| mode | Storage mode |
| AVG | Average |
| MAX | Maximum |
| MIN | Minimum |
| TTL | Average・Maximum・Minimum |
| DVT | Standard deviation |
| IND | Individual measurement result |
| Omitted | Maximum |
| sflatness | Difference between the maximum value in Range 2 and the minimum value in Range 1 in specified Storage mode. |
| avg | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Average) |
| max | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Maximum) |
| min | Difference between the maximum value in Range 2 and the minimum value in Range 1 (Minimum) |
| sflatness(n) | Nth difference between the maximum value in Range 2 and the minimum value in Range 1 (n = 1 to s) |
| Resolution | 0.01 dB |
| Unit | dB |
| s | Measurement count |

Example of Use

To query the average of difference between the maximum value in Range 2 and the minimum value in Range 1:

```
SPECFLAT_RP21? AVG
> 0.04
```

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# TRGDLY

Trigger Delay

## Function

Sets or queries the Trigger Delay.

## Command

```
TRGDLY delay
```

## Query

```
TRGDLY?
```

## Response

delay

## Parameters

| | |
|---|---|
| delay | Trigger Delay |
| Range | 0.000 to 10.000 ms |
| Resolution | 0.001 ms |
| Suffix code | S MS US NS (uses ms when omitted) |
| Default | 0.000 ms |
| Unit | ms |

## Details

This command is available when trigger source is set to other than FREE.

## Example of Use

To set the Trigger Delay to 0.001 ms:

```
TRGDLY 0.001
TRGDLY?
> 0.001
```

# TRGLVL

Trigger Level

## Function

Sets or queries the Trigger Level.

## Command

```
TRGLVL level
```

## Query

```
TRGLVL?
```

## Response

```
level
```

## Parameters

| | |
|---|---|
| level | Trigger Level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB |
| Default | –30 dB |
| Unit | dB |

## Details

This command is available when trigger source is set to VIDEO.

## Example of Use

To set the Trigger Level to –30 dB:

```
TRGLVL -30
TRGLVL?
> -30
```

# TRGMGAP

Minimum Trigger Gap

## Function

Sets or queries the minimum time the signal must be below the trigger level when the trigger source is set to VIDEO.

## Command

```
TRGMGAP time
```

## Query

```
TRGMGAP?
```

## Response

```
time
```

## Parameters

| | |
|---|---|
| time | Minimum Trigger Gap |
| Range | 0 to 10.0 ms |
| Resolution | 0.1 ms |
| Suffix code | S MS US NS (uses ms when omitted) |
| Default | 0.0 ms |
| Unit | ms |

## Details

This command is available when trigger source is set to VIDEO.

## Example of Use

To set the Minimum Trigger Gap to 1 ms:

```
TRGMGAP 1MS
TRGMGAP?
> 1
```

# TRGSRC

Trigger Source

## Function

Sets or queries the Trigger Source.

## Command

```
TRGSRC source
```

## Query

```
TRGSRC?
```

## Response

source

## Parameters

| source | Trigger Source |
|---|---|
| VIDEO | Power |
| FRAME | Frame |
| FREE | Freerun |
| Default | FRAME |

## Example of Use

To set the Trigger Source to Frame:

```
TRGSRC FRAME
TRGSRC?
> FRAME
```

# TRGTOUT

Trigger Timeout

## Function

Sets or queries the Trigger Timeout.

## Command

```
TRGTOUT time
```

## Query

```
TRGTOUT?
```

## Response

```
time
```

## Parameters

| | |
|---|---|
| time | Trigger Timeout |
| Range | 1 to 60 s |
| Unit | s |
| Resolution | 1 s |
| Suffix code | NS, US, MS, S (uses s when omitted) |
| Default | 10 s |

## Example of Use

To set the Trigger Timeout to 10 s:

```
TRGTOUT 10
TRGTOUT?
> 10
```

# TTL_WORST_SEM?

SEM Mask Margin (All range)

## Function

Queries the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement.

## Query

```
TTL_WORST_SEM?
```

## Response

```
margin(-1),freq(-1),…,margin(-4),freq(-4),margin(1),freq(1),…,margin(4),freq(4)
```

## Parameter

| | | |
|---|---|---|
| level(n) | | Margin from template for the worst spectrum level in each frequency range (Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 0.01 dB |
| | Unit | dB |
| freq(n) | | Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 1 Hz |
| | Unit | Hz |

## Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to 4” for Frequency ranges.

## Example of Use

To query the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
TTL_WORST_SEM?
> -10.90,-855000,-10.73,-1500000,-10.82,-2300000,-10.96,-4300000,
-10.80,735000,-10.64,2000000,-10.61,2300000, -10.48,4500000
```

# TTL_WORST_SEM_DET?

SEM Mask Margin (Detail) (All range)

## Function

Queries the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement.

## Query

```
TTL_WORST_SEM_DET?
```

## Response

```
margin(-1),freq(-1),…,margin(-23),freq(-23),margin(1),freq(1),…,margin(23),freq(23)
```

## Parameter

| | |
|---|---|
| level(n) | Margin from template for the worst spectrum level in each frequency range (Frequency range: n = –23 to –1, 1 to 23) |
| Resolution | 0.01 dB |
| Unit | dB |
| freq(n) | Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = –23 to –1, 1 to 23) |
| Resolution | 1 Hz |
| Unit | Hz |

## Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

## Example of Use

To query the margin from template for the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
TTL_WORST_SEM_DET?
> -10.90,-855000,-10.73,-1500000,-10.82,-2300000,-10.96,-4300000,
-10.62,-5500000,-10.54,-9500000,-10.47,-14500000,-10.54,-19500000,…,
-10.42,-23500000,-10.80,735000,-10.64,2000000,-10.61,2300000,
-10.48,4500000,-10.78,5500000,-10.38,6500000,-10.50,12500000,
-10.60,16500000,-10.73,22500000
```

# TTL_WORST_SEM_DET_LV?

SEM Worst Value (Detail) (All range)

## Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

## Query

```
TTL_WORST_SEM_DET_LV?
```

## Response

```
level(-1),freq(-1),…,level(-23),freq(-23),level(1),freq(1),…,
level(23),freq(23)
```

## Parameters

| | | |
|---|---|---|
| level(n) | | Worst spectrum level in each frequency range<br>(Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 0.01 dB |
| | Unit | dBm |
| freq(n) | | Offset frequency of the worst spectrum level in each frequency range<br>(Frequency range: n = –23 to –1, 1 to 23) |
| | Resolution | 1 Hz |
| | Unit | Hz |

## Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

## Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
TTL_WORST_SEM_DET_LV?
> -94.90,-855000,-79.73,-1500000,-79.82,-2300000,-78.96,-4300000,
-79.62,-5500000,-79.54,-9500000,-79.47,-14500000,-79.54,-19500000,…,
-79.42,-23500000,-93.80,735000,-77.64,2000000,-77.61,2300000,
-9.48,4500000,-72.78,5500000,-77.38,6500000,-78.50,12500000,
-78.60,16500000,-78.73,22500000
```

## TTL_WORST_SEM_LV?

SEM Worst Value (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

```
TTL_WORST_SEM_LV?
```

### Response

```
level(-1),freq(-1),…,level(-4),freq(-4),level(1),freq(1),…,
level(4),freq(4)
```

### Parameters

| | | |
|---|---|---|
| level(n) | | Worst spectrum level in each frequency range<br>(Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 0.01 dB |
| | Unit | dBm |
| freq(n) | | Offset frequency of the worst spectrum level in each frequency range<br>(Frequency range: n = –4 to –1, 1 to 4) |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
TTL_WORST_SEM_LV?
>-20.00,30,-20.00,30,-20.00,30,-20.00,30,-20.00,30,-20.00,30,-20.00,
30,-20.00,30
```

# TXFREQ

Uplink Frequency

## Function

Sets or queries the uplink frequency.
This command has the same function as ULFREQ.

## Command

```
TXFREQ [cc,]ul_freq
```

## Query

```
TXFREQ? [cc]
```

## Response

```
ul_freq
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| ul_freq | | Uplink frequency |
| | Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| | Resolution | 1 Hz |
| | Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| | Default | 3750 000 000 Hz |
| | Unit | Hz |

## Details

This sets the Tx frequency for the mobile station.
Updating this Uplink frequency does not affect the Uplink Channel parameters.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the Uplink frequency to 3750 MHz:

```
TXFREQ PCC,3750MHZ
TXFREQ? PCC
> 3750000000
```

## TXMEASRESULT?

All Results

### Function

Queries the TX measurement results.

### Query

```
TXMEASRESULT? index
```

### Response

`result(1),…,result(x)` Tx measurement results. Refer to Details.

### Parameter

| | | |
|---|---|---|
| index | | Measurement results index |
| | Range | 1 to 6, 102 (Refer to Details) |
| | Resolution | 1 |

### Details

Refer to Details of NR_TXMEASRESULT? command in 5.2.3.

### Example of Use

To query the Tx measurement results for index 1:

```
TXMEASRESULT? 1
> -20.00,-19.55,-20.06,…,0.04,2
```

# ULBANDWIDTH

UL Channel Bandwidth

### Function

Sets or queries the UL Channel Bandwidth.

### Command

```
ULBANDWIDTH [cc,]ch_bw
```

### Query

```
ULBANDWIDTH? [cc]
```

### Response

```
ch_bw
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ch_bw | Bandwidth |
| 5MHZ | 5 MHz |
| 10MHZ | 10 MHz |
| 15MHZ | 15 MHz |
| 20MHZ | 20 MHz |
| 25MHZ | 25 MHz |
| 30MHZ | 30 MHz |
| 40MHZ | 40 MHz |
| 50MHZ | 50 MHz |
| 60MHZ | 60 MHz |
| 70MHZ | 70 MHz |
| 80MHZ | 80 MHz |
| 90MHZ | 90 MHz |
| 100MHZ | 100 MHz |
| Default | 100MHZ |

### Example of Use

To set the UL channel bandwidth to 100 MHz:

```
ULBANDWIDTH PCC,100MHZ
ULBANDWIDTH? PCC
> 100MHZ
```

### Remarks

When the UL Channel Bandwidth is updated, UL RMC Number of RBs and UL RMC Starting RB are changed accordingly.

UL RMC Number of RBs is reset to the maximum and UL RMC Starting RB is reset to 0.

When editing UL Channel Bandwidth makes UL Subcarrier Spacing outside the setting range, Subcarrier Spacing is set to 30 kHz.

## ULBANDWIDTH_EUTRA

E-UTRA UL Channel Bandwidth

### Function

Sets or queries the E-UTRA UL Channel Bandwidth.

### Command

```
ULBANDWIDTH_EUTRA [cc,]eutra_bw
```

### Query

```
ULBANDWIDTH_EUTRA? [cc]
```

### Response

```
eutra_bw
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_bw | Bandwidth |
| 1.4MHZ | 1.4 MHz (Default) |
| 3MHZ | 3 MHz |
| 5MHZ | 5 MHz |
| 10MHZ | 10 MHz |
| 15MHZ | 15 MHz |
| 20MHZ | 20 MHz |

### Example of Use

To set the E-UTRA UL channel bandwidth to 10 MHz:

```
ULBANDWIDTH_EUTRA PCC,10MHZ
ULBANDWIDTH_EUTRA? PCC
> 10MHZ
```

# ULCHAN

Uplink Channel

### Function

Sets or queries the Uplink Channel.

### Command

```
ULCHAN [cc,]ul_ch
```

### Query

```
ULCHAN? [cc]
```

### Response

```
ul_ch
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ul_ch | Uplink Channel |
| Range | 120000 to 653333 (MU887000A/01A)<br>120000 to 800000 (with MU887000A/01A-001)<br>120000 to 800000 (MU887002A)<br>120000 to 800000 (with MU887002A-007, Port 1 to 4)<br>120000 to 886666 (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 |
| Suffix code | None |
| Default | 650000 |

### Details

When the Uplink Channel is updated, the related Operation Band, Frame Structure, Downlink Channel, Uplink Frequency, and Downlink Frequency are changed accordingly. For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-1 “Relationship between Uplink Channel Number and Downlink Channel Number” and to Table 2.1.6-3 “NR channel numbers and TX-RX Frequency Separation”.

### Example of Use

To set the Uplink Channel to 120000:

```
ULCHAN PCC,120000
ULCHAN? PCC
> 120000
```

# ULCHAN_EUTRA

E-UTRA Uplink Channel

## Function

Sets or queries the E-UTRA Uplink Channel.

## Command

```
ULCHAN_EUTRA [cc,]ulchan
```

## Query

```
ULCHAN_EUTRA? [cc]
```

## Response

```
ulchan
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ulchan | Uplink Channel |
| Range | 0 to 262143 |
| Resolution | 1 |
| Default | 40620 |
| Suffix code | None |

## Details

When the E-UTRA Uplink Channel is changed, the Uplink Frequency and Frame Structure are changed accordingly.

For the relationship between the channel and frequency settings, refer to Table 2.1.6-5 “E-UTRA channel numbers and Default UE TX-RX frequency separation” and to Table 2.1.6-6 “Relationship between Band and Frame Structure”.

## Example of Use

To set the E-UTRA Uplink Channel to 40620:

```
ULCHAN_EUTRA PCC,40620
ULCHAN_EUTRA? PCC
> 40620
```

# ULDMRSDURATION

DMRS Duration

## Function

Sets or queries the PUSCH DMRS duration.

## Command

```
ULDMRSDURATION [cc,]symbol
```

## Query

```
ULDMRSDURATION? [cc]
```

## Response

```
symbol
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| symbol | DM-RS duration |
| SINGLE | single-symbol DM-RS |
| Default | SINGLE |

## Example of Use

To set the DMRS duration to single-symbol DM-RS:

```
ULDMRSDURATION PCC,SINGLE
ULDMRSDURATION? PCC
> SINGLE
```

## ULDMRSPORT

Antenna port

### Function

Sets or queries the PUSCH Antenna port.

### Command

```
ULDMRSPORT [cc,]port
```

### Query

```
ULDMRSPORT? [cc]
```

### Response

```
port
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| port | Antenna port |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Example of Use

To set the Antenna port to 0:

```
ULDMRSPORT PCC,0
ULDMRSPORT? PCC
> 0
```

# ULDMRSADDPOS

DMRS add pos

## Function

Sets or queries the PUSCH DMRS UL-DMRS-add-pos.

## Command

```
ULDMRSADDPOS [cc,]rspos
```

## Query

```
ULDMRSADDPOS? [cc]
```

## Response

```
rspos
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| rspos | UL-DMRS-add-pos |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |

## Example of Use

To set the UL-DMRS-add-pos to 0:

```
ULDMRSADDPOS PCC,0
ULDMRSADDPOS? PCC
> 0
```

# ULDMRSTYPEAPOS

DMRS typeA pos

## Function

Sets or queries the PUSCH DMRS Starting position (typeA-pos).

## Command

```
ULDMRSTYPEAPOS [cc,]pos
```

## Query

```
ULDMRSTYPEAPOS? [cc]
```

## Response

```
pos
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| pos | UL-DMRS-typeA-pos |
| 2 | 2 |
| 3 | 3 |
| Default | 2 |

## Example of Use

To set the Starting position (typeA-pos) to 2:

```
ULDMRSTYPEAPOS PCC,2
ULDMRSTYPEAPOS? PCC
> 2
```

# ULDMRSTYPE

UL DMRS Config Type

## Function

Sets or queries the PUSCH DMRS UL-DMRS-config-type.

## Command

```
ULDMRSTYPE [cc,]type
```

## Query

```
ULDMRSTYPE? [cc]
```

## Response

```
type
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| type | PUSCH DM-RS configuration type |
| TYPE1 | Type1 |
| Default | TYPE1 |

## Example of Use

To set the UL-DMRS-config-type to Type1:

```
ULDMRSTYPE PCC,TYPE1
ULDMRSTYPE? PCC
> TYPE1
```

# ULDURATION

UL Duration

## Function

Sets or queries the UL signal period of DL/UL Periodicity by slot.

## Command

```
ULDURATION [cc,]duration
```

## Query

```
ULDURATION? [cc]
```

## Response

```
duration
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| duration | UL signal period of DL/UL Periodicity by slot |
| Range | 1 to 39 |
| Resolution | 1 |
| Default | 10 |
| Suffix code | None |

## Details

The setting range varies according to the setting value of DL/UL Periodicity and UL Subcarrier Spacing.

UL Duration setting range

| UL Subcarrier Spacing | DL/UL Periodicity | | | |
|---|---|---|---|---|
| | 1 ms | 2.5 ms | 5 ms | 10 ms |
| 15 kHz | – | – | 1 to 4 | 1 to 9 |
| 30 kHz | 1 | 1 to 4 | 1 to 9 | 1 to 19 |
| 60 kHz | 1 to 3 | 1 to 9 | 1 to 19 | 1 to 39 |

The slots including burst signal rise are out of the measurement target,
"the maximum settable value – 1" is the upper limit of the setting range.

This command is available when trigger source is set to VIDEO or FRAME.

## Example of Use

To set the UL signal period to 10 slots:

```
ULDURATION PCC,10
ULDURATION? PCC
> 10
```

# ULFREQ

Uplink Frequency

## Function

Sets or queries the Uplink frequency.

## Command

```
ULFREQ [cc,]ul_freq
```

## Query

```
ULFREQ? [cc]
```

## Response

```
ul_fleq
```

## Parameter

| | | |
|---|---|---|
| cc | | Component Carrier |
| | PCC | PCC (Default) |
| | Omitted | PCC |
| ul_freq | | Uplink frequency |
| | Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| | Resolution | 1 Hz |
| | Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| | Default | 3750 000 000 Hz |
| | Unit | Hz |

## Details

This sets the Tx frequency for the mobile station.
Updating this Uplink frequency does not affect the Uplink Channel parameters.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the Uplink frequency to 3750 MHz:

```
ULFREQ 3750MHZ
ULFREQ?
> 3750000000
```

# ULFREQ_EUTRA

E-UTRA Uplink Frequency

## Function

Sets or queries the E-UTRA Uplink frequency.

## Command

```
ULFREQ_EUTRA [cc,]ulfreq
```

## Query

```
ULFREQ_EUTRA? [cc]
```

## Response

```
ulfreq
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ulfreq | Uplink frequency |
| Range | 600 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>600 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>600 000 000 to 6000 000 000 Hz (MU887002A)<br>600 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>600 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 2593 000 000 Hz |
| Unit | 1 Hz |

## Details

This sets the Tx frequency for the mobile station.
Updating this Uplink frequency does not affect the Uplink Channel parameters.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the E-UTRA Uplink frequency to 2593 MHz:

```
ULFREQ_EUTRA PCC,2593MHZ
ULFREQ_EUTRA? PCC
> 2593000000
```

# ULMAPPINGTYPE

PUSCH mapping type

## Function

Sets or queries the PUSCH mapping type.

## Command

```
ULMAPPINGTYPE [cc,]mappingtype
```

## Query

```
ULMAPPINGTYPE? [cc]
```

## Response

```
mappingtype
```

## Parameters

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| mappingtype | PUSCH mapping type |
| TYPEA | Type A |
| TYPEB | Type B |
| Default | TYPEA |

## Example of Use

To set the PUSCH mapping type to Type B:

```
ULMAPPINGTYPE PCC,TYPEB
ULMAPPINGTYPE? PCC
> TYPEB
```

## ULRB_START

UL RMC Starting RB

### Function

Sets or queries the starting RB number for Uplink signal.

### Command

```
ULRB_START [cc,]ulrb
```

### Query

```
ULRB_START? [cc]
```

### Response

```
ulrb
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ulrb | Starting RB number |
| Range | 0 to (RBmax – RBn)<br>For RBmax, refer to Details of ULRMC_RB command.<br>RBn is set using the ULRMC_RB command. |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

### Details

UL RMC Starting RB is reset to 0 when the setting value of UL Channel Bandwidth, Subcarrier Spacing, or UL RMC Number of RBs is updated.

### Example of Use

To set the UL RMC starting RB number to 0:

```
ULRB_START PCC,0
ULRB_START? PCC,
> 0
```

# ULRB_START_EUTRA

E-UTRA UL Starting RB

## Function

Sets or queries the starting RB number for E-UTRA Uplink signal assigned to E-UTRA channel.

## Command

```
ULRB_START_EUTRA [cc,]eutra_start
```

## Query

```
ULRB_START_EUTRA? [cc]
```

## Response

```
eutra_start
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| eutra_start | Starting RB number |
| Range | 0 to (RBmax_eutra – RBn_eutra)<br>For RBmax_eutra, refer to Details of ULRMC_RB_EUTRA command.<br>RBn_eutra is set using the ULRMC_RB_EUTRA command. |
| Resolution | 1 |
| Default | 0 |
| Suffix code | None |

## Details

E-UTRA UL Starting RB is reset to 0 when the setting value of E-UTRA UL Channel Bandwidth or E-UTRA UL Number of RBs is updated.

## Example of Use

To set the starting RB number for Uplink signal assigned to E-UTRA channel to 0:

```
ULRB_START_EUTRA PCC,0
ULRB_START_EUTRA? PCC
> 0
```

# ULRMC_MOD

UL RMC Modulation

## Function

Sets or queries the Modulation scheme of uplink signal.

## Command

```
ULRMC_MOD [cc,]ul_rmc_mod
```

## Query

```
ULRMC_MOD? [cc]
```

## Response

```
ul_rmc_mod
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ul_rmc_mod | Modulation scheme |
| PI2BPSK | π/2-BPSK (When UL RMC Waveform is DFT-s-OFDM) |
| QPSK | QPSK |
| 16QAM | 16QAM |
| 64QAM | 64QAM |
| Default | QPSK |

## Details

This parameter is changed to QPSK if this parameter is PI2BPSK and UL RMC Waveform is changed to CP-OFDM.

## Example of Use

To set the Modulation scheme to QPSK:

```
ULRMC_MOD PCC,QPSK
ULRMC_MOD? PCC
> QPSK
```

# ULRMC_RB

UL RMC Number of RBs

## Function

Sets or queries the number of RBs (Resource Blocks) assigned at Uplink RMC.

## Command

```
ULRMC_RB [cc,]ul_rmc_rb
```

## Query

```
ULRMC_RB? [cc]
```

## Response

```
ul_rmc_rb
```

## Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ul_rmc_rb | Number of RBs |
| Range | 0 to RBmax |
| Resolution | 1 |
| Default | 273 |
| Suffix code | None |

## Details

The UL RMC Starting RB is reset to 0 accordingly when the UL RMC Number of RBs is changed.
When UL RMC Number of RBs is set to 0, the measurement result of Modulation Analysis will not be measured.
Number of RBs upper limit (RBmax) is changed depending on the setting of UL Channel Bandwidth (CBW) and UL Subcarrier Spacing (SCS).

Upper limit for UL RMC Number of RBs (RBmax)

| SCS | CBW (MHz) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 15 kHz | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 | – | – | – | – | – |
| 30 kHz | 11 | 24 | 38 | 51 | 65 | 78 | 106 | 133 | 162 | 189 | 217 | 245 | 273 |
| 60 kHz | – | 11 | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 93 | 107 | 121 | 135 |

### Settable Value

When UL RMC Waveform is CP-OFDM: 1 to RBmax
When UL RMC Waveform is DFT-s-OFDM: The following values less than or equal to RBmax.

1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 27, 30, 32, 36, 40, 45, 48, 50, 54, 60, 64, 72, 75, 80, 81, 90, 96, 100, 108, 120, 125, 128, 135, 144, 150, 160, 162, 180, 192, 200, 216, 225, 240, 243, 250, 256, 270

Example of Use

To set the number of RBs to 273:

```
ULRMC_RB PCC,273
ULRMC_RB? PCC
> 273
```

Remarks

When UL RMC Waveform is set to DFT-s-OFDM, the number of RBs that can be set is the number defined by equation of (2^X) × (3^Y) × (5^Z) where (X, Y, Z ≥ 0, integer).

# ULRMC_RB_EUTRA

E-UTRA UL Number of RBs

### Function

Sets or queries the number of RBs (Resource Blocks) assigned to E-UTRA channel.

### Command

```
ULRMC_RB_EUTRA [cc,]eutra_nrb
```

### Query

```
ULRMC_RB_EUTRA? [cc]
```

### Response

```
eutra_nrb
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| ul_rmc_rb | Number of RBs |
| Range | 0 to Rbmax_eutra |
| Resolution | 1 |
| Default | 6 |
| Suffix code | None |

### Details

The E-UTRA UL RMC Starting RB is reset to 0 accordingly when the E-UTRA UL Number of RBs is changed.
E-UTRA UL Number of RBs upper limit (RBmax_eutra) is changed depending on the setting of E-UTRA UL Channel Bandwidth (eutra_bw).

Upper limit for E-UTRA UL Number of RBs (RBmax_eutra)

| eutra_bw (MHz) | 1.4 | 3 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|
| RBmax_eutra | 6 | 15 | 25 | 50 | 75 | 100 |

Settable Value: The following values less than or equal to RBmax_eutra in above table.
0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 27, 30, 32, 36, 40, 45, 48, 50, 54, 60, 64, 72, 75, 80, 81, 90, 96, 100

### Example of Use

To set the number of RBs assigned to E-UTRA channel to 6:

```
ULRMC_RB_EUTRA PCC,6
ULRMC_RB_EUTRA? PCC
> 6
```

## ULSCS

UL Subcarrier Spacing

### Function

Sets or queries the Subcarrier Spacing.

### Command

```
ULSCS [cc,]scs
```

### Query

```
ULSCS? [cc]
```

### Response

```
scs
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| scs | Subcarrier Spacing |
| 15KHZ | 15 kHz (when UL Channel Bandwidth ≤ 50 MHz) |
| 30KHZ | 30 kHz |
| 60KHZ | 60 kHz (when UL Channel Bandwidth ≥ 10 MHz) |
| Default | 30 kHz |

### Example of Use

To set the Subcarrier Spacing to 30 kHz:

```
ULSCS PCC,30KHZ
ULSCS? PCC
> 30KHZ
```

### Remarks

When the UL Subcarrier Spacing is updated, UL RMC Number of RBs and UL RMC Starting RB are changed accordingly.

UL RMC Number of RBs is reset to the maximum, UL RMC Starting RB is reset to 0.

The setting range varies depending on the UL Channel Bandwidth.
When editing UL Channel Bandwidth makes UL Subcarrier Spacing outside the setting range, Subcarrier Spacing is set to 30 kHz.

When editing UL Subcarrier Spacing makes DL/UL Periodicity outside the setting range, DL/UL Periodicity is set to 10 ms.

# ULWAVEFORM

UL RMC Waveform

### Function

Sets or queries the PUSCH Waveform.

### Command

```
ULWAVEFORM [cc,]wave
```

### Query

```
ULWAVEFORM? [cc]
```

### Response

```
wave
```

### Parameter

| | |
|---|---|
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| wave | Waveform |
| CPOFDM | CP-OFDM |
| DFTOFDM | DFT-s-OFDM |
| Default | CPOFDM |

### Example of Use

To set the Waveform of PUSCH to CP-OFDM:

```
ULWAVEFORM PCC,CPOFDM
ULWAVEFORM? PCC
> CPOFDM
```

### Remarks

When UL RMC Waveform is changed, UL RMC Number of RBs is set to maximum and UL RMC Starting RB is set to 0.

## WAVEFMEAS?

Waveform

### Function

Queries the spectrum waveform data of each measurement result.

### Query

```
WAVEFMEAS? format,position,length[,symbol]
```

### Response

```
data(1),…,data(length)
```

### Parameter

format Measurement Item

| Format | Measurement Item | Format | Measurement Item |
|---|---|---|---|
| 1 | Occupied Bandwidth | 11 | In-band Emissions (dB) (average) |
| 2 | Spectrum Emission Mask | 12 | In-band Emissions (dB) (maximum) |
| 3 | Constellation (I) | 13 | In-band Emissions (dBc) (average) |
| 4 | Constellation (Q) | 14 | In-band Emissions (dBc) (maximum) |
| 5 | EVM (average) | 15 | Spectrum Flatness (average) |
| 6 | EVM (maximum) | 16 | Spectrum Flatness (maximum) |
| 7 | Phase Error (average) | 17 | Spectrum Flatness (minimum) |
| 8 | Phase Error (maximum) | 18 | In-band Emissions (E-UTRA) (dB) (average) |
| 9 | Magnitude Error (average) | 19 | In-band Emissions (E-UTRA) (dB) (maximum) |
| 10 | Magnitude Error (maximum) | 20 | In-band Emissions (E-UTRA) (dBc) (average) |
| | | 21 | In-band Emissions (E-UTRA) (dBc) (maximum) |

position Start point of waveform data
Range 0 to (Number of data – 1)
Number of data: Refer to Table 2.8-2, 2.8-3, 2.8-4
Resolution 1
Suffix code None
length Number of read data
Range 1 to Number of data Number of data: Refer to Table 2.8-2, 2.8-3, 2.8-4
Resolution 1
Suffix code None
symbol Position of SC-FDMA symbol
Range 0 to 13 (Constellation, EVM, Phase Error, Magnitude Error)
Resolution 1

| | | |
|---|---|---|
| data(n) | Waveform data | |
| Resolution | 0.01 dB | (Occupied Bandwidth, Spectrum Emission Mask, In-band Emissions, Spectrum Flatness) |
| | 0.01 deg. | (Phase Error) |
| | 0.01% | (EVM, Magnitude Error) |
| | 0.0001 | (Constellation) |
| Unit | dBm | (Spectrum Emission Mask) |
| | dB | (Occupied Bandwidth, In-band Emissions (dB), Spectrum Flatness) |
| | dBc | (In-band Emissions (dBc)) |
| | degree | (Phase Error) |
| | % | (EVM, Magnitude Error) |
| | None | (Constellation) |

### Details

Refer to Table 2.8-1 “Waveform Data Type and Data Interval” for Data Interval.

### Example of Use

To query the Occupied Bandwidth of 20 data from 25 of each measurement:

```
WAVEFMEAS? 1,25,20
> -42.12,-40.14,…,-41.22
```

# WORST_CARRFERR?

Worst Carrier Frequency Error Result

## Function

Queries the worst value in Frequency Error measurement results.

## Query

```
WORST_CARRFERR? unit
```

## Response

```
cferr
```

## Parameters

| | | |
|---|---|---|
| unit | Unit | |
| HZ | Hz | |
| PPM | ppm | |
| cferr | Worst value in Frequency Error measurement results | |
| Resolution | 0.1 Hz | (unit = HZ) |
| | 0.01 ppm | (unit = PPM) |
| Unit | Hz | (unit = HZ) |
| | ppm | (unit = PPM) |

## Details

The worst value is either the maximum or minimum frequency error, whichever is the larger absolute value.

## Example of Use

To query the worst value in Frequency Error measurement results:

```
WORST_CARRFERR? PPM
> 0.03
```

# WORST_SEM?

SEM Mask Margin

## Function

Queries the margin from template for the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

## Query

```
WORST_SEM? range
```

## Response

```
margin,freq
```

## Parameter

| | |
|---|---|
| range | Frequency Range |
| Range | –4 to –1, 1 to 4 |
| Resolution | 1 |
| Suffix code | None |
| margin | Margin from template for the worst spectrum level in the frequency range specified by range. |
| Resolution | 0.01 dB |
| Unit | dB |
| freq | Offset frequency at the spectrum level in the frequency range specified by range. |
| Resolution | 1 Hz |
| Unit | Hz |

## Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

## Example of Use

To query the margin from template for the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM? 1
> -20.01,705
```

# WORST_SEM_DET?

SEM Mask Margin (Detail)

## Function

Queries the margin from template for the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

## Query

```
WORST_SEM_DET? range
```

## Response

```
margin,freq
```

## Parameter

| | | |
|---|---|---|
| range | | Frequency Range |
| | Range | –23 to –1, 1 to 23 |
| | Resolution | 1 |
| | Suffix code | None |
| level | | Margin from template for the worst spectrum level in the frequency range specified by range. |
| | Resolution | 0.01 dB |
| | Unit | dB |
| freq | | Offset frequency at the spectrum level in the frequency range specified by range. |
| | Resolution | 1 Hz |
| | Unit | Hz |

## Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

## Example of Use

To query the margin from template for the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_DET? 1
> -20.01,705
```

# WORST_SEM_DET_LV?

SEM Worst Value (Detail)

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
WORST_SEM_DET_LV? range
```

### Response

```
level,freq
```

### Parameter

| | |
|---|---|
| range | Frequency Range |
| Range | –23 to –1, 1 to 23 |
| Resolution | 1 |
| Suffix code | None |
| level | Worst spectrum level in the specified frequency range |
| Resolution | 0.01 dB |
| Unit | dB |
| freq | Offset frequency of the worst spectrum level in the specified frequency range |
| Resolution | 1 Hz |
| Unit | Hz |

### Details

The frequency range varies according to the channel bandwidth.
Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_DET_LV? 1
> -20.01,705
```

## WORST_SEM_LV?

SEM Worst Value

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

```
WORST_SEM_LV? range
```

### Response

```
level,freq
```

### Parameter

| | | |
|---|---|---|
| range | | Frequency Range |
| | Range | –4 to –1, 1 to 4 |
| | Resolution | 1 |
| | Suffix code | None |
| level | | Worst spectrum level in the specified frequency range |
| | Resolution | 0.01 dB |
| | Unit | dB |
| freq | | Offset frequency of the worst spectrum level in the specified frequency range |
| | Resolution | 1 Hz |
| | Unit | Hz |

### Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_LV? 1
> -20.01,705
```

## 5.2.3 Sequence measurement commands

### DLFREQ

Downlink Frequency

#### Function

Sets or queries the downlink frequency.

#### Command

```
DLFREQ dl_freq
```

#### Query

```
DLFREQ?
```

#### Response

```
dl_fleq
```

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

#### Parameters

| | |
|---|---|
| dl_fleq | Downlink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 2140 000 000 Hz |

#### Details

This sets the Rx frequency for the mobile station.
Changing the setting of downlink frequency does not change the setting of the downlink channel.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

#### Example of Use

To set the downlink frequency to 2050 MHz:

```
DLFREQ 2050MHZ
DLFREQ?
>2050000000
```

# ILVL

Input Level

### Function

Sets or queries the input level of the input test port.

### Command

```
ILVL level
```

### Query

```
ILVL?
```

### Response

```
level
```

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

### Parameters

level Input level

| | |
|---|---|
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –1.0 dBm |

### Details

For MU887000A, the setting range varies according to the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, the MU887000A Port1/Port2 setting range is –60.0 to +40.0 dBm.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

### Example of Use

To set the input level to –10.0 dBm:

```
ILVL -10.0
ILVL?
```

```
>-10.0
```

Related commands

EXTLOSSW
LOSSTBL
LOSSTBLVAL
For details of the commands, refer to Chapter 6 “Native Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

## NR_MEAS

Measurement Enable and Count

### Function

Sets or queries the On /Off status of measurement items and measurement counts collectively.

### Command

```
NR_MEAS
mcond,PWRonoff,PWRcount,MODonoff,MODcount,OBWonoff,OBWcount,SEMonoff,SEMc
ount,ACLRonoff,ACLRcount
```

### Query

```
NR_MEAS? mcond
```

### Response

```
PWRonoff,PWRcount,MODonoff,MODcount,OBWonoff,OBWcount,SEMonoff,SEMcount,A
CLRonoff,ACLRcount
```

### Parameters

| | |
|---|---|
| mcond | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |
| PWRonoff | Enables/disables Tx Power measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | ON |
| PWRcount | Tx Power measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| MODonoff | Enables/disables Modulation analysis measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| MODcount | Modulation analysis measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| OBWonoff | Enables/disables Occupied Bandwidth measurement |

| | |
|---|---|
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| OBWcount | Occupied Bandwidth measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| SEMonoff | Enables/disables Spectrum Emission Mask Measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| SEMcount | Spectrum Emission Mask Measurement count |
| Range | 1 to 100 |
| Resolution | 1 |
| ACLRonoff | Enables/disables Adjacent Channel Leakage Power Ratio measurement |
| ON | Enables measurement. |
| OFF | Disables measurement. |
| Default | OFF |
| ACLRcount | Adjacent Channel Leakage Power Ratio measurement count |
| Range | 1 to 100 |
| Resolution | 1 |

### Example of Use

To set all measurement items to On and set the number of measurement to 1 for the condition number 0 in the NR measurement condition table:

```
NR_MEAS 0,ON,1,ON,1,ON,1,ON,1,ON,1
```

## NR_MEAS_OFF

Turn Off All Measurement Items

### Function

Sets all measurement items to Off collectively.

### Command

```
NR_MEAS_OFF mcond
```

### Parameters

| | |
|---|---|
| mcond | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |

### Example of Use

To set all measurement items of number 0 in the NR measurement condition table to Off collectively:

```
NR_MEAS_OFF 0
```

# NR_SETUP

NR Parameter

## Function

Sets the NR measurement condition table.

## Command

When index = 1:

```
NR_SETUP
mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal
```

When index = 2:

```
NR_SETUP
mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal
```

When index = 3:

```
NR_SETUP
mcond,[cc,]index,band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal,ranop_type,endc_mode,eutra_ulfreq,eutra_bw,eutra_nrb,eutra_start,eutra_frametype,eutra_grouphop,eutra_cshift,eutra_cellid,eutra_dss
```

## Query

```
NR_SETUP? mcond,[cc,]index
```

## Response

When index = 1:

```
band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal
```

When index = 2:

```
band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal
```

When index = 3:

```
band,frametype,chconfig,cellid,wave,bw,scs,periodicity,duration,nrb,start,mod,symbol,port,mappingtype,addpos,typeApos,type,grouphop,seqhop,measoff,preph,contsignal,ranop_type,endc_mode,eutra_ulfreq,eutra_bw,eutra_nrb,eutra_start,eutra_frametype,eutra_grouphop,eutra_cshift,eutra_cellid,eutra_dss
```

Parameters

| | |
|---|---|
| mcond | Measurement condition number |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| cc | Component Carrier |
| PCC | PCC (Default) |
| Omitted | PCC |
| index | Measurement condition list index |
| Range | 1 to 3 |
| contsignal | Measurement signal format |
| ON | Continuous wave (only ON is available) |
| Default | ON |

Refer to 5.2.2 “Fundamental measurement commands” for details of parameters other than the above.

The commands corresponding to the parameters are as follows:

| Parameter | Corresponding Command |
|---|---|
| band | BAND |
| frametype | FRAMETYPE |
| chconfig | CHCONFIG |
| cellid | CELLID |
| wave | ULWAVEFORM |
| bw | ULBANDWIDTH |
| scs | ULSCS |
| periodicity | DLULPERIOD |
| duration | ULDURATION |
| nrb | ULRMC_RB |
| start | ULRB_START |
| mod | ULRMC_MOD |
| symbol | ULDMRSDURATION |
| port | ULDMRSPORT |
| mappingtype | ULMAPPINGTYPE |
| addpos | ULDMRSADDPOS |
| typeApos | ULDMRSTYPEAPOS |
| type | ULDMRSTYPE |
| grouphop | GROUPHOPPING |
| seqhop | SEQUENCEHOPPING |
| measoff | MEASOFFSET |
| preph | PREPHASECORR |
| mappingtype | ULMAPPINGTYPE |
| ranop_type | RANOP |
| endc_mode | ENDCMEASMODE |
| eutra_ulfreq | ULFREQ_EUTRA |
| eutra_bw | ULBANDWIDTH_EUTRA |
| eutra_nrb | ULRMC_RB_EUTRA |
| eutra_start | ULRB_START_EUTRA |
| eutra_frametype | FRAMETYPE_EUTRA |
| eutra_grouphop | GROUPHOPPING_EUTRA |
| eutra_cshift | CSHIFT_EUTRA |
| eutra_cellid | CELLID_EUTRA |
| eutra_dss | DELTASS_EUTRA |

Example of Use

To set the parameter for the condition number 0, index 1 in the NR measurement condition table:

```
NR_SETUP
0,PCC,1,77,TDD,PUSCH,0,CPOFDM,100MHZ,30KHZ,10MS,10,273,0,QPSK,SINGLE,0,0,
2,TYPE1,OFF,OFF,0.0,OFF,ON
```

Remarks

The following settings are ignored because the signal to be measured is fixed to continuous wave:

- DL/UL Periodicity
- UL Duration

# NR_TXMEASRESULT?

All Results

### Function

Queries the Tx measurement results.

### Query

```
NR_TXMEASRESULT? seg,index
```

### Response

`result(1),…,result(x)` Tx measurement results. Refer to Details.

### Parameters

| | |
|---|---|
| `seg` | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| `index` | Measurement results index |
| Range | 1 to 6, 102 (Refer to Details.) |
| Resolution | 1 |

### Details

By setting the index, the number and value of the response change as follows. For details of each response refer to 5.2.2 “Fundamental measurement commands”.

index = 1 (Tx Power Result + Modulation Analysis Result), Response number = 71

```
1.    Tx Power Avg[dBm]
2.    Tx Power Max[dBm]
3.    Tx Power Min[dBm]
4.    Channel Power Avg[dBm]
5.    Channel Power Max[dBm]
6.    Channel Power Min[dBm]
7.    Carrier Frequency[Hz]
8.    Carrier Frequency Error Avg[ppm]
9.    Carrier Frequency Error Avg[Hz]
10.   Carrier Frequency Error Max[ppm]
11.   Carrier Frequency Error Max[Hz]
12.   Carrier Frequency Error Min[ppm]
13.   Carrier Frequency Error Min[Hz]
14.   Carrier Frequency Error Worst[ppm]
15.   Carrier Frequency Error Worst[Hz]
16.   EVM Avg [%]
17.   EVM Max [%]
18.   EVM Min [%]
19.   Peak EVM Avg [%]
20.   Peak EVM Max [%]
21.   Peak EVM Min [%]
```

22. Reference Signal EVM Avg [%]
23. Reference Signal EVM Max [%]
24. Reference Signal EVM Min [%]
25. Rho Avg
26. Rho Max
27. Rho Min
28. Phase Error Avg [deg]
29. Phase Error Max [deg]
30. Phase Error Min [deg]
31. Magnitude Error Avg [%]
32. Magnitude Error Max [%]
33. Magnitude Error Min [%]
34. Carrier Leakage Avg[dBc]
35. Carrier Leakage Max[dBc]
36. Carrier Leakage Min[dBc]
37. In Band Emission(General) Avg[dB]
38. In Band Emission(General) Max[dB]
39. In Band Emission(General) Min[dB]
40. In Band Emission(Image) Avg[dB]
41. In Band Emission(Image) Max[dB]
42. In Band Emission(Image) Min[dB]
43. In Band Emission(Carrier Leakage) Avg[dB]
44. In Band Emission(Carrier Leakage) Max[dB]
45. In Band Emission(Carrier Leakage) Min[dB]
46. In Band Emission(Measured Item)
47. Spectrum Flatness(>3M(R1+)) Avg[dB]
48. Spectrum Flatness(>3M(R1+)) Max[dB]
49. Spectrum Flatness(>3M(R1+)) Min[dB]
50. Spectrum Flatness(>3M(R1-)) Avg[dB]
51. Spectrum Flatness(>3M(R1-)) Max[dB]
52. Spectrum Flatness(>3M(R1-)) Min[dB]
53. Spectrum Flatness(>3M(RP1)) Avg[dB]
54. Spectrum Flatness(>3M(RP1)) Max[dB]
55. Spectrum Flatness(>3M(RP1)) Min[dB]
56. Spectrum Flatness(<3M(R2+)) Avg[dB]
57. Spectrum Flatness(<3M(R2+)) Max[dB]
58. Spectrum Flatness(<3M(R2+)) Min[dB]
59. Spectrum Flatness(<3M(R2-)) Avg[dB]
60. Spectrum Flatness(<3M(R2-)) Max[dB]
61. Spectrum Flatness(<3M(R2-)) Min[dB]
62. Spectrum Flatness(<3M(RP2)) Avg[dB]
63. Spectrum Flatness(<3M(RP2)) Max[dB]
64. Spectrum Flatness(<3M(RP2)) Min[dB]
65. Spectrum Flatness(RP12) Avg[dB]

66. Spectrum Flatness(RP12) Max[dB]
67. Spectrum Flatness(RP12) Min[dB]
68. Spectrum Flatness(RP21) Avg[dB]
69. Spectrum Flatness(RP21) Max[dB]
70. Spectrum Flatness(RP21) Min[dB]
71. Spectrum Flatness(Measured Item)

index = 2 (Tx Power Result + Spectrum Emission Mask Result), Response number = 94

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]
35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]

37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]
40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R1(Upper)[dBm]
60. SEM Detail Freq R1(Upper)[Hz]
61. SEM Detail Level R2(Upper)[dBm]
62. SEM Detail Freq R2(Upper)[Hz]
63. SEM Detail Level R3(Upper)[dBm]
64. SEM Detail Freq R3(Upper)[Hz]
65. SEM Detail Level R4(Upper)[dBm]
66. SEM Detail Freq R4(Upper)[Hz]
67. SEM Detail Level R5(Upper)[dBm]
68. SEM Detail Freq R5(Upper)[Hz]
69. SEM Detail Level R6(Upper)[dBm]
70. SEM Detail Freq R6(Upper)[Hz]
71. SEM Detail Level R7(Upper)[dBm]
72. SEM Detail Freq R7(Upper)[Hz]
73. SEM Detail Level R8(Upper)[dBm]
74. SEM Detail Freq R8(Upper)[Hz]
75. SEM Detail Level R9(Upper)[dBm]
76. SEM Detail Freq R9(Upper)[Hz]
77. SEM Detail Level R10(Upper)[dBm]
78. SEM Detail Freq R10(Upper)[Hz]
79. SEM Detail Level R11(Upper)[dBm]
80. SEM Detail Freq R11(Upper)[Hz]

81. SEM Detail Level R12(Upper)[dBm]
82. SEM Detail Freq R12(Upper)[Hz]
83. SEM Detail Level R13(Upper)[dBm]
84. SEM Detail Freq R13(Upper)[Hz]
85. SEM Detail Level R14(Upper)[dBm]
86. SEM Detail Freq R14(Upper)[Hz]
87. SEM Detail Level R15(Upper)[dBm]
88. SEM Detail Freq R15(Upper)[Hz]
89. SEM Detail Level R16(Upper)[dBm]
90. SEM Detail Freq R16(Upper)[Hz]
91. SEM Detail Level R17(Upper)[dBm]
92. SEM Detail Freq R17(Upper)[Hz]
93. SEM Detail Level R18(Upper)[dBm]
94. SEM Detail Freq R18(Upper)[Hz]

index = 3 (Tx Power Result + OBW Result + ACLR Result), Response number = 28

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. Occupied Band Width [Hz]
8. Occupied Band Width Freq (LOWER) [Hz]
9. Occupied Band Width Freq (UPPER) [Hz]
10. Occupied Band Width Freq (CENTER) [Hz]
11. ACLR NR Lower Avg[dB]
12. ACLR NR Upper Avg[dB]
13. ACLR Lower2 Avg[dB]
14. ACLR Lower1 Avg[dB]
15. ACLR Upper1 Avg[dB]
16. ACLR Upper2 Avg[dB]
17. ACLR NR Lower Max[dB]
18. ACLR NR Upper Max[dB]
19. ACLR Lower2 Max[dB]
20. ACLR Lower1 Max[dB]
21. ACLR Upper1 Max[dB]
22. ACLR Upper2 Max[dB]
23. ACLR NR Lower Min[dB]
24. ACLR NR Upper Min[dB]
25. ACLR Lower2 Min[dB]
26. ACLR Lower1 Min[dB]
27. ACLR Upper1 Min[dB]
28. ACLR Upper2 Min[dB]

index = 4 (Tx Power Result + Modulation Analysis Result) Response number = 81

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. Carrier Frequency[Hz]
8. Carrier Frequency Error Avg[ppm]
9. Carrier Frequency Error Avg[Hz]
10. Carrier Frequency Error Max[ppm]
11. Carrier Frequency Error Max[Hz]
12. Carrier Frequency Error Min[ppm]
13. Carrier Frequency Error Min[Hz]
14. Carrier Frequency Error Worst[ppm]
15. Carrier Frequency Error Worst[Hz]
16. EVM Avg [%]
17. EVM Max [%]
18. EVM Min [%]
19. Peak EVM Avg [%]
20. Peak EVM Max [%]
21. Peak EVM Min [%]
22. Reference Signal EVM Avg [%]
23. Reference Signal EVM Max [%]
24. Reference Signal EVM Min [%]
25. Rho Avg
26. Rho Max
27. Rho Min
28. Phase Error Avg [deg]
29. Phase Error Max [deg]
30. Phase Error Min [deg]
31. Magnitude Error Avg [%]
32. Magnitude Error Max [%]
33. Magnitude Error Min [%]
34. Carrier Leakage Avg[dBc]
35. Carrier Leakage Max[dBc]
36. Carrier Leakage Min[dBc]
37. In Band Emission(General) Avg[dB]
38. In Band Emission(General) Max[dB]
39. In Band Emission(General) Min[dB]
40. In Band Emission(Image) Avg[dB]
41. In Band Emission(Image) Max[dB]
42. In Band Emission(Image) Min[dB]
43. In Band Emission(Carrier Leakage) Avg[dB]

```
44.   In Band Emission(Carrier Leakage) Max[dB]
45.   In Band Emission(Carrier Leakage) Min[dB]
46.   In Band Emission(Measured Item)
47.   Spectrum Flatness(>3M(R1+)) Avg[dB]
48.   Spectrum Flatness(>3M(R1+)) Max[dB]
49.   Spectrum Flatness(>3M(R1+)) Min[dB]
50.   Spectrum Flatness(>3M(R1-)) Avg[dB]
51.   Spectrum Flatness(>3M(R1-)) Max[dB]
52.   Spectrum Flatness(>3M(R1-)) Min[dB]
53.   Spectrum Flatness(>3M(RP1)) Avg[dB]
54.   Spectrum Flatness(>3M(RP1)) Max[dB]
55.   Spectrum Flatness(>3M(RP1)) Min[dB]
56.   Spectrum Flatness(<3M(R2+)) Avg[dB]
57.   Spectrum Flatness(<3M(R2+)) Max[dB]
58.   Spectrum Flatness(<3M(R2+)) Min[dB]
59.   Spectrum Flatness(<3M(R2-)) Avg[dB]
60.   Spectrum Flatness(<3M(R2-)) Max[dB]
61.   Spectrum Flatness(<3M(R2-)) Min[dB]
62.   Spectrum Flatness(<3M(RP2)) Avg[dB]
63.   Spectrum Flatness(<3M(RP2)) Max[dB]
64.   Spectrum Flatness(<3M(RP2)) Min[dB]
65.   Spectrum Flatness(RP12) Avg[dB]
66.   Spectrum Flatness(RP12) Max[dB]
67.   Spectrum Flatness(RP12) Min[dB]
68.   Spectrum Flatness(RP21) Avg[dB]
69.   Spectrum Flatness(RP21) Max[dB]
70.   Spectrum Flatness(RP21) Min[dB]
71.   Spectrum Flatness(Measured Item)
72.   E-UTRA In Band Emission(General) Avg[dB]
73.   E-UTRA In Band Emission(General) Max[dB]
74.   E-UTRA In Band Emission(General) Min[dB]
75.   E-UTRA In Band Emission(Image) Avg[dB]
76.   E-UTRA In Band Emission(Image) Max[dB]
77.   E-UTRA In Band Emission(Image) Min[dB]
78.   E-UTRA In Band Emission(Carrier Leakage) Avg[dB]
79.   E-UTRA In Band Emission(Carrier Leakage) Max[dB]
80.   E-UTRA In Band Emission(Carrier Leakage) Min[dB]
81.   E-UTRA In Band Emission(Measured Item)
```

index = 5 (Tx Power Result + Modulation Analysis Result),
Response number = 92 (with the following list added to the index = 4)

```
82.   In Band Emission Judgement
83.   In Band Emission Limit (General) [dB]
84.   In Band Emission Limit (Image) [dB]
```

85. In Band Emission Limit (Carrier Leakage) [dB]
86. In Band Emission Margin [dB]
87. E-UTRA In Band Emission Judgement
88. E-UTRA In Band Emission Limit (General) [dB]
89. E-UTRA In Band Emission Limit (Image) [dB]
90. E-UTRA In Band Emission Limit (Carrier Leakage) [dB]
91. E-UTRA In Band Emission Margin [dB]
92. Spectrum Flatness Judgement

index = 6 (Tx Power Result + Spectrum Emission Mask Result), Response number = 169

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]

35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]
37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]
40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R19(Lower)[dBm]
60. SEM Detail Freq R19(Lower)[Hz]
61. SEM Detail Level R20(Lower)[dBm]
62. SEM Detail Freq R20(Lower)[Hz]
63. SEM Detail Level R21(Lower)[dBm]
64. SEM Detail Freq R21(Lower)[Hz]
65. SEM Detail Level R22(Lower)[dBm]
66. SEM Detail Freq R22(Lower)[Hz]
67. SEM Detail Level R23(Lower)[dBm]
68. SEM Detail Freq R23(Lower)[Hz]
69. SEM Detail Level R1(Upper)[dBm]
70. SEM Detail Freq R1(Upper)[Hz]
71. SEM Detail Level R2(Upper)[dBm]
72. SEM Detail Freq R2(Upper)[Hz]
73. SEM Detail Level R3(Upper)[dBm]
74. SEM Detail Freq R3(Upper)[Hz]
75. SEM Detail Level R4(Upper)[dBm]
76. SEM Detail Freq R4(Upper)[Hz]
77. SEM Detail Level R5(Upper)[dBm]
78. SEM Detail Freq R5(Upper)[Hz]

79. SEM Detail Level R6(Upper)[dBm]
80. SEM Detail Freq R6(Upper)[Hz]
81. SEM Detail Level R7(Upper)[dBm]
82. SEM Detail Freq R7(Upper)[Hz]
83. SEM Detail Level R8(Upper)[dBm]
84. SEM Detail Freq R8(Upper)[Hz]
85. SEM Detail Level R9(Upper)[dBm]
86. SEM Detail Freq R9(Upper)[Hz]
87. SEM Detail Level R10(Upper)[dBm]
88. SEM Detail Freq R10(Upper)[Hz]
89. SEM Detail Level R11(Upper)[dBm]
90. SEM Detail Freq R11(Upper)[Hz]
91. SEM Detail Level R12(Upper)[dBm]
92. SEM Detail Freq R12(Upper)[Hz]
93. SEM Detail Level R13(Upper)[dBm]
94. SEM Detail Freq R13(Upper)[Hz]
95. SEM Detail Level R14(Upper)[dBm]
96. SEM Detail Freq R14(Upper)[Hz]
97. SEM Detail Level R15(Upper)[dBm]
98. SEM Detail Freq R15(Upper)[Hz]
99. SEM Detail Level R16(Upper)[dBm]
100. SEM Detail Freq R16(Upper)[Hz]
101. SEM Detail Level R17(Upper)[dBm]
102. SEM Detail Freq R17(Upper)[Hz]
103. SEM Detail Level R18(Upper)[dBm]
104. SEM Detail Freq R18(Upper)[Hz]
105. SEM Detail Level R19(Upper)[dBm]
106. SEM Detail Freq R19(Upper)[Hz]
107. SEM Detail Level R20(Upper)[dBm]
108. SEM Detail Freq R20(Upper)[Hz]
109. SEM Detail Level R21(Upper)[dBm]
110. SEM Detail Freq R21(Upper)[Hz]
111. SEM Detail Level R22(Upper)[dBm]
112. SEM Detail Freq R22(Upper)[Hz]
113. SEM Detail Level R23(Upper)[dBm]
114. SEM Detail Freq R23(Upper)[Hz]
115. SEM Margin Level R1(Lower)[dB]
116. SEM Margin Level R2(Lower)[dB]
117. SEM Margin Level R3(Lower)[dB]
118. SEM Margin Level R4(Lower)[dB]
119. SEM Margin Level R1(Upper)[dB]
120. SEM Margin Level R2(Upper)[dB]
121. SEM Margin Level R3(Upper)[dB]
122. SEM Margin Level R4(Upper)[dB]

123. SEM Margin Detail Level R1(Lower)[dB]
124. SEM Margin Detail Level R2(Lower)[dB]
125. SEM Margin Detail Level R3(Lower)[dB]
126. SEM Margin Detail Level R4(Lower)[dB]
127. SEM Margin Detail Level R5(Lower)[dB]
128. SEM Margin Detail Level R6(Lower)[dB]
129. SEM Margin Detail Level R7(Lower)[dB]
130. SEM Margin Detail Level R8(Lower)[dB]
131. SEM Margin Detail Level R9(Lower)[dB]
132. SEM Margin Detail Level R10(Lower)[dB]
133. SEM Margin Detail Level R11(Lower)[dB]
134. SEM Margin Detail Level R12(Lower)[dB]
135. SEM Margin Detail Level R13(Lower)[dB]
136. SEM Margin Detail Level R14(Lower)[dB]
137. SEM Margin Detail Level R15(Lower)[dB]
138. SEM Margin Detail Level R16(Lower)[dB]
139. SEM Margin Detail Level R17(Lower)[dB]
140. SEM Margin Detail Level R18(Lower)[dB]
141. SEM Margin Detail Level R19(Lower)[dB]
142. SEM Margin Detail Level R20(Lower)[dB]
143. SEM Margin Detail Level R21(Lower)[dB]
144. SEM Margin Detail Level R22(Lower)[dB]
145. SEM Margin Detail Level R23(Lower)[dB]
146. SEM Margin Detail Level R1(Upper)[dB]
147. SEM Margin Detail Level R2(Upper)[dB]
148. SEM Margin Detail Level R3(Upper)[dB]
149. SEM Margin Detail Level R4(Upper)[dB]
150. SEM Margin Detail Level R5(Upper)[dB]
151. SEM Margin Detail Level R6(Upper)[dB]
152. SEM Margin Detail Level R7(Upper)[dB]
153. SEM Margin Detail Level R8(Upper)[dB]
154. SEM Margin Detail Level R9(Upper)[dB]
155. SEM Margin Detail Level R10(Upper)[dB]
156. SEM Margin Detail Level R11(Upper)[dB]
157. SEM Margin Detail Level R12(Upper)[dB]
158. SEM Margin Detail Level R13(Upper)[dB]
159. SEM Margin Detail Level R14(Upper)[dB]
160. SEM Margin Detail Level R15(Upper)[dB]
161. SEM Margin Detail Level R16(Upper)[dB]
162. SEM Margin Detail Level R17(Upper)[dB]
163. SEM Margin Detail Level R18(Upper)[dB]
164. SEM Margin Detail Level R19(Upper)[dB]
165. SEM Margin Detail Level R20(Upper)[dBm]
166. SEM Margin Detail Level R21(Upper)[dB]

167. SEM Margin Detail Level R22(Upper)[dB]
168. SEM Margin Detail Level R23(Upper)[dB]
169. SEM Template Judgement

index = 102 (Tx Power Result + Spectrum Emission Mask Result), Response number = 139

1. Tx Power Avg[dBm]
2. Tx Power Max[dBm]
3. Tx Power Min[dBm]
4. Channel Power Avg[dBm]
5. Channel Power Max[dBm]
6. Channel Power Min[dBm]
7. SEM Level R1(Lower)[dBm]
8. SEM Freq R1(Lower)[Hz]
9. SEM Level R2(Lower)[dBm]
10. SEM Freq R2(Lower)[Hz]
11. SEM Level R3(Lower)[dBm]
12. SEM Freq R3(Lower)[Hz]
13. SEM Level R4(Lower)[dBm]
14. SEM Freq R4(Lower)[Hz]
15. SEM Level R1(Upper)[dBm]
16. SEM Freq R1(Upper)[Hz]
17. SEM Level R2(Upper)[dBm]
18. SEM Freq R2(Upper)[Hz]
19. SEM Level R3(Upper)[dBm]
20. SEM Freq R3(Upper)[Hz]
21. SEM Level R4(Upper)[dBm]
22. SEM Freq R4(Upper)[Hz]
23. SEM Detail Level R1(Lower)[dBm]
24. SEM Detail Freq R1(Lower)[Hz]
25. SEM Detail Level R2(Lower)[dBm]
26. SEM Detail Freq R2(Lower)[Hz]
27. SEM Detail Level R3(Lower)[dBm]
28. SEM Detail Freq R3(Lower)[Hz]
29. SEM Detail Level R4(Lower)[dBm]
30. SEM Detail Freq R4(Lower)[Hz]
31. SEM Detail Level R5(Lower)[dBm]
32. SEM Detail Freq R5(Lower)[Hz]
33. SEM Detail Level R6(Lower)[dBm]
34. SEM Detail Freq R6(Lower)[Hz]
35. SEM Detail Level R7(Lower)[dBm]
36. SEM Detail Freq R7(Lower)[Hz]
37. SEM Detail Level R8(Lower)[dBm]
38. SEM Detail Freq R8(Lower)[Hz]
39. SEM Detail Level R9(Lower)[dBm]

40. SEM Detail Freq R9(Lower)[Hz]
41. SEM Detail Level R10(Lower)[dBm]
42. SEM Detail Freq R10(Lower)[Hz]
43. SEM Detail Level R11(Lower)[dBm]
44. SEM Detail Freq R11(Lower)[Hz]
45. SEM Detail Level R12(Lower)[dBm]
46. SEM Detail Freq R12(Lower)[Hz]
47. SEM Detail Level R13(Lower)[dBm]
48. SEM Detail Freq R13(Lower)[Hz]
49. SEM Detail Level R14(Lower)[dBm]
50. SEM Detail Freq R14(Lower)[Hz]
51. SEM Detail Level R15(Lower)[dBm]
52. SEM Detail Freq R15(Lower)[Hz]
53. SEM Detail Level R16(Lower)[dBm]
54. SEM Detail Freq R16(Lower)[Hz]
55. SEM Detail Level R17(Lower)[dBm]
56. SEM Detail Freq R17(Lower)[Hz]
57. SEM Detail Level R18(Lower)[dBm]
58. SEM Detail Freq R18(Lower)[Hz]
59. SEM Detail Level R1(Upper)[dBm]
60. SEM Detail Freq R1(Upper)[Hz]
61. SEM Detail Level R2(Upper)[dBm]
62. SEM Detail Freq R2(Upper)[Hz]
63. SEM Detail Level R3(Upper)[dBm]
64. SEM Detail Freq R3(Upper)[Hz]
65. SEM Detail Level R4(Upper)[dBm]
66. SEM Detail Freq R4(Upper)[Hz]
67. SEM Detail Level R5(Upper)[dBm]
68. SEM Detail Freq R5(Upper)[Hz]
69. SEM Detail Level R6(Upper)[dBm]
70. SEM Detail Freq R6(Upper)[Hz]
71. SEM Detail Level R7(Upper)[dBm]
72. SEM Detail Freq R7(Upper)[Hz]
73. SEM Detail Level R8(Upper)[dBm]
74. SEM Detail Freq R8(Upper)[Hz]
75. SEM Detail Level R9(Upper)[dBm]
76. SEM Detail Freq R9(Upper)[Hz]
77. SEM Detail Level R10(Upper)[dBm]
78. SEM Detail Freq R10(Upper)[Hz]
79. SEM Detail Level R11(Upper)[dBm]
80. SEM Detail Freq R11(Upper)[Hz]
81. SEM Detail Level R12(Upper)[dBm]
82. SEM Detail Freq R12(Upper)[Hz]
83. SEM Detail Level R13(Upper)[dBm]

84. SEM Detail Freq R13(Upper)[Hz]
85. SEM Detail Level R14(Upper)[dBm]
86. SEM Detail Freq R14(Upper)[Hz]
87. SEM Detail Level R15(Upper)[dBm]
88. SEM Detail Freq R15(Upper)[Hz]
89. SEM Detail Level R16(Upper)[dBm]
90. SEM Detail Freq R16(Upper)[Hz]
91. SEM Detail Level R17(Upper)[dBm]
92. SEM Detail Freq R17(Upper)[Hz]
93. SEM Detail Level R18(Upper)[dBm]
94. SEM Detail Freq R18(Upper)[Hz]
95. SEM Margin Level R1(Lower)[dB]
96. SEM Margin Level R2(Lower)[dB]
97. SEM Margin Level R3(Lower)[dB]
98. SEM Margin Level R4(Lower)[dB]
99. SEM Margin Level R1(Upper)[dB]
100. SEM Margin Level R2(Upper)[dB]
101. SEM Margin Level R3(Upper)[dB]
102. SEM Margin Level R4(Upper)[dB]
103. SEM Margin Detail Level R1(Lower)[dB]
104. SEM Margin Detail Level R2(Lower)[dB]
105. SEM Margin Detail Level R3(Lower)[dB]
106. SEM Margin Detail Level R4(Lower)[dB]
107. SEM Margin Detail Level R5(Lower)[dB]
108. SEM Margin Detail Level R6(Lower)[dB]
109. SEM Margin Detail Level R7(Lower)[dB]
110. SEM Margin Detail Level R8(Lower)[dB]
111. SEM Margin Detail Level R9(Lower)[dB]
112. SEM Margin Detail Level R10(Lower)[dB]
113. SEM Margin Detail Level R11(Lower)[dB]
114. SEM Margin Detail Level R12(Lower)[dB]
115. SEM Margin Detail Level R13(Lower)[dB]
116. SEM Margin Detail Level R14(Lower)[dB]
117. SEM Margin Detail Level R15(Lower)[dB]
118. SEM Margin Detail Level R16(Lower)[dB]
119. SEM Margin Detail Level R17(Lower)[dB]
120. SEM Margin Detail Level R18(Lower)[dB]
121. SEM Margin Detail Level R1(Upper)[dB]
122. SEM Margin Detail Level R2(Upper)[dB]
123. SEM Margin Detail Level R3(Upper)[dB]
124. SEM Margin Detail Level R4(Upper)[dB]
125. SEM Margin Detail Level R5(Upper)[dB]
126. SEM Margin Detail Level R6(Upper)[dB]
127. SEM Margin Detail Level R7(Upper)[dB]

```
128.  SEM Margin Detail Level R8(Upper)[dB]
129.  SEM Margin Detail Level R9(Upper)[dB]
130.  SEM Margin Detail Level R10(Upper)[dB]
131.  SEM Margin Detail Level R11(Upper)[dB]
132.  SEM Margin Detail Level R12(Upper)[dB]
133.  SEM Margin Detail Level R13(Upper)[dB]
134.  SEM Margin Detail Level R14(Upper)[dB]
135.  SEM Margin Detail Level R15(Upper)[dB]
136.  SEM Margin Detail Level R16(Upper)[dB]
137.  SEM Margin Detail Level R17(Upper)[dB]
138.  SEM Margin Detail Level R18(Upper)[dB]
139.  SEM Template Judgement
```

### Example of Use

To query the Tx measurement results for segment 0, index 1:

```
NR_TXMEASRESULT? 0,1
> -20.00,-19.55,-20.06,…,0.04,2
```

# OLVL

Output Level

## Function

Sets or queries the total output level of all channels.

## Command

```
OLVL level
```

## Query

```
OLVL?
```

## Response

```
level
```

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

## Parameters

level Output level

Range

| | | |
|---|---|---|
| MU887000A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1/Port 2) |
| | –120.0 to 0.0 dBm | (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1/Port 2) |
| | –120.0 to –8.0 dBm | (Port 3/Port 4) |
| MU887001A | 400 MHz ≤ frequency ≤ 3800 MHz | |
| | –130.0 to –10.0 dBm | (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz | |
| | –130.0 to –18.0 dBm | (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm | (Port 1 to Port 12) |
| Resolution | 0.1 dB | |
| Suffix code | DBM (uses dBm when omitted) | |
| Default | –60.2 dBm | |

## Details

For MU887000A, the setting range varies with the output test port setting.
If cable loss correction is set to ON, the setting range of the output level is the range of values with subtracted cable loss.
When the cable loss is 5 dB and frequency ≤ 3800 MHz,
the MU887000A Port1/Port2 setting range is –135.0 to –15.0 dBm,

### Example of Use

To set the output level to –50.0 dBm:

```
OLVL -50.0
OLVL?
> -50.0
```

### Related Commands

EXTLOSSW
LOSSTBL
LOSSTBLVAL
For details of the commands, refer to Chapter 6 “Native Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

# RXFREQ

Downlink Frequency

## Function

Sets or queries the downlink frequency.
This command has the same function as DLFREQ.

## Command

```
RXFREQ dl_freq
```

## Query

```
RXFREQ?
```

## Response

dl_freq

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

## Parameter

| | |
|---|---|
| dl_freq | Downlink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 2140 000 000 Hz |

## Details

This sets the Rx frequency for the mobile station.
Changing the setting of downlink frequency does not change the setting of the downlink channel.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the downlink frequency to 2120 MHz:

```
RXFREQ 2120MHZ
RXFREQ?
> 2120000000
```

# SEQCTRL

Sequence Control Parameter - Sequence Control

### Function

Sets or queries the start and stop segments of Sequence Table.
Sets the parameters for both measurement and signal transmission.

### Command

```
SEQCTRL start,end
```

### Query

```
SEQCTRL?
```

### Response

```
start,end
```

### Parameters

| | |
|---|---|
| start | Start segment |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| end | Stop segment |
| Range | Start to 1999 |
| Resolution | 1 |
| Default | 199 |

### Details

start = 0 to 1999, end = 0 to 1999 where end ≥ start

Whether the set sequence table can be executed is evaluated.
Use the SEQERR? command to query the error details.

### Example of Use

To set the start segment to 20 and the stop segment to 52:

```
SEQCTRL 20,52
SEQCTRL?
> 20,52
```

# SEQCTRLTX

Sequence Control Parameter - Sequence Control

## Function

Sets or queries start and stop segments in sequence table.
Sets the measurement parameters only, without affecting the signal transmission parameters.

## Command

```
SEQCTRLTX start,end
```

## Query

```
SEQCTRLTX?
```

## Response

```
start,end
```

## Parameters

| | |
|---|---|
| start | Start segment |
| Range | 0 to 1999 |
| Resolution | 1 |
| Default | 0 |
| end | Stop segment |
| Range | Start to 1999 |
| Resolution | 1 |
| Default | 199 |

## Details

start = 0 to 1999, end = 0 to 1999 where end ≥ start

Whether the set sequence table can be executed is evaluated.
Use the SEQERR? command to query the error details.

## Example of Use

To set the start and stop segments to 20 and 55, respectively:

```
SEQCTRLTX 20,55
SEQCTRLTX?
> 20,55
```

# SEQERR?

Sequence Parameter Information - Error Check

## Function

Queries the setting error information of sequence table.

## Query

```
SEQERR? [item]
```

## Response

When nothing is set to item:

```
n,err(0),…,err(n-1)
```

| | | |
|---|---|---|
| n | | Number of errors |
| | Range | 0 to 4 |
| err(n–1) | | Parameter with error |
| | ILVL | Input level |
| | OLVL | Output level |
| | STEP | Step count |
| | LEN | Capture memory length |

When item is ILVL, OLVL, STEP, DLPAT, or PORT:

```
ns,seg(0),…,seg(ns-1)
```

| | | |
|---|---|---|
| ns | | Number of segments with errors |
| | Range | 0 to 2000 |
| Seg(ns–1) | | Segment number with errors |
| | Range | 0 to 1999 |

When item is LEN:

```
e,mem,exe,set
```

| | | |
|---|---|---|
| e | | Presence of errors |
| | Range | 0 No error, executable |
| | | 1 Errors found, not executable |
| mem | | Memory utilization |
| | Range | 0.0 to 100.0% |
| | Resolution | 0.1% |
| exe | | Number of segments capable of executing capture in number of configured segments |
| | Range | 0 to 2000 |
| set | | Number of segments with capture configured |
| | Range | 0 to 2000 |

When item is OLVLNUM, PATNUM, or STDNUM:

```
e,exe,set
```

| | | |
|---|---|---|
| e | | Presence of errors |
| | Range | 0 No error, executable |
| | | 1 Errors found, not executable |
| exe | | Number of segments capable of executing capture in number of |

| | | |
|---|---|---|
| | | configured segments |
| | Range | 0 to 2000 |
| set | | Number of segments with capture configured |
| | Range | 0 to 2000 |

If no error is found in the sequence table, the response returns 0.

### Parameters

| | |
|---|---|
| item | Parameter in sequence table |
| ILVL | Input level |
| OLVL | Output level |
| STEP | Step count |
| DLPAT | Waveform pattern |
| PORT | Port |
| LEN | Capture memory length |
| OLVLNUM | Output level change count |
| PATNUM | Waveform pattern change count |
| STDNUM | Measurement mode change count |

### Details

This command can check error presence of input level, output level, step count, and capture memory length.

To query error presence of the following parameters,

use :FETCh:CELLular:SEQuence:ERRor2? command.

Waveform pattern, port, output level change count, waveform pattern change count, measurement mode change count.

To set parameters for sequence table using the following commands, errors are not checked.

SEQTRX, SEQTX, SEQMEAS

### Example of Use

To query the presence of errors:

```
SEQERR?
> 1,ILVL
```

To query the input level setting error information:

```
SEQERR? ILVL
> 2,3,12
```

To query the capture memory error information:

```
SEQERR? LEN
> 0,25.0,20,20
```

Here, the capture memory utilization is 25.0%, so all captures configured in 20 segments are executable.

### Remarks

Sequence measurement cannot be started if there are errors.

However, the sequence can be started if segment numbers with errors are excluded from the execution range using the SEQCTRL command.

# SEQERR2?

Sequence Parameter Information - Error Check

## Function

Queries setting error information of sequence table.

## Query

```
SEQERR2? format
```

## Response

```
n,err(0),...,err(n-1)
```

| | |
|---|---|
| n | Number of errors |
| Range | 0 to 7 |
| err(n-1) | Parameter with errors |
| ILVL | Input level |
| OLVL | Output level |
| STEP | Step count |
| DLPAT | Waveform pattern |
| PORT | Port |
| LEN | Capture memory length |
| OLVLNUM | Output level change count |
| PATNUM | Waveform pattern change count |
| STDNUM | Measurement mode change count |

If no error is found in the sequence table, the response returns 0.

## Parameters

| | |
|---|---|
| format | Format |
| 1 | Error Check 1 |

## Details

Parameter setting errors can be checked up to seven types.
Only one of output level change count, waveform pattern change count, or measurement mode change count has an error. Two or three of them cannot have an error simultaneously.

To set parameters for sequence table using the following commands, errors are not checked.
SEQTRX, SEQTX, SEQMEAS, SEQSGPORT
To query error details per parameter, use :FETCh:CELLular:SEQuence:ERRor command.

## Example of Use

To query the presence of errors:

```
SEQERR2? 1
> 2,ILVL,DLPAT
```

## Remarks

Sequence measurement cannot be started if there are errors.
However, sequence measurement can be started if segment numbers with errors are excluded from the execution range using the SEQCTRL command.

# SEQEXECTX

Start Signal Analyzer Measurement Only

## Function

Sets only the parameters for the specified measurement and executes measurement, without affecting the signal transmission parameters.

## Command

SEQEXECTX

# SEQMEAS

Sequence Table Parameter - Measurement

### Function

Sets or queries the measurement conditions of the specified segment.

### Command

```
SEQMEAS seg,mode,step,mcond
```

### Query

```
SEQMEAS? seg
```

### Response

```
mode,step,mcond
```

### Parameters

| | | |
|---|---|---|
| seg | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| mode | Measurement mode | Required software license |
| TXP | Transmit power measurement mode | MX887010A |
| WCDMA | W-CDMA measurement mode | MX887010A and MX887011A |
| GSM | GSM measurement mode | MX887010A and MX887012A |
| CDMA2K | CDMA2000 1x measurement mode | MX887010A and MX887015A |
| EVDO | CDMA2000 1xEVDO measurement mode | MX887010A and MX887016A |
| TDSCDMA | TD-SCDMA measurement mode | MX887010A and MX887017A |
| LTE | LTE measurement mode | MX887010A and MX887013A or MX887010A and MX887014A |
| NR | NR sub-6GHz measurement mode | MX887010A and MX887018A or MX887010A and MX887019A |
| Default | TXP | |
| step | Step count | |
| Range | 2 to 3000 | |
| Resolution | 1 | |
| Default | 2 | |
| mcond | Measurement condition number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| Default | 0 | |

### Example of Use

To set the settings for segment 2 as follows:
Measurement mode: NR, Step count: 10, Measurement condition number: 3

```
SEQMEAS 2,NR,10,3
SEQMEAS? 2
> NR,10,3
```

# SEQMSTAT?

Sequence Measurement Status

## Function

Queries the status of sequence measurement.

## Query

```
SEQMSTAT?
```

## Response

```
m_status,n,s(0),s(1),…,s(n-1)
```

| | | |
|---|---|---|
| m_status | | Measurement execution status |
| | 0 | Measurement completed successfully |
| | 2 | Over level |
| | 3 | Under level |
| | 4 | Measurement failed |
| | 5 | Synchronization word not detected |
| | 9 | Measurement in progress or not measured |
| | 12 | Tx measurement timeout |
| | The value received from MX887018A/19A is 0, 2, 5, 9, or 12. | |
| n | | Number of measured segments |
| | Range | 0 to 2000 |
| s(n–1) | | Measurement status of specified segment |
| | 0 | Measurement completed successfully |
| | 2 | Over level |
| | 3 | Under level |
| | 4 | Measurement failed |
| | 5 | Synchronization word not detected |
| | 9 | Measurement in progress or not measured |
| | 10 | Segment not measured |
| | 12 | Tx measurement timeout |
| | The value received from MX887018A/19A is 0, 2, 5, 9, or 12. | |

## Example of Use

To query the status of sequence measurement:

```
SEQMSTAT?
> 2,6,0,0,0,0,2,0
```

The results shows that six segments are measured segments and the fifth segment is over level.

## Related Commands

MSTAT

SEQSEGSTAT

# SEQPROGRESS?

Sequence Progress

### Function

Queries the progress ratio and the executing sequence number.

### Query

```
SEQPROGRESS?
```

### Response

```
p,cur,start,stop
```

| | |
|---|---|
| p | Progress ratio in Sequence Measurement mode |
| Range | 0 to 100% |
| cur | Current segment number being executed |
| Range | 0 to 1999 |
| start | First segment number |
| Range | 0 to 1999 |
| stop | Last segment number |
| Range | 0 to 1999 |

### Example of Use

To query the progress ratio and the executing sequence number in Sequence Measurement mode:

```
SEQPROGRESS?
> 65,23,11,30
```

### Remarks

The first and last segment numbers are the same as the start and end segment numbers specified using the SEQCTRL command.

# SEQREINIT

Sequence Control Parameter - Sequence End State Reinitialization

## Function

Enables and queries the automatic initialization of following items after sequence measurement completion.

- Downlink frequency
- Output level
- Output signal pattern
- Uplink frequency
- Input level

## Command

```
SEQREINIT sw
```

## Query

```
SEQREINIT?
```

## Response

```
sw
```

## Parameters

| | | |
|---|---|---|
| sw | | Automatic initialization after sequence measurement completion |
| | ON | Enables automatic initialization |
| | OFF | Disables automatic initialization |
| | Default | ON |

## Details

If the parameter is set to ON, the settings are initialized to the values configured by the following commands after sequence measurement completion.

| | |
|---|---|
| Downlink frequency | DLFREQ |
| Output level | OLVL |
| Output signal pattern | DLPAT |
| Uplink frequency | ULFREQ |
| Input level | ILVL |

If the parameter is set to OFF, the settings remain those of the sequence measurement stop segment.

## Example of Use

To reset the target parameters:

```
SEQREINIT ON
SEQREINIT?
> ON
```

# SEQSAPORT

Sequence Table Parameter - SA Input Port

## Function

Specifies the segment number and sets or queries the test port number for inputting RF signals.

## Command

```
SEQSAPORT seg,port
```

## Query

```
SEQSAPORT? seg
```

## Response

```
port
```

## Parameters

| | | |
|---|---|---|
| seg | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| port | Input test port number | |
| Range | COMMON, Test Port 1 to 4 | (MU887000A) |
| | COMMON, Test Port 1 to 4 | (MU887001A) |
| | OFF, COMMON, Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| OFF | No any Input Test Ports | (MU887002A) |
| COMMON | Input test port specified by PORT command. | |
| Default | COMMON | |

## Details

For MU887000A,
Test Port 3 cannot be set when Test Port 3 is selected for RF signal output test port.
Test Port 4 cannot be set when Test Port 4 is selected for RF signal output test port.

For MU887001A and MU887002A, there are no restrictions as above.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the test port number of segment 5 to Test Port 2:

```
SEQSAPORT 5,PORT2
SEQSAPORT? 5
```

```
> PORT2
```

## SEQSEGSTAT?

Specified Segment Status

### Function

Queries the measurement status of the specified segment.

### Query

```
SEQSEGSTAT? seg
```

### Response

| | |
|---|---|
| stat | Segment status |
| 0 | Measurement completed successfully |
| 2 | Over level |
| 3 | Under level |
| 4 | Measurement failed |
| 5 | Synchronization word not detected |
| 9 | Measurement in progress or not measured |
| 10 | Segment not measured |
| 12 | Tx measurement timeout |

The value received from MX887018A/19A is 0, 2, 5, 9, 10, or 12.

### Parameters

| | |
|---|---|
| seg | Segment number |
| Range | 0 to 1999 |

### Example of Use

To query the measurement status of segment 16:

```
SEQSEGSTAT? 16
> 0
```

# SEQSGPORT

Sequence Table Parameter - SG Output Port

## Function

Specifies the segment number and sets or queries the test port number for outputting RF signals.

## Command

| | |
|---|---|
| `SEQSGPORT seg,port` | MU887000A, MU887001A |
| `SEQSGPORT seg,port[,port,…,port]` | MU887002A |

## Query

```
SEQSGPORT? seg
```

## Response

| | |
|---|---|
| port | MU887000A, MU887001A |
| port[,port,…,port] | MU887002A |

## Parameters

| | | |
|---|---|---|
| seg | Segment number | |
| Range | 0 to 1999 | |
| Resolution | 1 | |
| port | Output test port number | |
| Range | Test Port 1 to 4 | (MU887000A) |
| | Test Port 1 to 4 | (MU887001A) |
| | Test Port 1 to 12 | (MU887002A) |
| PORT1 | Test Port 1 | |
| … | … | |
| PORT12 | Test Port 12 | |
| Default | PORT1 | |

## Details

For MU887000A

Test Port 3 cannot be set when Test Port 3 is selected for RF signal input test port.

Test Port 4 cannot be set when Test Port 4 is selected for RF signal input test port.

For MU887001A and MU887002A, there are no restrictions as above.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the test port number of segment 5 to Test Port 2:

```
SEQSGPORT 5,PORT2
SEQSGPORT? 5
```

```
> PORT2
```

To set the test port number of segment 5 to Test Port 2, Test Port 11, and Test Port 5:

```
SEQSGPORT 5,PORT2,PORT11,PORT5
SEQSGPORT? 5
> PORT2,PORT5,PORT11
```

## SEQTBL

Sequence Control Parameter - Sequence Table

### Function

Sets or queries the number of sequence table to execute.

### Command

```
SEQTBL table
```

### Query

```
SEQTBL?
```

### Response

```
table
```

### Parameters

| | |
|---|---|
| table | Sequence table number |
| Range | 0 to 3 |
| Resolution | 1 |
| Default | 0 |

### Example of Use

To select the sequence table 1:

```
SEQTBL 1
SEQTBL?
> 1
```

# SEQTRG

Sequence Table Parameter - Trigger

### Function

Sets or queries the trigger condition for starting Sequence Measurement. (for functional extensions)

### Command

```
SEQTRG seg,src,slope,level,delay
```

### Query

```
SEQTRG? Seg
```

### Response

```
src,slope,level,delay
```

### Parameters

| | |
|---|---|
| seg | Segment number |
| Range | 0 to 1999 |
| src | Trigger source |
| FRAME | Frame |
| FREERUN | Free run |
| PWR | Input signal power |
| Default | FREERUN |
| slope | Trigger slope |
| RISE | Rising edge trigger |
| Default | RISE |
| level | Trigger level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB (uses dB when omitted) |
| Default | –30 dB |
| delay | Delay time |
| Range | 0 to 1000.000 ms |
| Resolution | 0.001 ms |
| Suffix code | NS, US, MS, S (uses ms when omitted) |
| Default | 0.000 ms |

### Details

The trigger slope and trigger level are enabled when trigger source is set to PWR.

### Example of Use

To set the trigger condition of segment 2 as follows:
Trigger source: PWR, Trigger slope: RISE, Trigger level: –30 dB, Delay time: 0

```
SEQTRG 2,PWR,RISE,-30,0
SEQTRG? 2
> PWR,RISE,-30,0.000
```

Remarks

Trigger level is defined as the level difference from the input level specified by the following commands:
ILVL, SEQTRX

# SEQTRGEXT

Sequence Table Parameter - Trigger

### Function

Sets or queries the trigger condition for starting Sequence Measurement. (for functional extensions)

### Command

```
SEQTRGEXT seg,index,src,slope,level,delay,mgap
```

### Query

```
SEQTRGEXT? seg,index
```

### Response

```
src,slope,level,delay,mgap
```

### Parameters

| | |
|---|---|
| seg | Segment number |
| Range | 0 to 1999 |
| index | Index number |
| Range | 1 (Fixed) |
| src | Trigger source |
| FRAME | Frame |
| FREERUN | Free run |
| PWR | Input signal power |
| Default | FREERUN |
| slope | Trigger slope |
| RISE | Rising edge trigger |
| Default | RISE |
| level | Trigger level |
| Range | –40 to 0 dB |
| Resolution | 1 dB |
| Suffix code | DB (uses dB when omitted) |
| Default | –30 dB |
| delay | Delay time |
| Range | 0 to 1000.000 ms |
| Resolution | 0.001 ms |
| Suffix code | NS, US, MS, S (uses ms when omitted) |
| Default | 0.000 ms |
| mgap | Minimum Trigger Gap |
| Range | 0 to 80.0 ms |
| Resolution | 0.1 ms |
| Suffix code | S MS US NS (uses ms when omitted |
| Default | 0.0 ms |
| Unit | ms |

### Details

The trigger slope, trigger level and Minimum Trigger Gap are enabled when trigger source is set to PWR.

### Example of Use

To set the trigger condition of segment 2 as follows:
Trigger source: PWR, Trigger slope: RISE, Trigger level: –30 dB, Delay time: 0, Minimum Trigger Gap: 0.0

```
SEQTRGEXT 2,1,PWR,RISE,-30,0,0.0
SEQTRGEXT? 2,1
> PWR,RISE,-30,0.000,0.0
```

### Remarks

Trigger level is defined as the level difference from the input level specified by the following commands:
ILVL, SEQTRX

# SEQTRX

Sequence Table Parameter - TRX Control

## Function

Sets or queries the following items in the specific segment of the sequence table.

- Downlink frequency
- Output Level
- Output signal pattern
- Uplink frequency
- Input level

## Command

```
SEQTRX seg,ul_freq,ref,dl_freq,level,pat
```

## Query

```
SEQTRX? seg
```

## Response

```
ul_freq,ref,dl_freq,level,pat
```

ul_freq, dl_freq

| | |
|---|---|
| Unit | MHz |
| Resolution | 0.000001 MHz |

ref, level

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

## Parameters

| | |
|---|---|
| seg | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| ul_freq | Uplink frequency |
| Range | 400.000000 to 3800.000000 MHz (MU887000A/01A) |
| | 400.000000 to 6000.000000 MHz (with MU887000A/01A-001) |
| | 400.000000 to 6000.000000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 1950.000000 MHz |
| ref | Input level |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |

| | |
|---|---|
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –10.0 dBm |
| dl_freq | Downlink frequency |
| Range | 400.000000 to 3800.000000 MHz (MU887000A/01A) |
| | 400.000000 to 6000.000000 MHz (with MU887000A/01A-001) |
| | 400.000000 to 6000.000000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 2140.000000 MHz |
| level | Output Level |
| Range | |
| MU887000A | 400 MHz ≤ frequency ≤ 3800 MHz |
| | –130.0 to –10.0 dBm (Port 1/Port 2) |
| | –120.0 to 0.0 dBm (Port 3/Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz |
| | –130.0 to –18.0 dBm (Port 1/Port 2) |
| | –120.0 to –8.0 dBm (Port 3/Port 4) |
| MU887001A | 400 MHz ≤ frequency ≤ 3800 MHz |
| | –130.0 to –10.0 dBm (Port 1 to Port 4) |
| | 3800 MHz < frequency ≤ 6000 MHz |
| | –130.0 to –18.0 dBm (Port 1 to Port 4) |
| MU887002A | –130.0 to 0.0 dBm (Port 1 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |
| Default | –60.0 dBm |
| pat | Waveform pattern |
| PAT1 to PATn | Pattern number (n: waveform information file group range) |
| CW | Modulation turned OFF |
| OFF | Output level turned OFF |
| NC | Waveform pattern not configured in this segment (holds currently configured waveform pattern) |
| Default | CW |

Details

For MU887000A, the setting range varies with the input/output test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss and the setting range of the output level is the range of values with subtracted cable loss.

If the cable loss is 5 dB and frequency ≤ 3800 MHz, the input and output levels are as follows:

| | |
|---|---|
| MU887000A Port1/Port2 Input level | –60.0 to +40.0 dBm |
| MU887000A Port1/Port2 Output level | –135.0 to –15.0 dBm |

In this case, if the output level is set to –10.0 dBm, an out-of-parameter setting range error occurs. (The response to :SYSTem:ERRor? returns 220, Parameter error).
Whether an out-of-parameter setting range error has occurred is determined during execution of the following commands:
SEQCTRL, SNGLS, SEQEXECTX
A measurement execution error occurs when an out-of-range error occurs.
SEQERR? is used to query the error details.

The pattern number is the same as the group number. Refer to Chapter 3, "Waveform File Details" in the Waveform Files for Cellular Application Operation Manual.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

### Example of Use

To set segment 0 as follows:
Uplink frequency set to 1950.0 MHz, input level to –10.0 dBm, downlink frequency to 2140.0 MHz, output level to –60.0 dBm, and no modulation

```
SEQTRX 0,1950.000000,-10.0,2140.000000,-60.0,CW
SEQTRX? 0
> 1950.000000,-10.0,2140.000000,-60.0,CW
```

### Remarks

The group range is the selected waveform file.
For details of the waveform pattern, refer to Chapter 3, "Waveform File Details" in the *Waveform Files for Cellular Application Operation Manual.*

# SEQTX

Sequence Table Parameter - Uplink Frequency, Input Level

## Function

Sets or queries uplink frequency and input level of segments in sequence table.

## Command

```
SEQTX seg,ul_freq,ref
```

## Query

```
SEQTX? seg
```

## Response

```
ul_freq,ref
```

ul_freq

| | |
|---|---|
| Unit | MHz |
| Resolution | 0.000001 MHz |

ref

| | |
|---|---|
| Unit | dBm |
| Resolution | 0.1 dB |

## Parameters

| | |
|---|---|
| seg | Segment number |
| Range | 0 to 1999 |
| Resolution | 1 |
| ul_freq | Rx frequency (uplink) |
| Range | 400.000000 to 3800.000000 MHz (MU887000A/01A) |
| | 400.000000 to 6000.000000 MHz (with MU887000A/01A-001) |
| | 400.000000 to 6000.000000 MHz (MU887002A) |
| | 400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4) |
| | 400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 0.000001 MHz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses MHz when omitted) |
| Default | 1950.000000 MHz |
| ref | Input level |
| Range | |
| MU887000A | –65.0 to +35.0 dBm (Port 1/Port 2) |
| | –65.0 to +25.0 dBm (Port 3/Port 4) |
| MU887001A | –65.0 to +35.0 dBm (Port 1 to Port 4) |
| MU887002A | –65.0 to +35.0 dBm (Port 1 to Port 12) |
| MU887002A-007 | |
| | –65.0 to +35.0 dBm (Frequency ≤ 6000 MHz, Port 1 to Port 4) |
| | –65.0 to +35.0 dBm (Frequency < 5900 MHz, Port 5 to Port 12) |
| | –65.0 to +30.0 dBm (5900 MHz ≤ Frequency, Port 5 to Port 12) |
| Resolution | 0.1 dB |
| Suffix code | DBM (uses dBm when omitted) |

Default –10.0 dBm

Details

This command sets only the uplink frequency and input level among the parameters that are set by :CONFigure:CELLular:SEQuence:RFSettings:TRX.
For MU887000A, the setting range varies with the input test port setting.
If cable loss correction is set to ON, the setting range of the input level is the range of values with added cable loss.
If the cable loss is 5 dB, the MU887000A Port1/Port2 setting range is –60.0 to +40.0 dBm.
Whether an out-of-parameter setting range error has occurred is determined during execution of the following commands:
SEQCTRL, SNGLS, SEQEXECTX

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

With MU887002A-007,
The upper limit of the input level of Port 5 to Port 12 varies according to their set frequencies.
Frequency < 5900 MHz: +35.0 dBm
5900 MHz ≤ Frequency: +30.0 dBm

Example of Use

To set the parameters for segment 1 as follows:
Uplink frequency: 1950 MHz, Input level: –10.0 dBm

```
SEQTX 1,1950,-10.0
SEQTX? 1
> 1950.000000,-10.0
```

# TRGTOUT

Trigger Timeout

## Function

Sets or queries the trigger timeout.

## Command

```
TRGTOUT time
```

## Query

```
TRGTOUT?
```

## Response

```
time
```

| | |
|---|---|
| Unit | s |
| Resolution | 1 s |

## Parameters

| | |
|---|---|
| time | Timeout time |
| Range | 1 to 60 s |
| Resolution | 1 s |
| Suffix code | NS, US, MS, S (uses s when omitted) |
| Default | 10 s |

## Example of Use

To set the Trigger timeout to 10 seconds:

```
TRGTOUT 10
TRGTOUT?
> 10
```

# TXFREQ

Uplink Frequency

## Function

Sets or queries the Uplink frequency.
This command has the same function as ULFREQ.

## Command

```
TXFREQ ul_freq
```

## Query

```
TXFREQ?
```

## Response

```
ul_fleq
```

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

## Parameters

| | |
|---|---|
| ul_freq | Uplink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 1950 000 000 Hz |

## Details

This sets the Tx frequency for the mobile station.
Changing the uplink frequency setting does not change the uplink channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

## Example of Use

To set the uplink frequency to 1950 MHz:

```
TXFREQ 1950MHZ
TXFREQ?
> 1950000000
```

# ULFREQ

Uplink Frequency

### Function

Sets or queries the uplink (Rx) frequency of MU887000A.

### Command

```
ULFREQ ul_freq
```

### Query

```
ULFREQ?
```

### Response

```
ul_fleq
```

| | |
|---|---|
| Unit | Hz |
| Resolution | 1 Hz |

### Parameters

| | |
|---|---|
| ul_freq | Uplink frequency |
| Range | 400 000 000 to 3800 000 000 Hz (MU887000A/01A)<br>400 000 000 to 6000 000 000 Hz (with MU887000A/01A-001)<br>400 000 000 to 6000 000 000 Hz (MU887002A)<br>400 000 000 to 6000 000 000 Hz (with MU887002A-007, Port 1 to 4)<br>400 000 000 to 7300 000 000 Hz (with MU887002A-007, Port 5 to 12) |
| Resolution | 1 Hz |
| Suffix code | HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted) |
| Default | 1950.000000 MHz |

### Details

This sets the Tx frequency for the mobile station.
Changing the uplink frequency setting does not change the uplink channel setting.

With MU887002A-007, there are the following restrictions. The command can be executed, but an error occurs.

- Test Port 1 to Test Port 4 cannot be set for RF signals above 6 GHz.
- Test Port 5 to Test Port 12 cannot be set as both the input and the output ports for RF signals of 5.9 GHz or higher.

### Example of Use

To set the uplink frequency to 1950 MHz:

```
ULFREQ 1950MHZ
ULFREQ?
> 1950000000
```

# Chapter 6 Performance Test

This chapter explains how to setup the measuring instruments required for the MX887018A NR FDD sub-6GHz Uplink and MX887019A NR TDD sub-6GHz Uplink TX performance tests as well as the test procedures.


6.1 Outline ..... 6-2
6.2 Instruments for Testing Performance ..... 6-3
6.3 Calibration (MX887018A/19A) ..... 6-5
6.3.1 SG Calibration (CW) ..... 6-5
6.3.2 SG Calibration (MOD) ..... 6-7
6.3.3 Linearity Calibration ..... 6-8
6.3.4 Measurement Frequencies ..... 6-10
6.4 Performance Tests (MX887018A/19A / MV887018A/19A) ..... 6-11
6.4.1 Measuring Output EVM ..... 6-12
6.4.2 Tx Power Measurement Accuracy (CW) ..... 6-15
6.4.3 Frequency/Modulation ..... 6-18
6.4.4 Adjacent Channel Leakage Power Ratio (ACLR) ..... 6-21
6.4.5 Sample Format for Test Result Sheets ..... 6-24
6.5 Calibration (MX887018A-001/19A-001) ..... 6-40
6.5.1 SG Calibration (CW) ..... 6-40
6.5.2 SG Calibration (MOD) ..... 6-42
6.5.3 Linearity Calibration ..... 6-43
6.5.4 Measurement Frequencies ..... 6-45
6.6 Performance Tests (MX887018A-001/19A-001) ..... 6-47
6.6.1 Adjacent Channel Leakage Power Ratio (ACLR) ..... 6-48
6.6.2 Sample Format for Test Result Sheets ..... 6-51
6.7 Servicing ..... 6-59

# 6.1 Outline

The performance tests are performed to assure that the MU887000A performance does not deteriorate. Test the performance of the MU887000A at the initial acceptance inspection, at periodic inspections, and after repairs. Test important items periodically to assure the performance. This chapter explains the following test items.

- Output EVM
- Tx Power measurement accuracy (CW)
- Frequency/modulation measurement Carrier frequency accuracy
  Residual EVM
- Adjacent Channel Leakage Power Ratio measurement (ACLR)

We recommend testing the performance periodically once or twice a year. If the test results do not meet the specifications, 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.

**⚠ CAUTION**

**Warm-up the MU887000A and the required measuring instruments for at least 30 minutes (except when specified otherwise) to stabilize them. To achieve the highest accuracy, the test should be performed at room temperature using a power supply with as little voltage fluctuation as possible in an environment free from noise, vibration, dust and humidity.**

# 6.2 Instruments for Testing Performance

The following table lists the measuring instruments required for testing the MU887000A performance and the specifications for each instrument.

**Table 6.2-1 Measuring Instruments for Performance Tests**

| Test Item | Required Specifications* | Recommendation |
|---|---|---|
| Output EVM | Signal Analyzer<br>● Frequency Range<br>MU887000A/01A: 600 to 3800 MHz<br>With MU887000A/01A-001:<br>600 to 5000 MHz<br>MU887002A: 600 to 5000 MHz<br>With MU887002A-007:<br>600 to 7125 MHz<br>● Frequency Resolution: 1 Hz<br>● Level Range: –130 to +30 dBm<br>● Level Accuracy: ±0.05 dB<br>● External Reference Input: (10 MHz) | Signal Analyzer<br>(MS2850A)<br>Microwave Preamplifier<br>(MS2850A-068)<br>5G Standard Measurement Software (Base License)<br>(MX285051A)<br>NR TDD sub-6GHz Downlink<br>(MX285051A-011) |
| Tx Power Measurements<br>● Measurement Accuracy (CW) | Signal Generator<br>● Frequency Range<br>MU887000A/01A: 600 to 3800 MHz<br>With MU887000A/01A-001:<br>600 to 5000 MHz<br>MU887002A 600 to 5000 MHz<br>With MU887002A-007:<br>600 to 7125 MHz<br>● Frequency Resolution: 1 Hz<br>● Output Level Range<br>Unmodulated: –110 to +17 dBm<br>Resolution: 0.01 dB | Vector Signal Generator |
| | Signal Analyzer<br>Same as above | Same as above |
| | Power Meter<br>● Frequency Range:<br>MU887000A/01A 600 to 3800 MHz<br>With MU887000A/01A-001:<br>600 to 5000 MHz<br>MU887002A 600 to 5000 MHz<br>With MU887002A-007:<br>600 to 7125 MHz<br>● Level Accuracy: ±0.02 dB<br>● Level Resolution: 0.01 dB | Power Meter (ML2437A) |

*: The performance covers the test item measurement range.

**Table 6.2-1 Measuring Instruments for Performance Tests (Cont'd)**

| Test Item | Required Specifications* | Recommendation |
|---|---|---|
| Tx Power Measurements (Cont'd)<br>● Measurement Accuracy (CW) | Power Sensor<br>● Frequency Range:<br>MU887000A/01A 600 to 3800 MHz<br>With MU887000A/01A-001:<br>600 to 5000 MHz<br>MU887002A 600 to 5000 MHz<br>With MU887002A-007:<br>600 to 7125 MHz<br>● Level Range: –40 to +20 dBm<br>● Input Connector: N type | Power Sensor (MA2442D) |
| Frequency/Modulation Measurements<br>● Carrier Frequency Accuracy<br>● Residual EVM<br>Adjacent Channel Leakage Power Ratio | Signal generator supporting output of 3GPP NR sub-6GHz modulation signals<br>Same as above | Same as above |
| | Power Meter<br>Same as above | Same as above |
| | Power Sensor<br>● Frequency Range:<br>MU887000A/01A 600 to 3800 MHz<br>With MU887000A/01A-001:<br>600 to 5000 MHz<br>MU887002A 600 to 5000 MHz<br>With MU887002A-007:<br>600 to 7125 MHz<br>● Level Range: –30 to +20 dBm<br>● Input Connector: N type | Power Sensor (MA24002A) |
| Common | Attenuator (for MU887000A/01A) | 3-dB Attenuator (AT-103) |
| | Attenuator (for MU887002A) | 3-dB Attenuator (BW-N3W5+)<br>6-dB Attenuator (BW-N6W5+) |

# 6.3 Calibration (MX887018A/19A)

This section explains how to obtain the calibration values of the instrument used for the performance tests.

## 6.3.1 SG Calibration (CW)

This section explains how to obtain the calibration values of the CW (unmodulated) signal source.

(1) Measuring instruments

- Vector signal generator:
- Power Meter: ML2437A
- Power Sensor: MA2442D
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(2) Setup

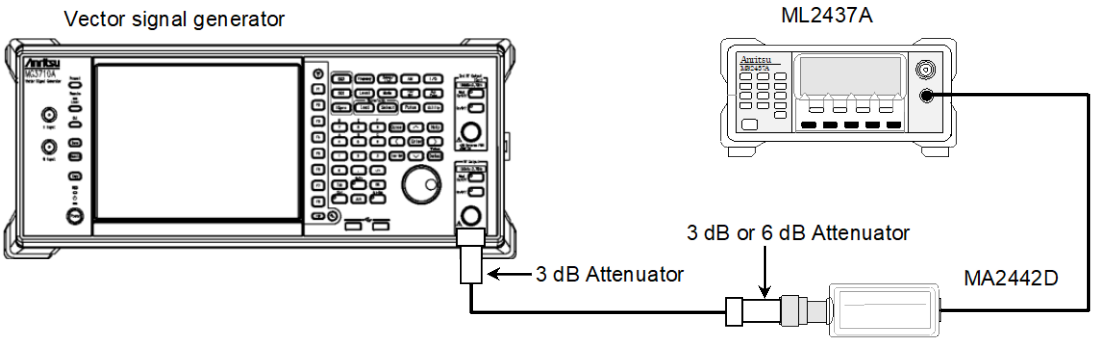



**Figure 6.3.1-1 SG Calibration (CW)**

(3) Test Procedure

1. Setup the instruments as shown in Figure 6.3.1-1.
2. Set the vector signal generator (SG) as follows:

   Modulation: OFF
   Output frequency: 600 MHz
   Output level: MU887000A/01A: 6 dBm (0 dBm + 6 dB)
   MU887002A: 9 dBm (0 dBm + 9 dB)
3. Adjust the SG output level so that the level measurement value of the power meter is 0 dBm, and obtain the calibration values for the setting frequency and setting level.
4. Set frequencies in accordance with the table in 6.3.4, “Measurement Frequencies”, and obtain the calibration values of each frequency.
5. Replace 0 dBm with –10 dBm and –20 dBm at step 2, repeat steps 2 to 4 respectively, and obtain the calibration values.

## 6.3.2 SG Calibration (MOD)

This section explains how to obtain the calibration values of the modulation wave signal source.

(1) Measuring instruments

- Vector signal generator:
- Power Meter: ML2437A
- Power sensor: MA24002A
- Attenuator:
  For MU887000A/01A 3 dB: AT-103 2 sets
  For MU887002A 3 dB: BW-N3W5+
  6 dB: BW-N6W5+

(2) Setup

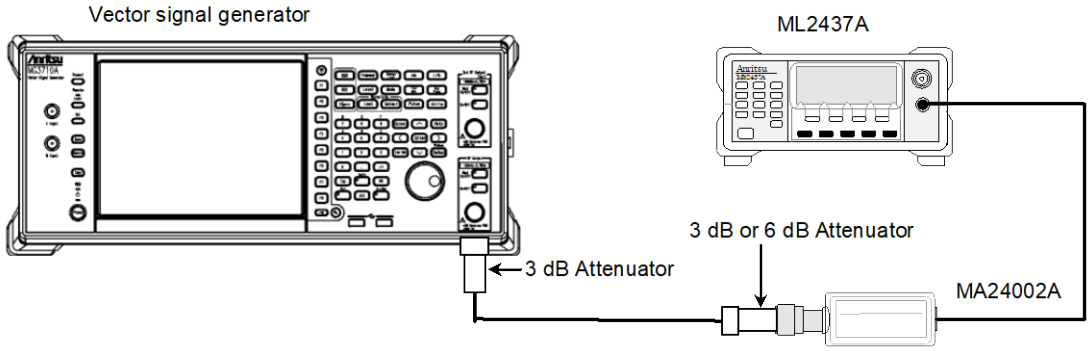



**Figure 6.3.2-1 SG Calibration (MOD)**

(3) Test procedure

1. Setup the instruments as shown in Figure 6.3.2-1.
2. Set the vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Analyzable waveform pattern in 6.4.3 "Frequency/Modulation".
   Output frequency: 600 MHz
   Output level: MU887000A/01A: –4 dBm (–10 dBm + 6 dB)
   MU887002A: –1 dBm (–10 dBm + 9 dB)
3. Adjust the SG output level so that the level measurement value of the power meter is –10 dBm, and obtain the calibration values for the setting frequency and setting level.
4. Set frequencies in accordance with the table in 6.3.4, "Measurement Frequencies", and obtain the calibration values of each frequency.

## 6.3.3 Linearity Calibration

This section explains how to obtain the calibration values for linearity.

(1) Measuring instruments

- Vector signal generator:
- Signal Analyzer: MS2850A
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(2) Setup

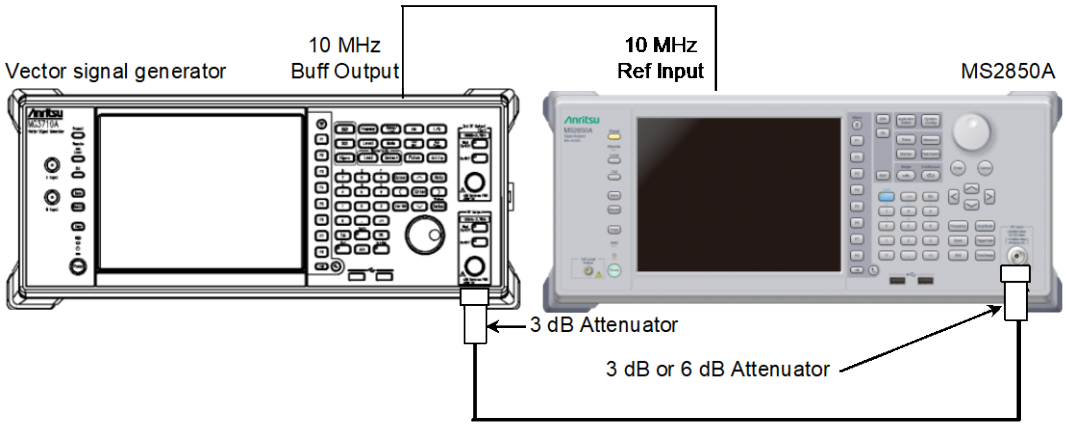



**Figure 6.3.3-1 Linearity Calibration**

(3) Test procedure

1. Setup the instruments as shown in Figure 6.3.3-1.
2. Set the signal analyzer (SA) as shown in #1 of Table 6.3.3-1 “Signal Analyzer Settings”.
3. Set the vector signal generator (SG) as follows:

   Modulation: OFF
   Output frequency: 600 MHz
   Output level: Setting level when the level measurement value of the power meter is 0 dBm in the SG calibration (Section 6.3.1)
4. Connect the output of the SG to the SA and measure the SG output level with the SA (A dBm).
5. Decrease the SG output level in 10-dB steps down to 40 dB and measure the level at each step (B dBm). (The calibration value is B – A.)

6. Set frequencies in accordance with the table in 6.3.4, "Measurement Frequencies", and obtain the calibration values of each frequency.
7. Set the SA as shown in #2 of Table 6.3.3-1 "Signal Analyzer Settings".
8. Replace 0 dBm with –20 dBm at step 3, and repeat steps 3 to 6.

**Table 6.3.3-1 Signal Analyzer Settings**

| | MS2850A | | | | | | |
|---|---|---|---|---|---|---|---|
| | Application Switch | RBW | Zone Width | Time Length | ATT | Preamp | Ref Lev |
| #1 | Signal Analyzer | 100 Hz | 781.3 Hz | AUTO | 20 dB | OFF | 0 dBm |
| #2 | Signal Analyzer | 100 Hz | 781.3 Hz | AUTO | 0 dB | OFF | –20 dBm |

## 6.3.4 Measurement Frequencies

Table 6.3.4-1 lists the frequencies set in the performance tests for the calibration and calibrated test system.
Frequencies from 4000 to 5000 MHz are measured only when MU887000A/01A-001 is installed, or by MU887002A.
Frequencies of 5900 MHz or higher are measured only when MU887002A-007 is installed.
Measurement point 18 is applied to other than the output EVM.
Measurement points 19 and 20 are applied to the output EVM only.

**Table 6.3.4-1 Measurement Point and Frequency**

| Meas. Point | Frequency (MHz) | Meas. Point | Frequency (MHz) |
|---|---|---|---|
| 1 | 600 | 12 | 3800 |
| 2 | 700 | 13 | 4000 |
| 3 | 880 | 14 | 4200 |
| 4 | 940 | 15 | 4500 |
| 5 | 1000 | 16 | 5000 |
| 6 | 1800 | 17 | 5900 |
| 7 | 2000 | 18 | 6359 |
| 8 | 2200 | 19 | 6800 |
| 9 | 2700 | 20 | 7050 |
| 10 | 3300 | 21 | 7125 |
| 11 | 3600 | – | – |

# 6.4 Performance Tests (MX887018A/19A / MV887018A/19A)

Common setting items

The following list shows the common settings for each measurement at the MU887000A.

| | |
|---|---|
| Application Select: | Cellular |
| Standard Select: | NR |
| Frame Type: | FDD (MX887018A) |
| | TDD (MX887019A) |
| RMC Configuration: | PUSCH |
| UL RMC Waveform | CPOFDM |
| Channel Bandwidth: | 100MHz |
| Subcarrier Spacing | 30KHZ |
| Uplink RMC Modulation: | 64QAM |
| Trigger Source | FREE |

## 6.4.1 Measuring Output EVM

This test measures the output signal EVM.

(1) Test specifications

| EVM | Remarks |
|---|---|
| 2%rms | 600 to 2700 MHz |
| 3%rms | 3300 to 3800 MHz |
| 4%rms | 3800 to 5000 MHz<br>(with MU887000A/01A-001 or MU887002A)<br>5900 to 7125 MHz<br>(with MU887002A-007, TRX 1/2 Test Port 5 to 12, and Channel Edge ≤ 7125 MHz) |

(2) Measuring instruments

- Signal analyzer: MS2850A

(3) Setup

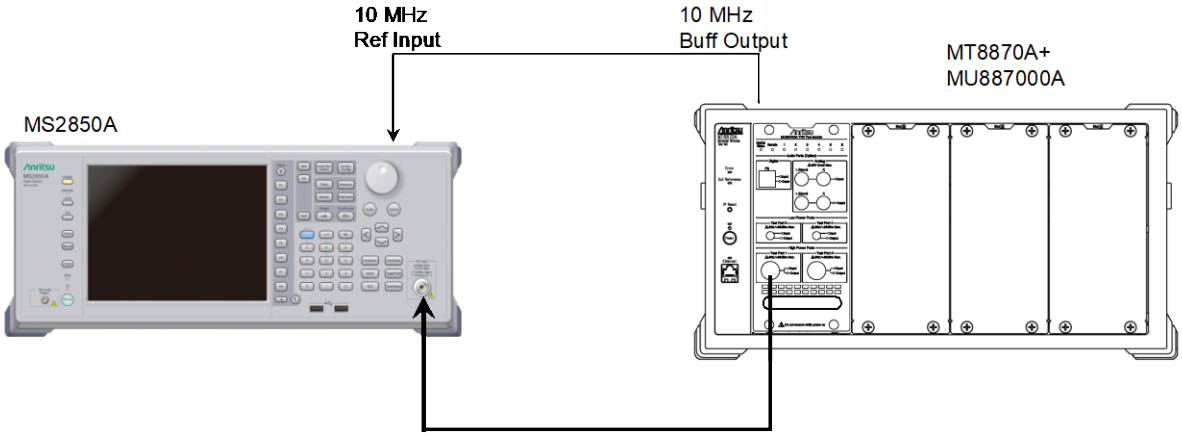



**Figure 6.4.1-1 Test System for Output EVM**

(4) Test procedure

This test is measured at the following Test Ports.
When testing other than Test Port 1, read "Test Port 1" in the following procedure as the port to be tested.

MU887000A: Test Port 1, 3
MU887001A: Test Port 1, 3
MU887002A: TRX 1: Test Port 1, 2, TRX 2: Test Port 1, 2
MU887002A-007, 5900 MHz ≤ Frquency:
TRX 1:Test Port 11, 12, TRX 2: Test Port 11, 12

1. Setup the instruments as shown in Figure 6.4.1-1.
2. Select the signal analyzer (SA) measurement software and set the following:

   Measurement software: MX285051A-011
   UL RMC Number of RBs: 273
   Synchronization Mode: Synchronization Signal
   Modulation Scheme: 256QAM
3. Select the MU887000A application software.
4. Set the MU887000A input and output levels.

   MU887000A
   Test Port 1 Output Level: –10.9 dBm (Freq. ≤ 3800 MHz)
   Output Level: –20.9 dBm (3800 MHz < Freq.)
   Input Level: +35 dBm
   Test Port 3 Output Level: –0.9 dBm (Freq. ≤ 3800 MHz)
   Output Level: –10.9 dBm (3800 MHz < Freq.)
   Input Level: +25 dBm

   MU887001A
   Test Port 1/3 Output Level: –10.9 dBm (Freq. ≤ 3800 MHz)
   Output Level: –20.9 dBm (3800 MHz < Freq.)
   Input Level: +35 dBm

   MU887002A
   TRX 1/2 Test Port 1/2
   Output Level: –5.0 dBm (Freq. ≤ 3800 MHz)
   Output Level: –8.0 dBm (3800 MHz < Freq.)
   Input Level: +35 dBm

   MU887002A-007, 5900 MHz ≤ Freq.
   TRX 1/2 Test Port 11/12
   Output Level: –10.0 dBm (5900 MHz ≤ Freq.)
   Input Level: +35 dBm
5. Set the MU887000A frequency to 600 MHz and output the modulated signal supporting the specification of 3GPP NR sub-6GHz.

   Connect Port: MU887000A Test Port 1 or 3
   MU887001A Test Port 1 or 3
   MU887002A TRX 1/2 Test Port 1 or 2
   MU887002A-007, 5900 MHz ≤ Freq. TRX 1/2 Test Port 11 or 12
   Output level ON/OFF: ON
   Downlink frequency: 600 MHz
6. Set the same SA frequency as the frequency set at step 5, and measure EVM.

7. Change the MU887000A frequency to 900, 2000, 2700, 3300, and 3800 MHz, and repeat steps 5 to 6 respectively.
   When MU887000A/01A-001 is installed or MU887002A, also repeat the steps for the frequencies 4000, 4500, and 5000 MHz.
   When MU887002A-007is installed, also repeat the steps for the frequencies 5900, 6800, 7050, 7125 MHz.
8. Change the Test Port, and repeat steps 4 to 7 respectively.

## 6.4.2 Tx Power Measurement Accuracy (CW)

This test is related to the accuracy of Tx power measurements.

(1) Test specifications

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
(600 MHz ≤ Frequency ≤ 2700 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±0.7 dB | –50 dBm ≤, < +35 dBm | 10 to 40°C |
| ±0.9 dB | –60 dBm ≤, < –50 dBm | 10 to 40°C |

(3300 MHz ≤ Frequency ≤ 3800 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.0 dB | –50 dBm ≤, < +35 dBm | 10 to 40°C |
| ±1.3 dB | –60 dBm ≤, < –50 dBm | 10 to 40°C |

MU887002A: TRX 1/2 Test Port 1 to 12
(600 MHz ≤ Frequency ≤ 2700 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±0.7 dB | –50 dBm ≤, < +35 dBm | 20 to 30°C |
| ±0.9 dB | –60 dBm ≤, < –50 dBm | 20 to 30°C |

(3300 MHz ≤ Frequency ≤ 3800 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.0 dB | –50 dBm ≤, < +35 dBm | 20 to 30°C |
| ±1.3 dB | –60 dBm ≤, < –50 dBm | 20 to 30°C |

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
MU887002A: TRX 1/2 Test Port 1 to 12
(3800 MHz < Frequency ≤ 5000 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.0 dB | –50 dBm ≤, < +35 dBm | 20 to 30°C |
| ±1.3 dB | –60 dBm ≤, < –50 dBm | 20 to 30°C |

MU887002A-007, TRX 1/2 Test Port 5 to 12
(5900 MHz ≤ Frequency ≤ 7125 MHz, and Channel Edge ≤ 7125 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.3 dB | –50 dBm ≤, < +30 dBm | 20 to 30°C |
| ±2.0 dB | –60 dBm ≤, < –50 dBm | 20 to 30°C |

MU887000A: Test Port 3/4

(600 MHz ≤ Frequency ≤ 2700 MHz)

| Measurement Accuracy | Input ≤Level | Temperature |
|---|---|---|
| ±0.7 dB | –20 dBm ≤, ≤ +25 dBm | 10 to 40°C |
| ±0.9 dB | –50 dBm ≤, < –20 dBm | 10 to 40°C |
| ±1.1 dB | –60 dBm ≤, < –50 dBm | 10 to 40°C |

(3300 MHz ≤ Frequency ≤ 3800 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.0 dB | –50 dBm ≤, < +25 dBm | 10 to 40°C |
| ±1.3 dB | –60 dBm ≤, < –50 dBm | 10 to 40°C |

(3800 MHz < Frequency ≤ 5000 MHz)

| Measurement Accuracy | Input Level | Temperature |
|---|---|---|
| ±1.0 dB | –50 dBm ≤, < +25 dBm | 20 to 30°C |
| ±1.3 dB | –60 dBm ≤, < –50 dBm | 20 to 30°C |

(2) Measuring instruments

- Vector signal generator:
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(3) Setup

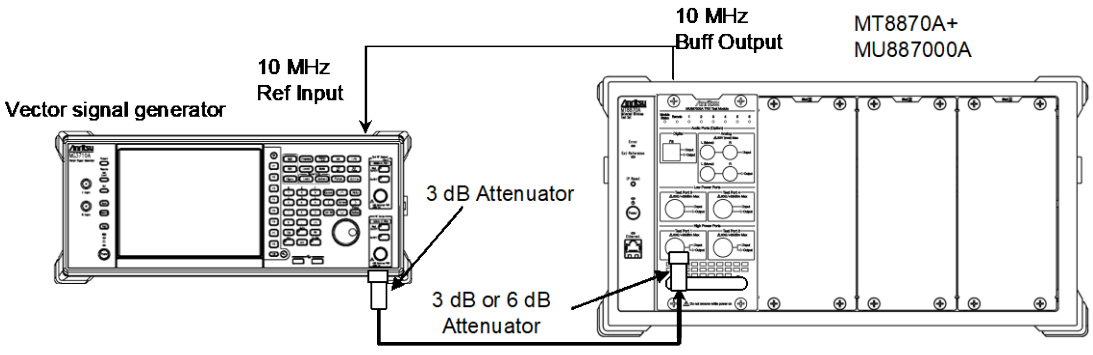



**Figure 6.4.2-1 Setup for Measuring Amplitude Measurement Accuracy**

(4) Test procedure

This test is measured at the following Test Ports.
When testing other than Test Port 1, read "Test Port 1" in the following procedure as the port to be tested.
MU887000A: Test Port 1, 2, 3, 4
MU887001A: Test Port 1, 2, 3, 4
MU887002A: TRX 1: Test Port 1, 2, TRX 2: Test Port 1, 2
MU887002A-007, 5900 MHz ≤ Frequency
TRX 1: Test Port 11, 12, TRX 2: Test Port 11, 12

1. Setup the instruments as shown in Figure 6.4.2-1.
2. Set the MU887000A as follows:

| | |
|---|---|
| Connect port: | Test Port 1 |
| Output level ON/OFF: | OFF |
| Input level: | –10 dBm |
| Uplink frequency: | 600 MHz |
| Trigger Source | Free Run |
| Turn Off All measurement: | OFF |
| Tx Power measurement: | ON, 1 time |

3. Set the Vector signal generator (SG) as follows:

| | |
|---|---|
| Modulation: | OFF |
| Output frequency: | 600 MHz |
| Output level: | –10 dBm (This output level reflects the calibration value for item 6.3.1.) |

4. Change the frequency of the MU887000A and SG according to Table 6.3.4 "Measurement Frequencies" and measure the Tx power.

   Tx Power Measurement Results: Average value

5. Change the SG output level and MU887000A input level each to –50, and –60 dBm and repeat steps 2 to 4 over and measure the Tx power. (This output level reflects the calibration value for item 6.3.3.)
6. Change the Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 5 over.

## 6.4.3 Frequency/Modulation

This test is related to the following modulation analyses.

- Carrier frequency accuracy
- Residual EVM

(1) Test specifications

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
MU887002A: TRX 1/2 Test Port 1 to 12
(600 MHz ≤ Frequency ≤ 2700 MHz)

| Item | Measurement Accuracy |
|---|---|
| Carrier frequency accuracy | ±(Set frequency × Reference oscillator accuracy + 15 Hz) |

(3300 MHz ≤ Frequency ≤ 5000 MHz)

| Item | Measurement Accuracy |
|---|---|
| Carrier frequency accuracy | ±(Set frequency × Reference oscillator accuracy + 36 Hz) |

MU887002A-007, TRX 1/2 Test Port 5 to 12
(5900 MHz ≤ Frequency ≤ 7125 MHz, and Channel Edge ≤ 7125 MHz)

| Item | Measurement Accuracy |
|---|---|
| Carrier frequency accuracy | ±(Set frequency × Reference oscillator accuracy + 36 Hz) |

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
MU887002A: TRX 1/2 Test Port 1 to 12
Input Level range: –25 dBm <, ≤ +35 dBm
MU887000A: Test Port 3/4
Input Level range: –25 dBm <, ≤ +25 dBm

| Item | Measurement Accuracy |
|---|---|
| Residual EVM | ≤ 2.5% (rms) |

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
MU887002A: TRX 1/2 Test Port 1 to 12
Input Level range: Minimum output power * ≤, ≤ –25 dBm
MU887000A: Test Port 3/4
Input Level range: Minimum output power* ≤, ≤ –25 dBm

| Item | Measurement Accuracy |
|---|---|
| Residual EVM | ≤ 3.0% (rms)<br>(600 MHz ≤ frequency ≤ 2700 MHz,<br>3300 MHz ≤ frequency ≤ 4200 MHz)<br>≤ 3.0%(rms)<br>(4200 MHz < frequency ≤ 5000 MHz) (20 to 30°C) |

MU887002A-007, TRX 1/2 Test Port 5 to 12

Input Level range Minimum output power* ≤, ≤ –25 dBm

| Item | Measurement Accuracy |
|---|---|
| Residual EVM | ≤ 3.0%(rms)<br>(5900 MHz ≤ frequency ≤ 7125 MHz,<br>and Channel Edge ≤ 7125 MHz)<br>(20 to 30°C) |

*: Minimum output power

| Channel Bandwidth (MHz) | Minimum output power (dBm) |
|---|---|
| 5, 10, 15, 20 | –40 |
| 25 | –39 |
| 30 | –38.2 |
| 40 | –37 |
| 50 | –36 |
| 60 | –35.2 |
| 80 | –34 |
| 90 | –33.5 |
| 100 | –33 |

(2) Measuring instruments

- Vector signal generator:
- Attenuator:

For MU887000A/01A 3 dB: AT-103 2 sets

For MU887002A 3 dB: BW-N3W5+

6 dB: BW-N6W5+

(3) Setup

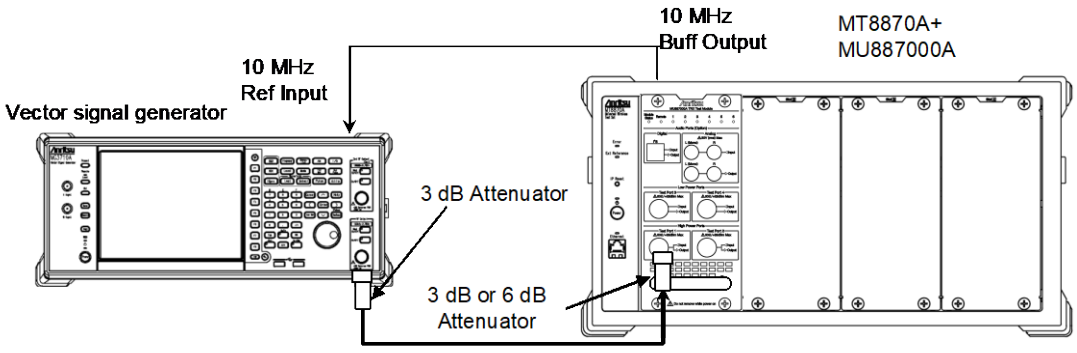



**Figure 6.4.3-1 Setup for Measuring Frequency/Modulation**

(4) Test procedure

This test is measured at the following Test Ports.
When testing other than Test Port 1, read "Test Port 1" in the following procedure as the port to be tested.
MU887000A: Test Port 1, 2, 3, 4
MU887001A: Test Port 1, 2, 3, 4
MU887002A: TRX 1: Test Port 1, 2, TRX 2: Test Port 1, 2
MU887002A-007:
TRX 1: Test Port 11, 12, TRX 2: Test Port 11, 12

1 Setup the instruments as shown in Figure 6.4.4-1.

2. Set the MU887000A as follows:

| | |
|---|---|
| Connect port: | Test Port 1 |
| Output level ON/OFF: | OFF |
| Input level: | –33 dBm |
| Uplink frequency: | 600 MHz |
| UL RMC Number of RBs: | 273 |
| UL RMC Starting RB: | 0 |
| Turn Off All measurement: | OFF |
| Modulation Analysis measurement: | ON, 20 times |

3. Set the Vector signal generator (SG) as follows, and perform IQ Calibration:

| | |
|---|---|
| Modulation: | ON |
| Modulation wave: | Analyzable waveform pattern in Step 2 above. |
| Output frequency: | 600 MHz |
| Output level: | –33 dBm (This output level reflects the calibration value for item 6.3.2.) |
| Internal Channel Correction: | ON |

4. Measure the frequency error and EVM.

| | |
|---|---|
| Carrier Frequency Error Result: | Worst value |
| EVM Result: | Average value |

5. Change the MU887000A and SG frequencies according to 6.3.4 "Measurement Frequencies" and repeat steps 2 to 4 over.

6. Change the SG output level and the MU887000A input level to –24.9 dBm and measure EVM by steps 2 to 5 over. (This output level reflects the calibration value for item 6.3.2.)

7. Change the Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 6 over.

## 6.4.4 Adjacent Channel Leakage Power Ratio (ACLR)

This test is related to Adjacent Channel Leakage Power Ratio measurements.

(1) Test specifications

Channel Bandwidth ≤ 60 MHz, and
600 MHz ≤ Frequency ≤ 2700 MHz, 3300 MHz ≤ Frequency ≤ 5000 MHz.
5900 MHz ≤ Frequency ≤ 7125 MHz (with MU887002A-007,
and Channel Edge ≤ 7125 MHz)

60 MHz < Channel Bandwidth, and
2000 MHz ≤ Frequency ≤ 2700 MHz, 3300 MHz ≤ Frequency ≤ 5000 MHz
5900 MHz ≤ Frequency ≤ 7125 MHz (with MU887002A-007,
and Channel Edge ≤ 7125 MHz)

| Adjacent Channel Leakage Power Ratio | Measurement Point |
|---|---|
| ≥ 42 dB | NR ACLR1 |
| ≥ 45 dB | UTRA ALCR1 |
| ≥ 48 dB | UTRA ALCR2 |

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
Input Level range: –10 dBm ≤, ≤ +35 dBm
MU887002A: TRX 1/2 Test Port 1 to 12
600 MHz ≤ frequency ≤ 2700 MHz
Input Level range: –10 dBm ≤, ≤ +35 dBm
3300 MHz ≤ frequency ≤ 5000 MHz
Input Level range: –14 dBm ≤, ≤ +35 dBm
MU887000A: Test Port 3/4
Input Level range: –10 dBm ≤, ≤ +25 dBm
MU887002A-007, TRX 1/2 Test Port 5 to 12
5900 MHz ≤ frequency ≤ 7125 MHz
(and Channel Edge ≤ 7125 MHz)
Input Level range: –14 dBm ≤, ≤ +30 dBm

(2) Measuring instruments

- Vector signal Generator:
- Attenuator:

For MU887000A/01A 3 dB: AT-103 2 sets
For MU887002A 3 dB: BW-N3W5+
6 dB: BW-N6W5+

(3) Setup

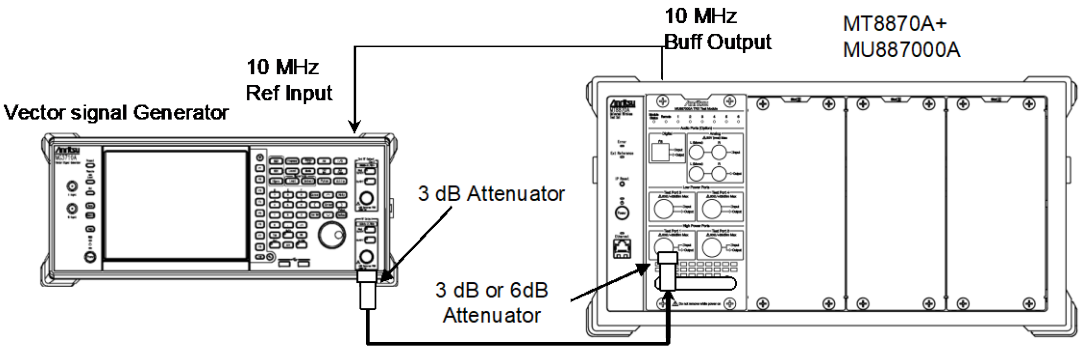



**Figure 6.4.4-1 Setup for Measuring Adjacent Channel Leakage Power Ratio**

(4) Test procedure

This test is measured at the following Test Ports.
When testing other than Test Port 1, read "Test Port 1" in the following procedure as the port to be tested.
MU887000A: Test Port 1, 2, 3, 4
MU887001A: Test Port 1, 2, 3, 4
MU887002A: TRX 1: Test Port 1, 2, TRX 2: Test Port 1, 2
MU887002A-007:
TRX 1: Test Port 11, 12, TRX 2: Test Port 11, 12

1. Setup the instruments as shown in Figure 6.4.4-1.
2. Set the MU887000A as follows:

   Connect port: Test Port 1
   Output level ON/OFF: OFF
   Input level: –10 dBm
   For MU887002A, 3400 MHz ≤ frequency: –14 dBm
   Uplink frequency: 2000 MHz
   Channel Bandwidth: 100 MHz
   UL RMC Number of RBs: 273
   UL RMC Starting RB: 0
   Turn Off All measurement: OFF
   ACLR measurement: ON, 20 times

3. Set the Vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Analyzable waveform pattern in Step 2 above.
   Output frequency: 2000 MHz
   Output level: –10 dBm
   (This output level reflects the calibration value for item 6.3.2.)

For MU887002A, 3400 MHz ≤ frequency: –14 dBm
(Obtained by subtracting 4 dB from the output level where the correction value in 6.3.2 is reflected)

4. Measure the Adjacent Channel Leakage Power and read the following value:

   ACLR Result: Max value

5. Change the MU887000A and SG frequencies according to 6.3.4 "Measurement Frequencies" and repeat steps 2 to 4 over.

6. Set the MU887000A as follows:

   Connect Port: Test Port 1
   Output Level On/Off: OFF
   Input Level: –10 dBm
   For MU887002A, 3400 MHz ≤ frequency: –14 dBm
   Uplink Frequency: 600 MHz
   Channel Bandwidth: 60 MHz
   UL RMC Number of RBs: 162
   UL RMC Starting RB: 0
   Turn Off All Measurement: OFF
   ACLR Measurement: ON, 20 times

7. Set the Vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Analyzable waveform pattern in Step 2 above.
   Output frequency: 600 MHz
   Output level: –10 dBm
   (This output level reflects the calibration value for item 6.3.2.)
   For MU887002A, 3400 MHz ≤ frequency: –14 dBm
   (Obtained by subtracting 4 dB from the output level where the correction value in 6.3.2 is reflected)

8. Measure the Adjacent Channel Leakage Power and read the following value.

   Result of ACLR: Max. value

9. Change the MU887000A and SG frequencies according to 6.3.4 "Measurement Frequencies" and repeat steps 6 to 8 over.

10. Change the Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 9 over.

## 6.4.5 Sample Format for Test Result Sheets

Use the following test result sheets when testing the MX887018A/19A performance. Duplicate these sheets as necessary for tests.

| | | | |
|---|---|---|---|
| Test location | | Report No. | |
| | | Date | |
| | | Person-in-charge | |

Model:

| | | | |
|---|---|---|---|
| Serial No. | | Ambient temperature | °C |
| Power source frequency | Hz | Relative humidity | % |

Remarks

SG Calibration (CW)

**SG Calibration Value (CW)**

Vector signal Generator Unmodulated Wave

| Frequency (MHz) | SG Setting (dBm) | | |
|---|---|---|---|
| | 0 dBm | –10 dBm | –20 dBm |
| 600 | | | |
| 700 | | | |
| 880 | | | |
| 940 | | | |
| 1000 | | | |
| 1800 | | | |
| 2000 | | | |
| 2200 | | | |
| 2700 | | | |
| 3300 | | | |
| 3600 | | | |
| 3800 | | | |
| 4000 | | | |
| 4200 | | | |
| 4500 | | | |
| 5000 | | | |
| 5900 | | | |
| 6359 | | | |
| 7125 | | | |

SG Calibration (MOD)

**SG Calibration Value (MOD)**

Vector signal Generator Modulation Wave

| Frequency (MHz) | SG Setting (dBm) |
|---|---|
| | –10 dBm |
| 600 | |
| 700 | |
| 880 | |
| 940 | |
| 1000 | |
| 1800 | |
| 2000 | |
| 2200 | |
| 2700 | |
| 3300 | |
| 3600 | |
| 3800 | |
| 4000 | |
| 4200 | |
| 4500 | |
| 5000 | |
| 5900 | |
| 6359 | |
| 7125 | |

Linearity Calibration

**Linearity Calibration**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 600 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 700 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 880 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 940 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 1000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 1800 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Linearity Calibration (Cont'd)

**Linearity Calibration (Cont'd)**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 2000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 2200 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 2700 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3300 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3600 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3800 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Linearity Calibration (Cont'd)

**Linearity Calibration (Cont'd)**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 4000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 4200 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 4500 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 5000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 5900 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 6359 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 7125 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Output EVM

**Output EVM**

| Frequency (MHz) | EVM (%rms) | | | EVM (%rms) | | |
|---|---|---|---|---|---|---|
| | Test Port | | Output Level | Test Port | | Output Level |
| | MU887000A Test Port 1 | | –10.9 dBm | MU887000A Test Port 3 | | –0.9 dBm |
| | MU887001A Test Port 1 | | –10.9 dBm | MU887001A Test Port 3 | | –10.9 dBm |
| | MU887002A TRX 1 / 2 Test Port 1 | | –5.0 dBm | MU887002A TRX 1 / 2 Test Port 2 | | –5.0 dBm |
| | Measured Value | Spec. | Measurement uncertainty | Measured Value | Spec. | Measurement uncertainty |
| 600 | | ≤ 2.0 | 0.1 | | ≤ 2.0 | 0.1 |
| 900 | | | | | | |
| 2000 | | | | | | |
| 2700 | | | | | | |
| 3300 | | ≤ 3.0 | 0.1 | | ≤ 3.0 | 0.1 |
| 3800 | | | | | | |
| Frequency (MHz) | EVM (%rms) | | | EVM (%rms) | | |
| | Test Port | | Output Level | Test Port | | Output Level |
| | MU887000A Test Port 1 | | –20.9 dBm | MU887000A Test Port 3 | | –10.9 dBm |
| | MU887001A Test Port 1 | | –20.9 dBm | MU887001A Test Port 3 | | –20.9 dBm |
| | MU887002A TRX 1 / 2 Test Port 1 | | –8.0 dBm | MU887002A TRX 1 / 2 Test Port 2 | | –8.0 dBm |
| | Measured Value | Spec. | Measurement uncertainty | Measured Value | Spec. | Measurement uncertainty |
| 4000 | | ≤ 4.0 | 0.3 | | ≤ 4.0 | 0.3 |
| 4500 | | | | | | |
| 5000 | | | | | | |
| Frequency (MHz) | EVM (%rms) | | | EVM (%rms) | | |
| | Test Port | | Output Level | Test Port | | Output Level |
| | MU887002A TRX 1 / 2 Test Port 11 | | –10.0 dBm | MU887002A TRX 1 / 2 Test Port 12 | | –10.0 dBm |
| | Measured Value | Spec. | Measurement uncertainty | Measured Value | Spec. | Measurement uncertainty |
| 5900 | | ≤ 4.0 | 0.3 | | ≤ 4.0 | 0.3 |
| 6800 | | | | | | |
| 7050 | | | | | | |
| 7125 | | | | | | |

Tx Power Measurement Accuracy (CW)

**Tx Power Measurement Accuracy**

**MU887000A Port 1/2, MU887001A Port 1/2/3/4, MU887002A TRX 1/2 Port 1/2**

**MU887002A-007, 5900 MHz ≤ frequency, TRx1/2 Port 11/12**

Input Level: –10 dBm (Item 6.3.1 Calibration Value)

| Frequency (MHz) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|
| | | Lower Limit | Measurement Accuracy –10 – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | –0.7 | | +0.7 | MU887000A, MU887001A: ±0.15 MU887002A: ±0.2 |
| 700 | | | | | |
| 880 | | | | | |
| 940 | | | | | |
| 1000 | | | | | |
| 1800 | | | | | |
| 2000 | | | | | |
| 2200 | | | | | |
| 2700 | | | | | |
| 3300 | | –1.0 | | +1.0 | MU887000A, MU887001A: ±0.14 MU887002A: ±0.26 |
| 3600 | | | | | |
| 3800 | | | | | |
| 4000 | | –1.0 | | +1.0 | MU887000A, MU887001A: ±0.33 MU887002A: ±0.3 |
| 4200 | | | | | |
| 4500 | | | | | |
| 5000 | | | | | |
| 5900 | | –1.3 | | +1.3 | MU887002A: ±0.35 |
| 6359 | | | | | |
| 7125 | | | | | |

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy**

**MU887000A Port 1/2, MU887001A Port 1/2/3/4, MU887002A TRX 1/2 Port1/2**

**MU887002A-007, 5900 MHz ≤ frequency, TRx1/2 Port 11/12**

Input Level: –50 dBm (Item 6.3.3 Calibration Value)

| Frequency (MHz) | Item 6.3.3 –50 dBm Calibration Value (C) (dB) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|---|
| | | | Lower Limit | Measurement Accuracy –20 + (C) – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | | –0.7 | | +0.7 | MU887000A, MU887001A: ±0.14 MU887002A: ±0.17 |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | –1.0 | | +1.0 | MU887000A, MU887001A: ±0.14 MU887002A: ±0.26 |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | –1.0 | | +1.0 | MU887000A, MU887001A: ±0.33 MU887002A: ±0.3 |
| 4200 | | | | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |
| 5900 | | | –1.3 | | +1.3 | MU887002A: ±0.35 |
| 6359 | | | | | | |
| 7125 | | | | | | |

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy**

**MU887000A Port 1/2, MU887001A Port 1/2/3/4, MU887002A TRX 1/2 Port1/2**

**MU887002A-007, 5900 MHz ≤ frequency, TRx1/2 Port 11/12**

Input Level :–60 dBm (Item 6.3.3 Calibration Value)

| Frequency (MHz) | Item 6.3.3 –60 dBm Calibration Value (C) (dB) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|---|
| | | | Lower Limit | Measurement Accuracy –20 + (C) – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | | –0.9 | | +0.9 | MU887000A, MU887001A: ±0.14 MU887002A: ±0.17 |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | –1.3 | | +1.3 | MU887000A, MU887001A: ±0.14 MU887002A: ±0.26 |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | –1.3 | | +1.3 | MU887000A, MU887001A: ±0.33 MU887002A: ±0.3 |
| 4200 | | | | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |
| 5900 | | | –2.0 | | +2.0 | MU887002A: ±0.35 |
| 6359 | | | | | | |
| 7125 | | | | | | |

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy MU887000A Port 3/4**

Input Level: –10 dBm (Item 6.3.1 Calibration Value)

| Frequency (MHz) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|
| | | Lower Limit | Measurement Accuracy –10 – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | –0.7 | | +0.7 | ±0.17 |
| 700 | | | | | |
| 880 | | | | | |
| 940 | | | | | |
| 1000 | | | | | |
| 1800 | | | | | |
| 2000 | | | | | |
| 2200 | | | | | |
| 2700 | | | | | |
| 3300 | | –1.0 | | +1.0 | ±0.14 |
| 3600 | | | | | |
| 3800 | | | | | |
| 4000 | | –1.0 | | +1.0 | ±0.20 |
| 4200 | | | | | |
| 4500 | | | | | |
| 5000 | | | | | |

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy MU887000A Port 3/4**

Input Level: –50 dBm (Item 6.3.3 Calibration Value)

| Frequency (MHz) | Item 6.3.3 –50 dBm Calibration Value (C) (dB) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|---|
| | | | Lower Limit | Measurement Accuracy –20 + (C) – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | | –0.9 | | +0.9 | ±0.14 |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | –1.0 | | +1.0 | ±0.14 |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | –1.0 | | +1.0 | ±0.20 |
| 4200 | | | | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy MU887000A Port 3/4**

Input Level :–60 dBm (Item 6.3.3 Calibration Value)

| Frequency (MHz) | Item 6.3.3 –60 dBm Calibration Value (C) (dB) | MX887018A/19A Measured Value (Pow) (dBm) | Measurement Accuracy (dB) | | | |
|---|---|---|---|---|---|---|
| | | | Lower Limit | Measurement Accuracy –20 + (C) – (Pow) | Upper Limit | Measurement uncertainty |
| 600 | | | –1.1 | | +1.1 | ±0.14 |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | +1.3 | | +1.3 | ±0.14 |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | –1.3 | | +1.3 | ±0.20 |
| 4200 | | | | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |

Frequency/Modulation Measurement

**Residual EVM/Carrier Frequency Accuracy**

Input Level: –24.9 dBm

| Frequency (MHz) | Residual EVM (%) | | |
|---|---|---|---|
| | Measured Value | Spec. | Measurement uncertainty |
| 600 | | ≤ 2.5 | MU887000A, MU887001A: ±0.1 MU887002A: ±0.2 |
| 700 | | | |
| 880 | | | |
| 940 | | | |
| 1000 | | | |
| 1800 | | | |
| 2000 | | | |
| 2200 | | | |
| 2700 | | | |
| 3300 | | | |
| 3600 | | | |
| 3800 | | | |
| 4000 | | | |
| 4200 | | | |
| 4500 | | | |
| 5000 | | | |
| 5900 | | | |
| 6359 | | | |
| 7125 | | | |

Frequency/Modulation Measurement (Cont'd)

**Residual EVM/Carrier Frequency Accuracy**

Input Level: –33 dBm

| Frequency (MHz) | Residual EVM (%) | | | Carrier Frequency Accuracy (Hz) | | |
|---|---|---|---|---|---|---|
| | Measured Value | Spec. | Measurement uncertainty | Measured Value | Spec. | Measurement uncertainty |
| 600 | | ≤ 3.0 | MU887000A, MU887001A: ±0.1 MU887002A: ±0.2 | | ±15.0 | ±3.2 |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | | | ±36.0 | ±3.8 |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | | | | |
| 4200 | | ≤ 3.0 | MU887000A, MU887001A: ±0.2 MU887002A: ±0.3 | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |
| 5900 | | ≤ 3.0 | MU887002A: ±0.3 | | ±36.0 | ±3.8 |
| 6359 | | | | | | |
| 7125 | | | | | | |

Adjacent Channel Leakage Power Measurement (ACLR)

**Adjacent Channel Leakage Power**

Input Level: –10 dBm / –14 dBm

| Frequency (MHz) | Adjacent Channel Leakage Power Ratio (dB) | | | | | |
|---|---|---|---|---|---|---|
| | Band | | | | | |
| | UTRA (–2) | UTRA (–1) | UTRA (+1) | UTRA (+2) | NR (–1) | NR (+1) |
| 600 | | | | | | |
| 700 | | | | | | |
| 880 | | | | | | |
| 940 | | | | | | |
| 1000 | | | | | | |
| 1800 | | | | | | |
| 2000 | | | | | | |
| 2200 | | | | | | |
| 2700 | | | | | | |
| 3300 | | | | | | |
| 3600 | | | | | | |
| 3800 | | | | | | |
| 4000 | | | | | | |
| 4200 | | | | | | |
| 4500 | | | | | | |
| 5000 | | | | | | |
| 5900 | | | | | | |
| 6359 | | | | | | |
| 7125 | | | | | | |
| Spec. (dB) | ≥ 48 dB | ≥ 45 dB | ≥ 45 dB | ≥ 48 dB | ≥ 42 dB | ≥ 42 dB |
| Measurement uncertainty | MU887000A, MU887001A | | | | | |
| | 2 dB | | | | 1 dB | |
| | MU887002A | | | | | |
| | 2.12 dB | 1.52 dB | | 2.12 dB | 2.69 dB | |

# 6.5 Calibration **(MX887018A-001/19A-001)**

This section explains how to obtain the calibration values of the instrument used for the performance tests.

## 6.5.1 SG Calibration (CW)

This section explains how to obtain the calibration values of the CW (unmodulated) signal source.

(1) Measuring instruments

- Vector signal generator:
- Power Meter: ML2437A
- Power Sensor: MA2442D
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(2) Setup

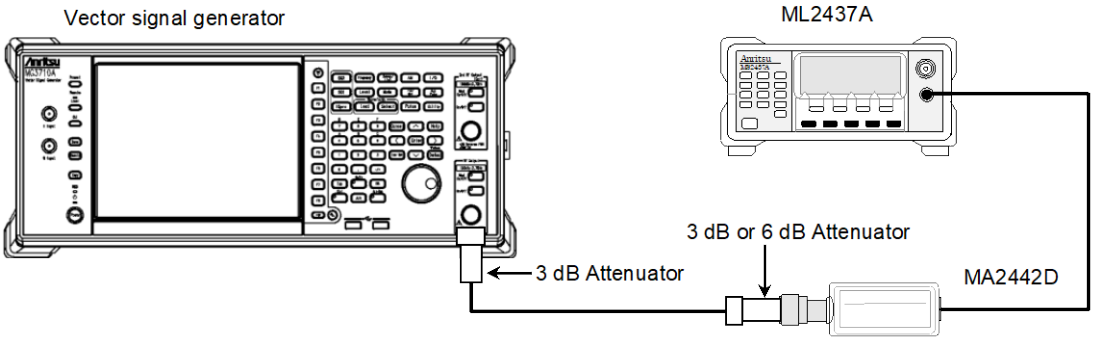



Figure **6.5.1-1 SG Calibration (CW)**

(3) Test Procedure

1. Setup the instruments as shown in Figure 6.5.1-1.
2. Set the vector signal generator (SG) as follows:

   Modulation: OFF
   Output frequency: 610 MHz
   Output level: MU887000A/01A: 6 dBm (0 dBm + 6 dB)
   MU887002A: 9 dBm (0 dBm + 9 dB)
3. Adjust the SG output level so that the level measurement value of the power meter is 0 dBm, and obtain the calibration values for the setting frequency and setting level.
4. Set frequencies in accordance with the table in 6.5.4, “Measurement Frequencies”, and obtain the calibration values of each frequency.
5. Replace 0 dBm with –10 dBm and –20 dBm at step 2, repeat steps 2 to 4 respectively, and obtain the calibration values.

## 6.5.2 SG Calibration (MOD)

This section explains how to obtain the calibration values of the modulation wave signal source.

(1) Measuring instruments

- Vector signal generator:
- Power Meter: ML2437A
- Power sensor: MA24002A
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(2) Setup

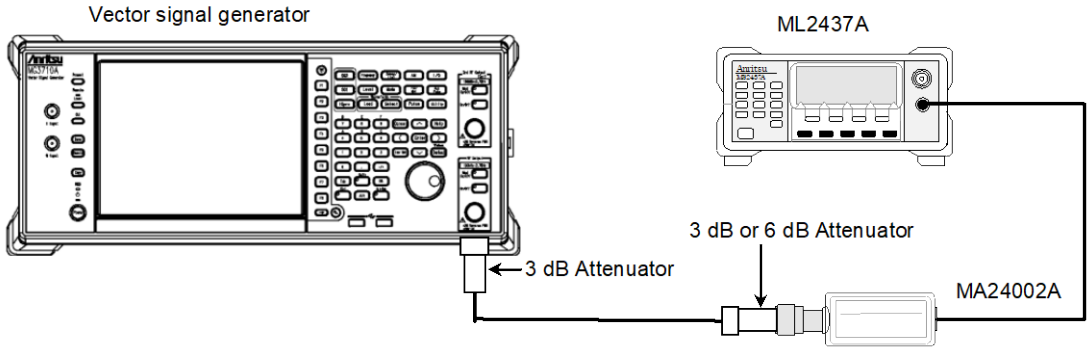



**Figure 6.5.2-1 SG Calibration (MOD)**

(3) Test procedure

1. Setup the instruments as shown in Figure 6.5.2-1.
2. Set the vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Analyzable waveform pattern in 6.6.1 "Adjacent Channel Leakage Power Ratio (ACLR)".
   Output frequency: 610 MHz
   Output level: MU887000A/01A: –4 dBm (–10 dBm + 6 dB)
   MU887002A: –1 dBm (–10 dBm + 9 dB)
3. Adjust the SG output level so that the level measurement value of the power meter is –10 dBm, and obtain the calibration values for the setting frequency and setting level.
4. Set frequencies in accordance with the table in 6.5.4, "Measurement Frequencies", and obtain the calibration values of each frequency.

## 6.5.3 Linearity Calibration

This section explains how to obtain the calibration values for linearity.

(1) Measuring instruments

- Vector signal generator:
- Signal Analyzer: MS2850A
- Attenuator:

| | | | |
|---|---|---|---|
| For MU887000A/01A | 3 dB: | AT-103 | 2 sets |
| For MU887002A | 3 dB: | BW-N3W5+ | |
| | 6 dB: | BW-N6W5+ | |

(2) Setup

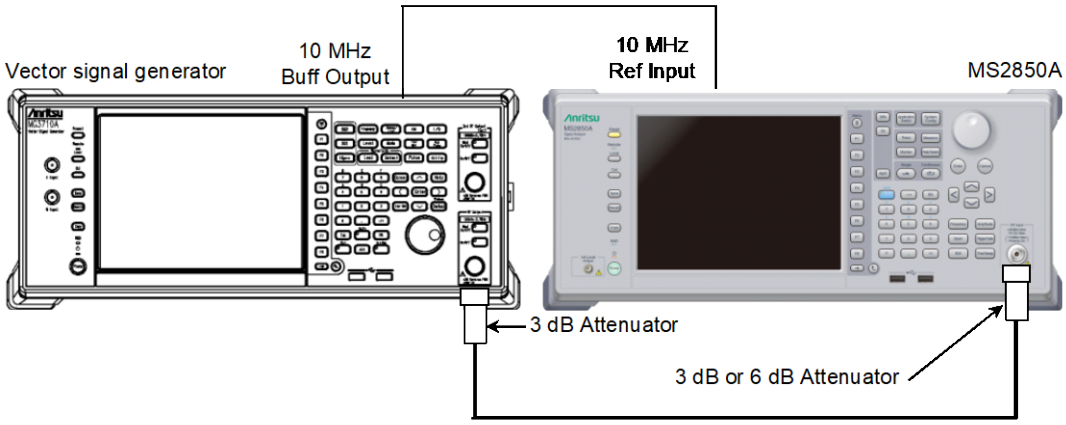



**Figure 6.5.3-1 Linearity Calibration**

(3) Test procedure

1. Setup the instruments as shown in Figure 6.5.3-1.
2. Set the signal analyzer (SA) as shown in #1 of Table 6.5.3-1 “Signal Analyzer Settings”.
3. Set the vector signal generator (SG) as follows:

   Modulation: OFF
   Output frequency: 610 MHz
   Output level: Setting level when the level measurement value of the power meter is 0 dBm in the SG calibration (Section 6.5.1)
4. Connect the output of the SG to the SA and measure the SG output level with the SA (A dBm).
5. Decrease the SG output level in 10 dB steps down to 40 dB and measure the level at each step (B dBm). (The calibration value is B – A.)

6. Set frequencies in accordance with the table in 6.5.4, "Measurement Frequencies", and obtain the calibration values of each frequency.
7. Set the SA as shown in #2 of Table 6.5.3-1 "Signal Analyzer Settings".
8. Replace 0 dBm with –20 dBm at step 3, and repeat steps 3 to 6.

**Table 6.5.3-1 Signal Analyzer Settings**

| | MS2850A | | | | | | |
|---|---|---|---|---|---|---|---|
| | Application Switch | RBW | Zone Width | Time Length | ATT | Preamp | Ref Lev |
| #1 | Signal Analyzer | 100 Hz | 781.3 Hz | AUTO | 20 dB | OFF | 0 dBm |
| #2 | Signal Analyzer | 100 Hz | 781.3 Hz | AUTO | 0 dB | OFF | –20 dBm |

## 6.5.4 Measurement Frequencies

Table 6.5.4-1 lists the frequencies set in the performance tests for the calibration and calibrated test system. The 4000 MHz and more frequency is measured only when MU887000A-001 is installed, or MU887002A.

**Table 6.5.4-1 Measurement Point and Frequency**

| Meas. Point | SG Setting Freq. (MHz) | NR Meas. Freq. (MHz) | E-UTRA Meas. Freq. (MHz) |
|---|---|---|---|
| 1 | 610 | 600 | 660 |
| 2 | 700 | 690 | 750 |
| 3 | 880 | 870 | 930 |
| 4 | 940 | 930 | 990 |
| 5 | 1000 | 990 | 1050 |
| 6 | 1800 | 1790 | 1850 |
| 7 | 2000 | 1990 | 2050 |
| 8 | 2200 | 2190 | 2250 |
| 9 | 2700 | 2690 | 2750 |
| 10 | 3300 | 3290 | 3350 |
| 11 | 3600 | 3590 | 3650 |
| 12 | 3750 | 3740 | 3800 |
| 13 | 4000 | 3990 | 4050 |
| 14 | 4200 | 4190 | 4250 |
| 15 | 4500 | 4490 | 4550 |
| 16 | 4950 | 4940 | 5000 |

**Table 6.5.4-2 Measurement Point and Frequency (ACLR Case2)**

| Meas. Point | SG Setting Freq. (MHz) | NR Meas. Freq. (MHz) | E-UTRA Meas. Freq. (MHz) |
|---|---|---|---|
| 1 | 610 | 608.5 | 640 |
| 2 | 700 | 698.5 | 730 |
| 3 | 880 | 878.5 | 910 |
| 4 | 940 | 938.5 | 970 |
| 5 | 1000 | 998.5 | 1030 |
| 6 | 1800 | 1798.5 | 1830 |
| 7 | 2000 | 1998.5 | 2030 |
| 8 | 2200 | 2198.5 | 2230 |
| 9 | 2700 | 2698.5 | 2730 |
| 10 | 3300 | 3298.5 | 3330 |
| 11 | 3600 | 3598.5 | 3630 |
| 12 | 3750 | 3748.5 | 3780 |
| 13 | 4000 | 3998.5 | 4030 |
| 14 | 4200 | 4198.5 | 4230 |
| 15 | 4500 | 4498.5 | 4530 |
| 16 | 4950 | 4948.5 | 4980 |

# 6.6 Performance Tests (MX887018A-001/19A-001)

Common test items

The following list shows the common settings for each measurement at the MU887000A.

| | |
|---|---|
| Application Select: | Cellular |
| Standard Select: | NR |
| Frame Type: | FDD (MX887018A)<br>TDD (MX887019A) |
| RMC Configuration: | PUSCH |
| UL RMC Waveform: | CPOFDM |
| Channel Bandwidth: | 100MHZ |
| Subcarrier Spacing: | 30KHZ |
| RMC Modulation: | 64QAM |
| Trigger Source: | FREE |
| RAN Operation: | EN-DC |
| EN-DC Measurement Mode: | Contiguous |
| E-UTRA UL Number of RBs: | 0 |
| E-UTRA UL Starting RB: | 0 |
| E-UTRA UL Channel Bandwidth: | 20MHZ |

## 6.6.1 Adjacent Channel Leakage Power Ratio (ACLR)

This test is related to Adjacent Channel Leakage Power Ratio measurements.

(1) Test specifications

ENBW ≤ 63 MHz, and
600 MHz ≤ Frequency ≤ 2700 MHz, 3300 MHz ≤ Frequency ≤ 5000 MHz.
63 MHz < ENBW, and
2000 MHz ≤ Frequency ≤ 2700 MHz, 3300 MHz ≤ Frequency ≤ 5000 MHz

| Adjacent Channel Leakage Power Ratio | Measurement Point |
|---|---|
| ≥ 42 dB | NR ACLR |

MU887000A: Test Port 1/2
MU887001A: Test Port 1 to 4
Input Level range: –10 dBm ≤, ≤ +35 dBm
MU887002A: TRX 1/2 Test Port 1 to 12
600 MHz ≤ frequency ≤ 2700 MHz
Input Level range: –10 dBm ≤, ≤ +35 dBm
3300 MHz ≤ frequency ≤ 5000 MHz
Input Level range: –14 dBm ≤, ≤ +35 dBm
MU887000A: Test Port 3/4
Input Level range: –10 dBm ≤, ≤ +25 dBm

(2) Measuring instruments

- Vector signal Generator:
- Attenuator:

For MU887000A/01A 3 dB: AT-103 2 sets
For MU887002A 3 dB: BW-N3W5+
6 dB: BW-N6W5+

(3) Setup

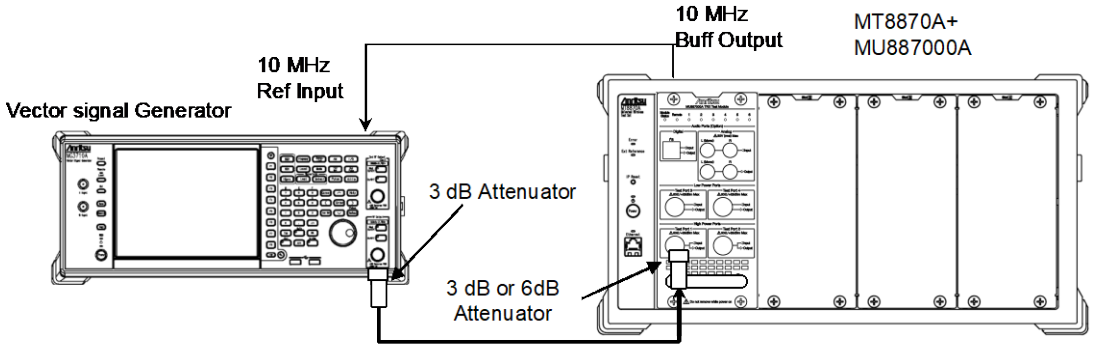



**Figure 6.6.1-1 Setup for Measuring Adjacent Channel Leakage Power Ratio**

(4) Test procedure

This test is measured at the following Test Ports.
When testing other than Test Port 1, read "Test Port 1" in the following procedure as the port to be tested.
MU887000A: Test Port 1, 2, 3, 4
MU887001A: Test Port 1, 2, 3, 4
MU887002A: TRX 1: Test Port 1, 2, TRX 2: Test Port 1, 2

1. Setup the instruments as shown in Figure 6.6.1-1.
2. Set the MU887000A as follows:

| | |
|---|---|
| Connect port: | Test Port 1 |
| Output level ON/OFF: | OFF |
| Input level: | –10 dBm |
| For MU887002A, 3400 MHz ≤ frequency: | –14 dBm |
| Uplink Frequency: | 1990 MHz |
| E-UTRA Uplink Frequency | 2050 MHz |
| Channel Bandwidth: | 100 MHz |
| E-UTRA Channel Bandwidth: | 20 MHz |
| UL RMC Number of RBs: | 273 |
| UL RMC Starting RB: | 0 |
| E-UTRA UL RMC Number of RBs: | 0 |
| E-UTRA UL RMC Starting RB: | 0 |
| Turn Off All Measurement: | OFF |
| ACLR measurement: | ON, 20 times |

3. Set the Vector signal generator (SG) as follows:

| | |
|---|---|
| Modulation: | ON |
| Modulation wave: | Analyzable waveform pattern in Step 2 above. |
| Output frequency: | 2000 MHz |
| Output level: | –10 dBm (This output level reflects the calibration value for item 6.5.2.) |
| For MU887002A, 3400 MHz ≤ frequency: | –14 dBm (Obtained by subtracting 4 dB from the output level where the correction value in 6.5.2 is reflected) |

4. Measure the Adjacent Channel Leakage Power and read the following value:

ACLR Result: Max value

5. Change the MU887000A and SG frequencies according to Table 6.5.4-1 "Measurement Point and Frequency" and repeat steps 2 to 4 over.

6. Set the MU887000A as follows:

   Connect Port: Test Port 1
   Output Level On/Off: OFF
   Input Level: –10 dBm
   For MU887002A, 3400 MHz ≤ frequency: –14 dBm
   Uplink Frequency: 608.5 MHz
   E-UTRA Uplink Frequency 640 MHz
   Channel Bandwidth: 60 MHz
   E-UTRA Channel Bandwidth: 3 MHz
   UL RMC Number of RBs: 162
   UL RMC Starting RB: 0
   E-UTRA UL RMC Number of RBs: 0
   E-UTRA UL RMC Starting RB: 0
   Turn Off All Measurement: OFF
   ACLR Measurement: ON, 20 times

7. Set the Vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Analyzable waveform pattern in Step 2 above.
   Output frequency: 610 MHz
   Output level: –10 dBm
   (This output level reflects the calibration value for item 6.5.2.)
   For MU887002A, 3400 MHz ≤ frequency: –14 dBm
   (Obtained by subtracting 4 dB from the output level where the correction value in 6.5.2 is reflected)

8. Measure the Adjacent Channel Leakage Power and read the following value.

   Result of ACLR: Max. value

9. Change the MU887000A and SG frequencies according to Table 6.5.4-2 “Measurement Point and Frequency (ACLR Case2)” and repeat steps 6 to 8 over.

10. Change the Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 9 over.

## 6.6.2 Sample Format for Test Result Sheets

Use the following test result sheets when testing the MX887018A-001/19A-001 performance. Duplicate these sheets as necessary for tests.

| | | | |
|---|---|---|---|
| Test location | | Report No. | |
| | | Date | |
| | | Person-in-charge | |
| Model: | | | |
| Serial No. | | Ambient temperature | °C |
| Power source frequency | Hz | Relative humidity | % |

Remarks

SG Calibration (CW)

**SG Calibration Value (CW)**

Vector signal Generator Unmodulated Wave

| Frequency (MHz) | SG Setting (dBm) | | |
|---|---|---|---|
| | 0 dBm | –10 dBm | –20 dBm |
| 610 | | | |
| 700 | | | |
| 880 | | | |
| 940 | | | |
| 1000 | | | |
| 1800 | | | |
| 2000 | | | |
| 2200 | | | |
| 2700 | | | |
| 3300 | | | |
| 3600 | | | |
| 3750 | | | |
| 4000 | | | |
| 4200 | | | |
| 4500 | | | |
| 4950 | | | |

SG Calibration (MOD)

**SG Calibration Value (MOD)**

Vector signal Generator Modulation Wave

| Frequency (MHz) | SG Setting (dBm) |
|---|---|
| | –10 dBm |
| 610 | |
| 700 | |
| 880 | |
| 940 | |
| 1000 | |
| 1800 | |
| 2000 | |
| 2200 | |
| 2700 | |
| 3300 | |
| 3600 | |
| 3750 | |
| 4000 | |
| 4200 | |
| 4500 | |
| 4950 | |

Linearity Calibration

**Linearity Calibration**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 610 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 700 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 880 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 940 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 1000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 1800 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Linearity Calibration (Cont'd)

**Linearity Calibration (Cont'd)**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 2000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 2200 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 2700 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3300 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3600 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 3750 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Linearity Calibration (Cont'd)

**Linearity Calibration (Cont'd)**

| Frequency (MHz) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) | SG Level (dBm) | SA Measured Value (dBm) | Calibration Value (C) (B) – (A) (dB) |
|---|---|---|---|---|---|---|
| 4000 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 4200 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 4500 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |
| 4950 | 0 | (A) | | –20 | (A) | |
| | –10 | (B) | | –30 | (B) | |
| | –20 | (B) | | –40 | (B) | |
| | –30 | (B) | | –50 | (B) | |
| | –40 | (B) | | –60 | (B) | |

Adjacent Channel Leakage Power Measurement (ACLR)

**Adjacent Channel Leakage Power**

Input Level: –10 dBm / –14 dBm

63 MHz < ENBW

| SG Frequency (MHz) | Adjacent Channel Leakage Power Ratio (dB) | |
|---|---|---|
| | Band | |
| | NR (–1) | NR (+1) |
| 2000 | | |
| 2200 | | |
| 2700 | | |
| 3300 | | |
| 3600 | | |
| 3750 | | |
| 4000 | | |
| 4200 | | |
| 4500 | | |
| 4950 | | |
| Spec. (dB) | ≥ 42 dB | ≥ 42 dB |
| Measurement uncertainty | MU887000A, MU887001 | |
| | 1.33 dB | |
| | MU887002A | |
| | 3.21 dB | |

Adjacent Channel Leakage Power Measurement (ACLR) (Cont'd)

Input Level: –10 dBm / –14 dBm

ENBW ≤ 63 MHz

| SG Frequency (MHz) | Adjacent Channel Leakage Power Ratio (dB) | |
|---|---|---|
| | Band | |
| | NR (–1) | NR (+1) |
| 610 | | |
| 700 | | |
| 880 | | |
| 940 | | |
| 1000 | | |
| 1800 | | |
| 2000 | | |
| 2200 | | |
| 2700 | | |
| 3300 | | |
| 3600 | | |
| 3750 | | |
| 4000 | | |
| 4200 | | |
| 4500 | | |
| 4950 | | |
| Spec. (dB) | ≥ 42 dB | ≥ 42 dB |
| Measurement uncertainty | MU887000A, MU887001 | |
| | 1.33 dB | |
| | MU887002A | |
| | 3.21 dB | |

# 6.7 Servicing

If any unit is found to be broken or does not operate as described in the specifications, 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.

When requesting repair, supply the following information:

(a) Model name and serial number marked on rear panel

(b) Failure symptoms

(c) Person to contact about nature of failure and repair completion notification

(d) Software version

# Appendix A Specifications

This appendix lists the specifications of the MX887018A NR FDD sub-6GHz Uplink TX Measurement and MX887019A NR TDD sub-6GHz Uplink TX Measurement. Refer to section 1.2 “Composition” for details of the product configuration.


A.1 MX887018A/MX887019A ..... A-2
A.2 MX887018A-001/MX887019A-001 ..... A-10

# A.1 MX887018A/MX887019A

This section explains the specifications of MX887018A NR FDD sub-6GHz Uplink TX Measurement and MX887019A NR TDD sub-6GHz Uplink TX Measurement where the software options are not installed.

These specifications assume use of the system at a constant temperature after warming-up the instruments for 30 minutes.
The abbreviation (typ.) indicates the reference data at 20 to 30°C and is not a guaranteed value.
For MU887002A:
With setting 600 MHz ≤ frequency ≤ 2700 MHz, 3300 MHz ≤ frequency ≤ 5000 MHz, when the ports 1 and 2 of TRX 1 or TRX 2 satisfy the specifications, the specifications of the ports 3 to 12 of the same TRX are guaranteed by design.
With setting 5900 MHz ≤ frequency ≤ 7125 MHz, when the ports 11 and 12 of TRX 1 or TRX 2 satisfy the specifications, the specifications of the ports 5 to 10 of the same TRX are guaranteed by design.

**Table A.1-1 MX887018A/19A Specifications**

| Item | Specification |
|---|---|
| Application | Perform TX measurement of the mobile station for NR Sub-6GHz.<br>MX887018A: For FDD frame structure<br>MX887019A: For TDD frame structure |
| Common Items | |
| Measuring Object | PUSCH |
| Channel Bandwidth | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz |
| Modulation scheme | π/2 BPSK, QPSK, 16QAM, 64QAM |
| Tx Power Measurement | |
| Frequency Range | 600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz) |
| Input Level Range | MU887000A Port 1, Port 2: –65.0 to +35.0 dBm<br>Port 3, Port 4: –65.0 to +25.0 dBm<br>MU887001A Port 1 to 4: –65.0 to +35.0 dBm<br>MU887002A TRX 1/2 Port 1 to 12:<br>600 to 2700 MHz, 3300 to 5000 MHz –65.0 to +35.0 dBm<br>MU887002A-007 TRX 1/2 Port 5 to 12:<br>5900 MHz ≤ frequency ≤ 7125 MHz –65.0～+30.0 dBm<br>(and Channel Edge ≤ 7125 MHz) |

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Measurement Accuracy</td><td>
MU887000A Port 1, Port 2: After calibration, 20 to 30°C<br>
MU887001A Port 1 to 4: After calibration, 20 to 30°C<br>
MU887002A TRX 1/2 Port 1 to 12: After calibration, 20 to 30°C<br>
Frequency: 600 MHz ≤ f ≤ 2700 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–20 to +35 dBm</td><td>±0.5 dB (typ.)</td></tr>
</table>
MU887000A Port 1, Port 2: After calibration, 10 to 40°C<br>
MU887001A Port 1 to 4: After calibration, 10 to 40°C<br>
MU887002A TRX 1/2 Port 1 to 12: After calibration, 20 to 30°C<br>
Frequency: 600 MHz ≤ f ≤ 2700 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±0.7 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±0.9 dB</td></tr>
</table>
Frequency: 3300 MHz ≤ f ≤ 3800 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±1.0 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB</td></tr>
</table>
MU887000A Port 1, Port 2: After calibration, 20 to 30°C<br>
MU887001A Port 1 to 4: After calibration, 20 to 30°C<br>
MU887002A TRX 1/2 Port 1 to 12: After calibration, 20 to 30°C<br>
Frequency: 3800 MHz < f ≤ 5000 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±1.0 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB</td></tr>
</table>
MU887002A TRX 1/2 Port 5 to 12: After calibration, 20 to 30°C<br>
Frequency: 5900 MHz ≤ f ≤ 7125 MHz, and Channel Edge ≤ 7125 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50～+30 dBm</td><td>±1.3 dB</td></tr>
<tr><td>–60～–50 dBm</td><td>±2.0 dB</td></tr>
</table>
</td></tr>
</table>

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Measurement Accuracy (Cont'd)</td><td>MU887000A Port 3, Port 4:<br>Frequency: 600 MHz ≤ f ≤ 2700 MHz (After calibration, 10 to 40°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–20 to +25 dBm</td><td>±0.7 dB</td></tr>
<tr><td>–50 to –20 dBm</td><td>±0.9 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.1 dB</td></tr>
</table>
Frequency: 3300 MHz ≤ f ≤ 3800 MHz (After calibration, 10 to 40°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +25 dBm</td><td>±1.0 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB</td></tr>
</table>
Frequency: 3800 MHz < f ≤ 5000 MHz (After calibration, 20 to 30°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +25 dBm</td><td>±1.0 dB</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB</td></tr>
</table></td></tr>
</table>

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Modulation Analysis<br>Frequency Range</td><td>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz)</td></tr>
<tr><td>Input Level Range</td><td>MU887000A Port 1, Port 2: Min. output power* to +35.0 dBm<br>Port 3, Port 4: Min. output power* to +25.0 dBm<br>MU887001A Port 1 to 4: Min. output power* to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12:<br>600 to 2700 MHz, 3300 to 5000 MHz Min. output power* to +35.0 dBm<br>MU887002A-007 TRX 1/2 Port 5 to 12:<br>5900 MHz ≤ frequency ≤ 7125 MHz Min. output power* to +30.0 dBm<br>(and Channel Edge ≤ 7125 MHz)<br>*: Minimum output power
<table>
<tr><th>Channel Bandwidth (MHz)</th><th>Minimum output power (dBm)</th></tr>
<tr><td>5, 10, 15, 20</td><td>–40</td></tr>
<tr><td>25</td><td>–39</td></tr>
<tr><td>30</td><td>–38.2</td></tr>
<tr><td>40</td><td>–37</td></tr>
<tr><td>50</td><td>–36</td></tr>
<tr><td>60</td><td>–35.2</td></tr>
<tr><td>70</td><td>–34.6</td></tr>
<tr><td>80</td><td>–34</td></tr>
<tr><td>90</td><td>–33.5</td></tr>
<tr><td>100</td><td>–33</td></tr>
</table>
</td></tr>
<tr><td>Carrier Frequency Accuracy</td><td>±(Set frequency × Reference oscillator accuracy + 15 Hz)<br>Frequency: 600 MHz ≤ f ≤ 2700 MHz<br>±(Set frequency × Reference oscillator accuracy + 36 Hz)<br>Frequency: 3300 MHz ≤ f ≤ 5000 MHz<br>±(Set frequency × Reference oscillator accuracy + 36 Hz)<br>Frequency: 5900 MHz ≤ f ≤ 7125 MHz (and Channel Edge ≤ 7125 MHz)</td></tr>
</table>

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

| Item | Specification |
|---|---|
| Modulation accuracy | Residual Vector Error: ≤ 2.5% (–25 dBm < Input level)<br>Residual Vector Error: ≤ 3.0%<br>(Minimum output power* ≤ Input level ≤ –25 dBm)<br>(Frequency: 600 MHz ≤ f ≤2700 MHz, 3300 MHz ≤ f ≤ 4200 MHz)<br>Residual Vector Error: ≤ 3.0%<br>(Minimum output power* ≤ Input level ≤ –25 dBm)<br>(4200 MHz < f ≤5000 MHz (20 to 30°C))<br>Residual Vector Error: ≤ 3.0% (with MU887002A-007)<br>(Minimum output power* ≤ Input level ≤ –25 dBm)<br>(5900 MHz ≤ f ≤ 7125 MHz (20 to 30°C),<br>and Channel Edge ≤ 7125 MHz)<br>(20 averaging times) |

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

| Item | Specification |
|---|---|
| Occupied Bandwidth | |
| Frequency Range | Channel Bandwidth ≤ 60 MHz<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz)<br>60 MHz < Channel Bandwidth<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz) |
| Input Level Range | MU887000A Port1, Port2: –10.0 to +35.0 dBm<br>Port3, Port4: –10.0 to +25.0 dBm<br>MU887001A Port1 to 4: –10.0 to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12:<br>600 to 2700 MHz, 3300 to 5000 MHz –10.0 to +35.0 dBm<br>MU887002A-007 TRX 1/2 Port 5 to 12:<br>5900 MHz ≤ frequency ≤ 7125 MHz –10.0 to +30.0 dBm<br>(and Channel Edge ≤ 7125 MHz) |

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Adjacent Channel Leakage Power Ratio</td><td></td></tr>
<tr><td>Frequency Range</td><td>Channel Bandwidth ≤ 60 MHz,<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz)<br>60 MHz < Channel Bandwidth,<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz)</td></tr>
<tr><td>Input Level Range</td><td>MU887000A Port 1, Port 2: –10.0 to +35.0 dBm<br>Port 3, Port 4: –10.0 to +25.0 dBm<br>MU887001A Port 1 to 4: –10.0 to +35.0 dBm<br>MU887002A TRX 1/2 Port 1 to 12:<br>600 MHz ≤ frequency ≤ 2700 MHz –10.0 to +35.0 dBm<br>3300 MHz ≤ frequency ≤ 5000 MHz –14.0 to +35.0 dBm<br>MU887002A-007 TRX 1/2 Port 5 to 12:<br>5900 MHz ≤ frequency ≤ 7125 MHz –14.0 to +30.0 dBm<br>(and Channel Edge ≤ 7125 MHz)</td></tr>
<tr><td>Measurement Range</td><td>
<table>
<tr><td>Adjacent Channel</td><td>Measurement Range</td></tr>
<tr><td>NR ACLR</td><td>≥ 42 dB</td></tr>
<tr><td>UTRA ACLR1</td><td>≥ 45 dB</td></tr>
<tr><td>UTRA ACLR2</td><td>≥ 48 dB</td></tr>
</table>
</td></tr>
</table>

**Table A.1-1 MX887018A/19A Specifications (Cont'd)**

| Item | Specification |
|---|---|
| Spectrum Emission Mask (SEM) | |
| Frequency Range | Channel Bandwidth ≤ 60 MHz,<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz)<br>60 MHz < Channel Bandwidth,<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>5900 MHz ≤ frequency ≤ 7125 MHz (with MU887002A-007, TRX 1/2 Port 5 to 12, and Channel Edge ≤ 7125 MHz) |
| Input Level Range | MU887000A Port 1, Port 2: –10.0 to +35.0 dBm<br>Port 3, Port 4: –10.0 to +25.0 dBm<br>MU887001A Port 1 to 4: –10.0 to +35.0 dBm<br>MU887002A TRX 1/2 Port 1 to 12:<br>600 to 2700 MHz, 3300 to 5000 MHz –10.0 to +35.0 dBm<br>MU887002A-007 TRX 1/2 Port 5 to 12:<br>5900 MHz ≤ frequency ≤ 7125 MHz (and Channel Edge ≤ 7125 MHz) –10.0 to +30.0 dBm |

# A.2 MX887018A-001/MX887019A-001

This section explains the specifications of
MX887018A-001 NR FDD Contiguous ENDC TX Measurement and
MX887019A-001 NR TDD Contiguous ENDC TX Measurement.

These specifications assume use of the system at a constant temperature after warming-up the instruments for 30 minutes.
The abbreviation (typ.) indicates the reference data at 20 to 30°C and is not a guaranteed value.
Nominal values (Nom.) are not guaranteed.
For MU887002A, when the ports 1 and 2 of TRX 1 or TRX 2 satisfy the specifications, the specifications of the ports 3 to 12 of the same TRX are guaranteed by design.

**Table A.2-1 MX887018A-001/19A-001 Specifications**

| Item | Specification | | |
|---|---|---|---|
| Application | Perform TX measurement of the mobile station for NR Sub-6GHz Contiguous ENDC.<br>MX887018A-001: For FDD frame structure<br>MX887019A-001: For TDD frame structure | | |
| Common Items<br>Measuring Object | PUSCH | | |
| Tx Power Measurement<br>Frequency Range | 600 to 2700 MHz, 3300 to 3800 MHz | | (MU887000A/01A) |
| | 600 to 2700 MHz, 3300 to 5000 MHz | | (With MU887000A/01A-001) |
| | 600 to 2700 MHz, 3300 to 5000 MHz | | (MU887002A) |
| Input Level Range | MU887000A | Port 1, Port 2: | –65.0 to +35.0 dBm |
| | | Port 3, Port 4: | –65.0 to +25.0 dBm |
| | MU887001A | Port 1 to 4: | –65.0 to +35.0 dBm |
| | MU887002A | TRX 1/2 Port 1 to 12: | –65.0 to +35.0 dBm |

**Table A.2-1 MX887018A-001/19A-001 Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Measurement Accuracy</td><td>
MU887000A Port 1, Port 2: After calibration, 10 to 40°C<br>
MU887001A Port 1 to 4: After calibration, 10 to 40°C<br>
MU887002A TRX 1/2 Port 1 to 12: After calibration, 20 to 30°C<br>
Frequency: 600 MHz ≤ f ≤ 2700 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±0.7 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±0.9 dB (Nom.)</td></tr>
</table>
Frequency: 3300 MHz ≤ f ≤ 3800 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±1.0 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB (Nom.)</td></tr>
</table>
MU887000A Port 1, Port 2: After calibration, 20 to 30°C<br>
MU887001A Port 1 to 4: After calibration, 20 to 30°C<br>
MU887002A TRX 1/2 Port 1 to 12: After calibration, 20 to 30°C<br>
Frequency: 3800 MHz < f ≤ 5000 MHz
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +35 dBm</td><td>±1.0 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB (Nom.)</td></tr>
</table>
MU887000A Port 3, Port 4:<br>
Frequency: 600 MHz ≤ f ≤ 2700 MHz (After calibration, 10 to 40°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–20 to +25 dBm</td><td>±0.7 dB (Nom.)</td></tr>
<tr><td>–50 to –20 dBm</td><td>±0.9 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.1 dB (Nom.)</td></tr>
</table>
Frequency: 3300 MHz ≤ f ≤ 3800 MHz (After calibration, 10 to 40°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +25 dBm</td><td>±1.0 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB (Nom.)</td></tr>
</table>
Frequency: 3800 MHz < f ≤ 5000 MHz (After calibration, 20 to 30°C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–50 to +25 dBm</td><td>±1.0 dB (Nom.)</td></tr>
<tr><td>–60 to –50 dBm</td><td>±1.3 dB (Nom.)</td></tr>
</table>
</td></tr>
</table>

**Table A.2-1 MX887018A-001/19A-001 Specifications (Cont'd)**

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Modulation Analysis<br>Frequency Range<br><br><br>Input Level Range</td><td>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>When E-UTRA is non-allocated,<br>MU887000A Port 1, Port 2: Min. output power* to +35.0 dBm<br>Port 3, Port 4: Min. output power* to +25.0 dBm<br>MU887001A Port 1 to 4: Min. output power* to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12: Min. output power* to +35.0 dBm<br>*: Minimum output power
<table>
<tr><th>Channel Bandwidth (MHz)</th><th>Minimum output power (dBm)</th></tr>
<tr><td>5, 10, 15, 20</td><td>–40</td></tr>
<tr><td>25</td><td>–39</td></tr>
<tr><td>30</td><td>–38.2</td></tr>
<tr><td>40</td><td>–37</td></tr>
<tr><td>50</td><td>–36</td></tr>
<tr><td>60</td><td>–35.2</td></tr>
<tr><td>70</td><td>–34.6</td></tr>
<tr><td>80</td><td>–34</td></tr>
<tr><td>90</td><td>–33.5</td></tr>
<tr><td>100</td><td>–33</td></tr>
</table>
</td></tr>
<tr><td>Occupied Bandwidth<br>Frequency Range<br><br><br><br><br><br><br><br>Input Level Range</td><td>ENBW ≤ 63 MHz<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>63 MHz < ENBW<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>MU887000A Port1, Port2: –10.0 to +35.0 dBm<br>Port3, Port4: –10.0 to +25.0 dBm<br>MU887001A Port1 to 4: –10.0 to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12: –10.0 to +35.0 dBm</td></tr>
</table>

**Table A.2-1 MX887018A-001/19A-001 Specifications (Cont'd)**

| Item | Specification |
|---|---|
| Adjacent Channel Leakage Power Ratio | |
| Frequency Range | ENBW ≤ 63 MHz,<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>63 MHz < ENBW,<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A) |
| Input Level Range | MU887000A Port 1, Port 2: –10.0 to +35.0 dBm<br>Port 3, Por t4: –10.0 to +25.0 dBm<br>MU887001A Port 1 to 4: –10.0 to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12:<br>600 MHz ≤ frequency ≤ 2700 MHz –10.0 to +35.0 dBm<br>3300 MHz ≤ frequency ≤ 5000 MHz –14.0 to +35.0 dBm |
| Measurement Range | ≥ 42 dB |
| Spectrum Emission Mask (SEM) | |
| Frequency Range | ENBW ≤ 63 MHz,<br>600 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>600 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>600 to 2700 MHz, 3300 to 5000 MHz (MU887002A)<br>63 MHz < ENBW,<br>2000 to 2700 MHz, 3300 to 3800 MHz (MU887000A/01A)<br>2000 to 2700 MHz, 3300 to 5000 MHz (with MU887000A/01A-001)<br>2000 to 2700 MHz, 3300 to 5000 MHz (MU887002A) |
| Input Level Range | MU887000A Port 1, Port 2: –10.0 to +35.0 dBm<br>Port 3, Port 4: –10.0 to +25.0 dBm<br>MU887001A Port 1 to 4: –10.0 to +35.0 dBm<br>MU887001A TRX 1/2 Port 1 to 12: –10.0 to +35.0 dBm |

# Index

References are page numbers.


## A

Abbreviations ..... 1-4
Adjacent Channel Leakage Power Ratio .....2-33

## C

Cable loss correction..... 2-4
Carrier leakage.....2-38
configurations..... 1-3

## E

Error Vector Magnitude .....2-37
EVM.....2-37

## F

Frequency ..... 2-3
Frequency error.....2-36

## I

In-band Emission for Non-Allocated RB .....2-39

## L

Level ..... 2-4

## M

Magnitude error .....2-37
Modulation analysis .....2-35

## N

Native
- Common ..... 5-3
- Common Parameter .....5-4, 5-5, 5-20
- Fundamental Measurement Parameter..... 5-9
- Measurement ..... 5-3
- Measurement Condition Parameter ...5-23, 5-24
- Result.....5-10, 5-25
- Sequence Control Parameter .....5-21
- Sequence Measurement.....5-20
- Sequence Parameter Information .....5-21
- Sequence Table Parameter .....5-22
- System..... 5-4

NR sub-6GHz Settings..... 5-6

## O

Occupied Bandwidth .....2-25

## P

Peak level ..... 2-29
performance tests ..... 6-2
Phase error ..... 2-37

## Q

Questionable Register ..... 2-22

## R

Reference signal ..... 2-38
Rho..... 2-38

## S

Sample program ..... 2-52
SCPI
- Common Parameter .....4-3, 4-4, 4-5, 4-20
- Fundamental Measurement Parameter..... 4-9
- Measurement ..... 4-3
- Measurement Condition Parameter ..... 4-23
- NR sub-6GHz Settings ..... 4-6
- Operation Status Register ..... 4-3
- Questionable Register ..... 4-3
- Result.....4-10, 4-25
- Sequence Control Parameter..... 4-21
- Sequence Measurement..... 4-20
- Sequence Parameter Information ..... 4-21
- Sequence Table Parameter ..... 4-22
- System..... 4-4

Software End-User License Agreement (EULA) .....v
Specifications.....A-1
Spectrum Emission Mask..... 2-27
Spectrum Flatness..... 2-42
Status Register .....2-21, 2-22

## T

Transmit Power ..... 2-23

## W

Warranty..... iii
Waveform data..... 2-48
Waveform file..... 2-5
Waveform quality ..... 2-38