MX887068A
LTE-V2X
TX Measurement
Operation Manual

Fourth Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided in 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-W4032AE-4.0

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





These indicate that the marked part should be recycled.

MX887068A
LTE-V2X TX Measurement
Operation Manual

17 January 2020 (First Edition)
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Revision History:

February 29th, 2020
December 17th, 2021

Cautions Against Computer Virus Infection

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  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
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- Network connections
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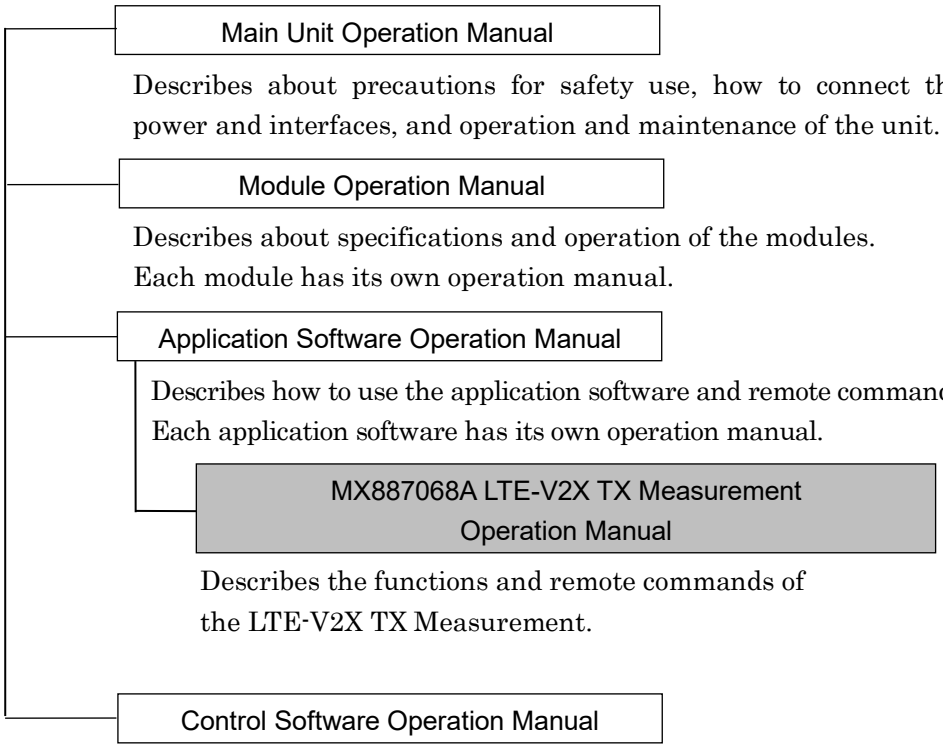
About This Manual

This manual mainly describes the operation of the MX887068A LTE-V2X 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.

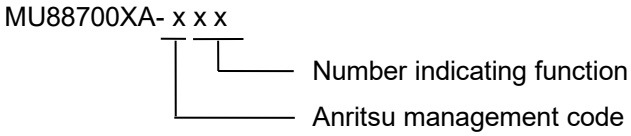


Table of Contents

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 2-14
2.3 Occupied Bandwidth 2-15
2.4 Spectrum Emission Mask 2-17
2.5 Adjacent Channel Leakage Power Ratio 2-21
2.6 Modulation Analysis 2-22
2.7 Capturing Waveform Data 2-34
2.8 Sample Programs 2-36

Chapter 3 Void

Chapter 4 SCPI Command Reference..... 4-1
4.1 List of Commands 4-2
4.2 Details of Commands 4-17

Chapter 5 Native Command Reference 5-1
5.1 List of Commands 5-2
5.2 Details of Commands 5-15

Chapter 6 Performance Test..... 6-1
6.1 Outline 6-2
6.2 Instruments for Testing Performance..... 6-3
6.3 Calibration (MX887068A/MX887068A-001) 6-5
6.4 Performance Tests (MX887068A) 6-11
6.5 Performance Tests (MX887068A-001) 6-26
6.6 Servicing..... 6-30

Appendix A Specifications..... A-1

Index Index-1

Chapter 1 Outline

This chapter outlines the MX887068A LTE-V2X 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 Option 1-3
1.3 License Registration 1-4
1.4 Abbreviations 1-4

1.1 Outline

The MX887068A LTE-V2X TX Measurement (hereafter MX887068A) adds the LTE-V2X wireless measurement function to the TRX Test Module.

The MX887068A supports setting of an arbitrary waveform pattern for sending as the LTE-V2X Rx signal. Regardless of the Tx signal information, the modulated waveform pattern loaded from memory is sent as the Rx signal (Non-signalling method).

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

Note:

The signal sent from the TRX Test Module to the mobile station is the Rx signal and the signal sent from the mobile station to the TRX Test Module is the Tx signal.

When conducting the RX measurement by the MX887068A, transmit a waveform pattern from the TRX Test Module and execute throughput measurement by the mobile station.

When the MX887068A-001 LTE-V2X PSCCH TX Measurement is added to an MX887068A-installed TRx Test module, the module becomes able to perform PSCCH Tx testing using the non-signaling method.

1.2 Configuration

The configurations of the MX887068A is 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 MX887068A Standard Configuration

Item	Model/Code	Name	Qty	Remarks
Software		Storage media (DVD, etc.)	1	
	MX887068A	LTE-V2X TX Measurement		License file included on storage media (DVD, etc.)
	W4032AE	MX887068A LTE-V2X TX Measurement Operation Manual		English, on storage media (DVD, etc.)

1.2.2 Option

The following table shows the software options.

Table 1.2.2-1 MX887068A-001 Option

Item	Model/Code	Name	Remarks
Option	MX887068A-001	LTE-V2X PSCCH TX Measurement	License file included on storage media (DVD, etc.)

1.3 License Registration

Before the MX887068A, MX887068A-001 software 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
HD	Half duplex
OBW	Occupied Bandwidth
SL	Sidelink
V2X	Vehicle-to-Everything

Chapter 2 Fundamental Measurement

This chapter describes the fundamental functions and commands of the MX887068A. 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 2-4
2.1.5 Waveform patterns 2-5
2.1.6 Setting LTE-V2X signals 2-5
2.1.7 Setting measurement 2-10
2.1.8 Starting/stopping measurement 2-10
2.2 Transmit Power 2-14
2.3 Occupied Bandwidth 2-15
2.4 Spectrum Emission Mask 2-17
2.5 Adjacent Channel Leakage Power Ratio 2-21
2.6 Modulation Analysis 2-22
2.6.1 Frequency Error 2-23
2.6.2 EVM 2-24
2.6.3 Carrier leakage 2-26
2.6.4 In-band emissions for non-allocated RB 2-27
2.6.5 Spectrum Flatness 2-29
2.7 Capturing Waveform Data 2-34
2.8 Sample Programs 2-36
2.8.1 Spectrum Emission Mask 2-36
2.8.2 Modulation Analysis 2-41

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 TRX Test Module application software to cellular by setting the parameter to CELLULAR using the following command.

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

Switch the MX887068A measurement standard using the following command. Set the parameter to LTE-V2X when a function described in Section 2.2, “Transmit Power” to Section 2.6, “Modulation Analysis” is to be used.

• Setting Measurement Mode

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

2.1.2 Setting ports

Set the TRX Test Module 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
```

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 TRX Test Module to the mobile station is the downlink signal and the signal sent from the mobile station to the TRX Test Module is the uplink signal.

- Operation band
  Set the operation band shown in Table 2.1.6-3.
  `BAND`
  `:CONFigure:CELLular:LV2X: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`

Level

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

- Output Level (Cell Total)
  `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 “Fundamental 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 TRX Test Module 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 send an LTE-V2X waveform pattern, specify a file in the MV887068A LTE-V2X Waveform files 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 MV887068A LTE-V2X Waveform files.

2.1.6 Setting LTE-V2X signals

Set the following items to configure the LTE-V2X signal.

Channel Bandwidth

An LTE-V2X system has a variable transmission bandwidth called the channel bandwidth.
The specified channel bandwidth values are 10 and 20 MHz.

RMC Configuration

Select the target physical channel from the following:
When PSSCH is selected, both physical channels PSSCH and PSCCH are measured. When PSCCH is selected, only PSCCH is measured.
PSSCH (Physical Sidelink Shared Channel)
PSCCH (Physical Sidelink Control Channel)

UL RMC Modulation

Specifies the modulation scheme of PSSCH. The following can be selected. When AUTO is selected, the modulation scheme is identified automatically. PSCCH is fixed to QPSK regardless of the setting.
QPSK, 16QAM, AUTO

UL RMC MCS Index

Sets MCS Index of uplink signal. When MCS Index is set, Modulation Scheme is changed automatically.
For the relation between MCS Index and Modulation Scheme, refer to Table 2.1.6-1.

Table 2.1.6-1 Relation Between MCS Index of UL RMC and Modulation Scheme

MCS Index	Modulation
0 to 10	QPSK
11 to 28	16QAM

additional Spectrum Emission

Sets or queries additionalSpectrumEmission.
The frequency range of Spectrum Emission Mask is changed according to the setting.

RMC Start RB Number
RMC Number of RBs

The LTE-V2X system has subcarrier signals at 15-kHz intervals and a set of 12 subcarriers is called a Resource Block (RB).
The target PSSCH RB is specified using the start RB number and the number of RBs as shown in Figure 2.1.6-1. The starting resource block number of PSCCH is that of PSSCH minus 2. Also, the number of PSCCH resource blocks is fixed to 2.
When Auto is set for RB Allocation, the starting resource block number and the number of resource blocks are automatically detected from the received signal regardless of this setting.

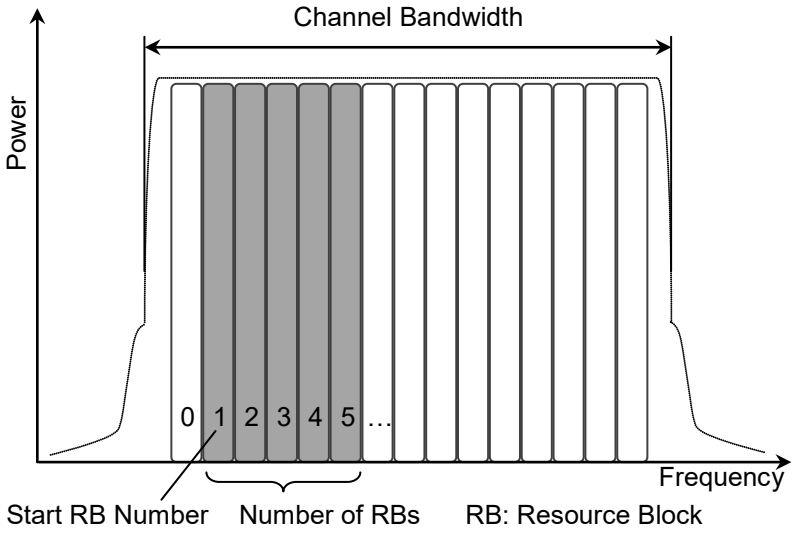


Figure 2.1.6-1 Target Resource Blocks

Uplink and Downlink Channels, Operation Band

The frequency of the signals sent and received by the TRX Test Module is set by the channel numbers as specified in TS 36.521 5.4.4 Carrier frequency and EARFCN.

If Uplink Channel Number is edited, Downlink Channel Number and Operation Band are changed, then Uplink Frequency and Downlink Frequency are changed as well.
In the same manner, editing Downlink Channel Number changes the Uplink Channel Number and Operation Band, then Uplink Frequency and Downlink Frequency.

However, the Uplink Frequency, channel number, and Operation band are not changed interlocking with the Downlink Frequency change and vice versa.

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

Table 2.1.6-2 Relationship between Uplink Channel Number and Downlink Channel Number

Operation Band	Uplink Channel Number (ul_ch) and Downlink Channel Number (dl_ch)
47	dl_ch = ul_ch

The operating bandwidth (Band) and the following values are determined referring to Table 2.1.6-3, based on the Uplink Channel Number (N_{UL}) and the Downlink Channel Number (N_{DL}).

Downlink lower limit frequency (F_{DL_low}), Downlink offset number ($N_{Offs\text{-}DL}$), Uplink lower limit frequency (F_{UL_low}), Uplink offset number ($N_{Offs\text{-}UL}$)

When Downlink Channel Number is changed, the MX887068A executes the following processes:

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

   Downlink lower limit frequency (F_{DL_low}), Downlink offset number ($N_{Offs\text{-}DL}$)
2. Calculates Downlink frequency (F_{DL}) from following equation:

   $F_{DL} = F_{DL\_low} + 0.1(N_{DL} - N_{Offs\text{-}DL})$
3. Sets Downlink frequency at the TRX Test Module.
4. Refer to the Downlink Channel Number range in Table 2.1.6-3 and the currently set operation band, and check whether the set Downlink Channel Number (N_{DL}) is within that range.
5. If it is not, find the operation band which the Downlink Channel Number (N_{DL}) belongs to in Table 2.1.6-3, and change the currently set operation band to the appropriate one. If there are multiple operation bands which the Downlink Channel Number belongs to, change to the operation band with the lowest number.
6. Determines Uplink Channel Number (N_{UL}) based on Downlink Channel Number (N_{DL}) and Operation Band on Table 2.1.6-2.
7. Determines values of following parameters based Uplink Channel Number (N_{UL}):

   Uplink lower limit frequency (F_{UL_low}), Uplink offset number ($N_{Offs\text{-}UL}$)
8. Calculates Uplink Frequency (F_{UL}) from following equation:

   $F_{UL} = F_{UL\_low} + 0.1(N_{UL} - N_{Offs\text{-}UL})$
9. Sets Uplink frequency (F_{UL}) at the TRX Test Module.

When Uplink Channel is changed, the MX887068A executes the following processing:

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

   Uplink lower limit frequency (F_{UL_low}), Uplink offset number ($N_{Offs\text{-}UL}$)
2. Calculates Uplink frequency (F_{UL}) from following equation:

   $F_{UL} = F_{UL\_low} + 0.1(N_{UL} - N_{Offs\text{-}UL})$
3. Sets Uplink frequency at the TRX Test Module.
4. Refer to the Uplink Channel Number range in Table 2.1.6-3 and the currently set operation band, and check whether the set Uplink Channel Number (N_{DL}) is within that range.
5. If it is not, find the operation band which the Uplink Channel Number (N_{DL}) belongs to in Table 2.1.6-3, and change the currently set operation band to the appropriate one. If there are multiple operation bands which the Uplink Channel Number belongs to, change to the operation band with the lowest number.
6. Determines Downlink Channel Number (N_{DL}) based on Uplink Channel Number (N_{UL}) and Operation Band on Table 2.1.6-2.
7. Determines values of following parameters based on Downlink Channel Number (N_{DL}):

   Downlink lower limit frequency (F_{DL_low}), Downlink offset number ($N_{Offs\text{-}DL}$)
8. Calculates Downlink frequency (F_{DL}) from following equation:

   $F_{DL} = F_{DL\_low} + 0.1(N_{DL} - N_{Offs\text{-}DL})$
9. Sets Downlink frequency (F_{DL}) at the TRX Test Module.

Table 2.1.6-3 E-UTRA Channel Numbers (N_{DL}, N_{UL}) and TX-RX Frequency Separation (Freq. Sep)

Operation Band	Freq. Sep (MHz)	Downlink				Uplink			
		F_{DL_low} (MHz)	F_{DL_high} (MHz)	$N_{Offs\text{-}DL}$	Range of N_{DL}	F_{UL_low} (MHz)	F_{UL_high} (MHz)	$N_{Offs\text{-}UL}$	Range of N_{UL}
47*1	0	5855	5924.9	54540	54540 to 55239	5855	5924.9	54540	54540 to 55239

*: This can be used only when MU887000A/01A-001 is installed, or MU887002A.

Table 2.1.6-4 Operation Band and Frame Structure

Band	Frame Structure
47	HD

Use the following commands to set the LTE-V2X signals.

- Channel Bandwidth
  `BANDWIDTH`
  `:CONFigure:CELLular:LV2X:CBANdwidth`
- RMC Configuration
  `CHCONFIG`
  `:CONFigure:CELLular:LV2X:CTYPe`
- UL RMC Modulation
  `ULRMC_MOD`
  `:CONFigure:CELLular:LV2X:MODulation:MSCHeme`
- UL RMC MCS Index
  `ULIMCS`
  `:CONFigure:CELLular:LV2X:MCS`
- UL RMC Number of RB
  `ULRMC_RB`
  `:CONFigure:CELLular:LV2X:RBALlocation:NRB`
- UL RMC Starting RB
  `ULRB_START`
  `:CONFigure:CELLular:LV2X:RBALlocation:ORB`
- RB Allocation
  `RB_ALLOC`
  `:CONFigure:CELLular:LV2X:RBALlocation`
- additionalSpectrumEmission
  `SIB2_NS`
  `:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission`

When Auto is set for RB Allocation, use the following commands to query the detected UL RMC Number of RB and UL RMC Starting RB:

- Detected UL RMC Number of RB
  `DETECT_ULRMC_RB?`
  `:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:NRB?`
- Detected UL RMC Starting RB
  `DETECT_ULRB_START?`
  `:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:ORB?`

2.1.7 Setting measurement

Set the following measurement items.

- Trigger Source
  TRGSRC
  :TRIGger:CELLular:LV2X:FUNDamental:SOURce
- Trigger level
  TRGLVL
  :TRIGger:CELLular:LV2X:FUNDamental:LEVel
- Trigger Delay
  TRGDLY
  :TRIGger:CELLular:LV2X:FUNDamental:DELay
- Trigger Timeout
  TRGTOUT
  :TRIGger:CELLular:LV2X:FUNDamental:TOUT
- Minimum Trigger Gap
  TRGMGAP
  :TRIGger:CELLular:LV2X:FUNDamental:MGAP
- Measurement Offset
  MEASOFFSET
  :CONFigure:CELLular:LV2X:FUNDamental:MOFFset

Use the following command when not measuring.

- Setting all measurement items to off
  ALLMEASITEMS_OFF
  :CONFigure:CELLular:LV2X:FUNDamental:AMITems:OFF

2.1.8 Starting/stopping measurement

Starting measurement

To start measurement, send the following command.
The status indication lamp 3 of the TRX Test Module 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 The TRX Test Module receive level is higher than the set input level.
5	Synchronization word not detected No reference signal was detected for Uplink frame synchronization.
9	Measurement in progress or not executed
12	Tx measurement timeout No trigger occurred before measurement timed out.

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 MX887068A 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 Tx Power measurement measures the power in the bandwidth specified in Table 6.3.2G.1.3-1 of 3GPP TS 36.521-1.

Table 2.2-1 Tx Power Bandwidth (MHz)

Channel Bandwidth	10 MHz	20 MHz
Tx Power	10	20
Channel Power	9.0	18.0

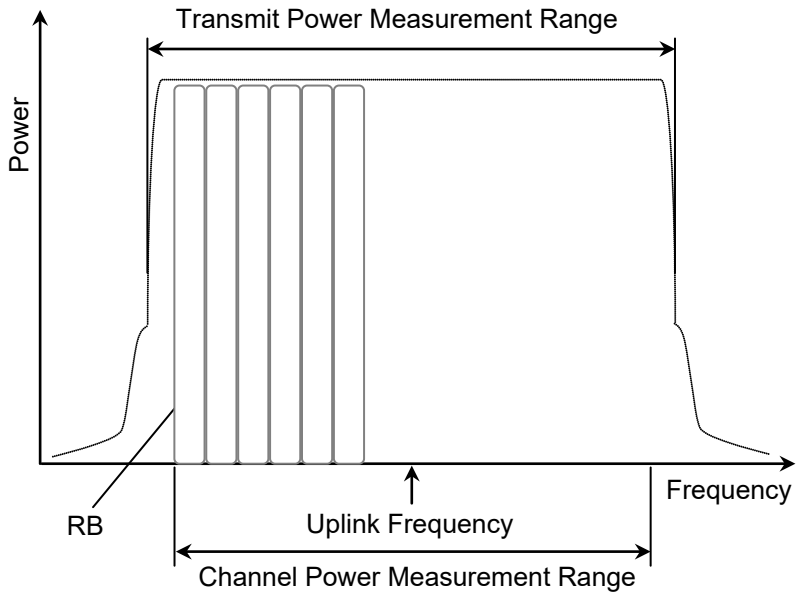


Figure 2.2-1 Tx Power Measurement Range

Set the following parameter to measure the Uplink Tx Power.

Measurement enable and measurement count

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

```
PWR_SET
:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET
```

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

- Tx Power

```
POWER
:FETCh:CELLular:LV2X:FUNDamental:POWer:TXPower
```

- Channel Power

```
CHPWR
:FETCh:CELLular:LV2X:FUNDamental:POWer:CHPower
```

2.3 Occupied Bandwidth

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

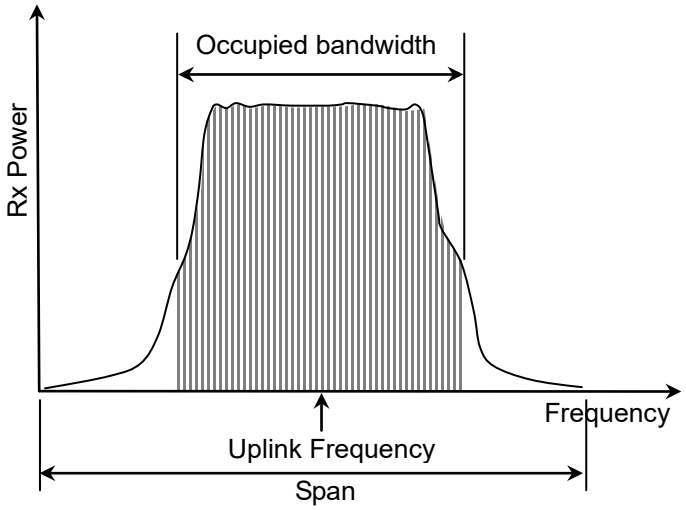


Figure 2.3-1 Occupied Bandwidth

The Occupied Bandwidth measurement settings are:

Span

The frequency span is determined by the channel bandwidth setting, referring to Section 2.1.6 “Setting LTE-V2X signals”.

Table 2.3-1 Occupied Bandwidth Measurement Frequency Range

Channel Bandwidth	10 MHz	20 MHz
Span (MHz)	20.013	40.009

Occupied Bandwidth power ratio

This is the power ratio (occupancy ratio) that determines the Occupied Bandwidth. It is 99%.

Measurement enable and measurement count

Use the following command to enable Occupied Bandwidth measurement and specify the measurement count. The Occupied Bandwidth for 1 subframe (1 ms) is measured at each measurement count.

```
OBW_SET
:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET
```

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

- OBW

  ```
  OBW
  :FETCh:CELLular:LV2X:FUNDamental:OBW
  ```

- OBW Frequency

  ```
  OBWFREQ
  :FETCh:CELLular:LV2X:FUNDamental:OBW:FREQuency
  ```

2.4 Spectrum Emission Mask

Spectrum Emission Mask measurement measures the peak level and margin at the conditions specified in TS 36.521-1 6.6.2.1G Spectrum Emission Mask for V2X Communication.

When using the MX887068A, 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.

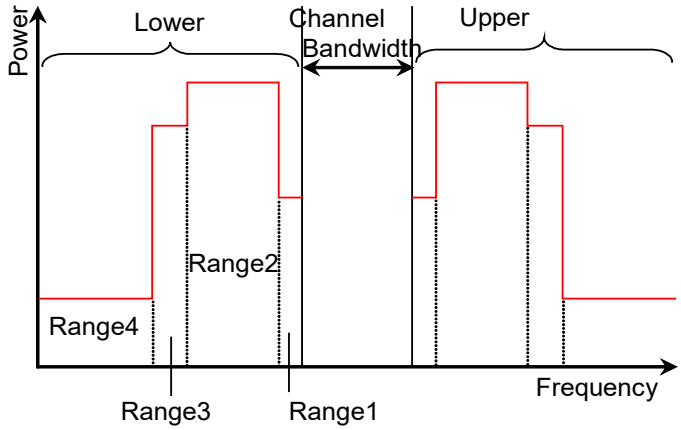


Figure 2.4-1 Mask Range of Spectrum Emission Mask

The Range 1 to Range 4 varies with the Channel Bandwidth and the Network Signalled Value (NS_01, NS_33, NS_34) for the additionalSpectrumEmission.

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

additional Spectrum Emission	Channel Bandwidth (MHz)	Frequency Range			
		Range 1	Range 2	Range 3	Range 4
NS_01	10	0 to 1 MHz	1 to 5 MHz	5 to 10 MHz	10 to 15 MHz
	20	0 to 1 MHz	1 to 5 MHz	5 to 20 MHz	20 to 25 MHz
	Measurement Bandwidth	30 kHz	1 MHz	1 MHz	1 MHz
NS_33 NS_34	10	0 to 0.5 MHz	0.5 to 5 MHz	5 to 10 MHz	-
	Measurement Bandwidth	100 kHz	100 kHz	100 kHz	-

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.

Table 2.4-2 shows the spectrum emission limit.

Table 2.4-2 Spectrum Emission Limit for Range 1 to Range 4

additional Spectrum Emission	Range	Spectrum Emission Limit (dBm) / Channel Bandwidth	
		10 MHz	20 MHz
NS_01	1	−16	−19
	2	−8	−8
	3	−12	−11
	4	−23	−23
NS_33, NS_34	1	$[-13 - 12\left(\left\|\Delta f_{OOB}\right\|/_{MHz}\right)] + 2$	-
	2	$[-19 - \frac{16}{9}\left(\left\|\Delta f_{OOB}\right\|/_{MHz} - 0.5\right)] + 2$	-
	3	$[-27 - 2\left(\left\|\Delta f_{OOB}\right\|/_{MHz} - 5.0\right)] + 2$	-
	4	-	-

The results of the spectrum emission mask measurement are:

- Pass/fail result
  If the spectrum is at the mask level or below, the result is PASS. If it exceeds the mask level, the result is FAIL.
- Peak level and frequency at each level
- Margin
  This is the minimum level difference from the threshold. The applicable threshold depends on the signal level.

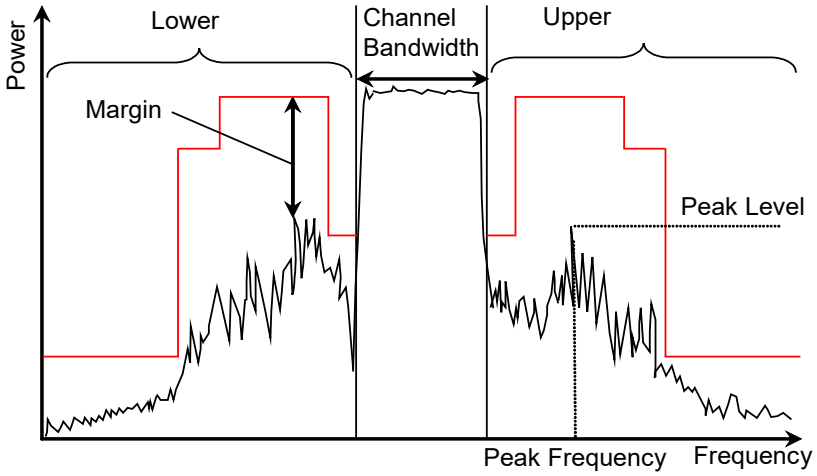


Figure 2.4-2 Spectrum Emission Mask Measurement Result

The peak level and frequency can be read in the following frequency ranges.

Table 2.4-3 Frequency Ranges for Measurement Results

		Frequency Difference from Channel Bandwidth Δf_{OOB} (MHz)								
additionalSpectrumEmission	**Channel Bandwidth (MHz)**	**0-1**	**1-2.5**	**2.5-2.8**	**2.8-5**	**5-6**	**6-10**	**10-15**	**15-20**	**20-25**
NS_01	10	✓	✓	✓	✓	✓	✓	✓		
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Measurement Bandwidth	0.03	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
additionalSpectrumEmission	**Channel Bandwidth (MHz)**	**0-0.5**	**0.5-5**	**5-10**						
NS_33 NS_34	10	✓	✓	✓						
	Measurement Bandwidth	0.1	0.1	0.1						
	Frequency Range (freq_range)	1,–1	2,–2	3,–3	4, –4	5, –5	6, –6	7, –7	8, –8	9, –9

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

- Measurement Count
  `SEM_SET`
  `:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET`
- Additional Spectrum Emission
  `SIB2_NS`
  `:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission`

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

- Evaluation Result
  SEM
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:JUDGement
- Lower Peak Level and Frequency
  SEMLVL_LOWER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer
- Upper Peak Level and Frequency
  SEMLVL_UPPER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer
- Lower Margin
  SEMMARGIN_LOWER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer
- Upper Margin
  SEMMARGIN_UPPER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer
- Lower Peak Level and Frequency (Detail)
  SEMLVL_DET_LOWER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer:DETail
- Upper Peak Level and Frequency (Detail)
  SEMLVL_DET_UPPER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer:DETail
- Lower Margin (Detail)
  SEMMARGIN_DET_LOWER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer:DETail
- Upper Margin (Detail)
  SEMMARGIN_DET_UPPER
  :FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer:DETail

2.5 Adjacent Channel Leakage Power Ratio

Adjacent Channel Leakage Power Ratio is the ratio of in-band power to the power leaking to adjacent channels. It is defined in TS 36.521-1 6.6.2.3G Adjacent Channel Leakage Power Ratio for V2X Communication.

The E-UTRA bands are specified for adjacent channels.

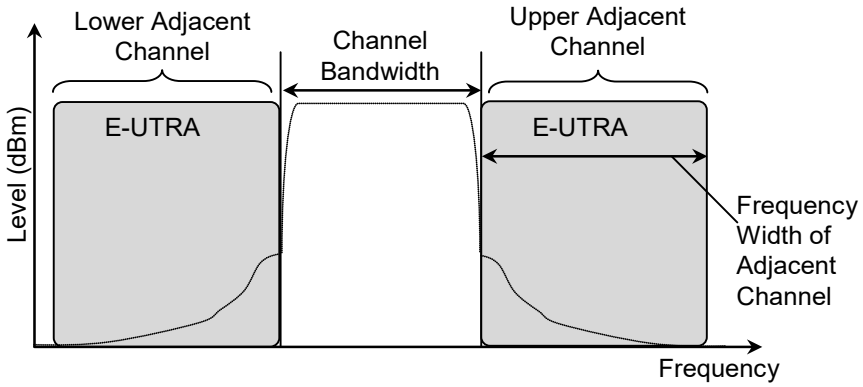


Figure 2.5-1 Adjacent Channels for Adjacent Channel Leakage Power Ratio Measurement

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

Table 2.5-1 Adjacent Channel Measurement Bandwidth (MHz)

Channel Bandwidth	10 MHz	20 MHz
E-UTRA	9.0	18.0

The Adjacent Channel Leakage Power Ratio measurement parameters are:

Measurement enable and measurement count

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

```
ACLR_SET
:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET
```

Use the following command to query the results of the Adjacent Channel Leakage Power Ratio measurement.

```
ACLR
:FETCh:CELLular:LV2X:FUNDamental:ACLR
```

2.6 Modulation Analysis

Modulation analysis measures:

- Frequency Error
- EVM
- Carrier Leakage
- In-band Emissions for Non-Allocated RB
- Spectrum Flatness

Use the following command to enable modulation analysis measurement and specify the measurement count. Modulation analysis of 1 slot is performed at each measurement count.

```
MOD_SET
:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET
```

2.6.1 Frequency Error

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

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
  CARRF
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:CFRequency
- Frequency Error
  CFERR
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor
- Worst Value of Frequency Error
  WORST_CARRFERR
  CFERR_WORST
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor:WORSt

When the MX887068A-001 is installed, use the following commands to query the PSCCH measurement results:

- Carrier Frequency (PSCCH)
  PSCCH_CARRF
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:CFRequency
- Frequency Error (PSCCH)
  PSCCH_CFERR
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor
- Worst Value of Frequency Error (PSCCH)
  PSCCH_WORST_CARRFERR
  PSCCH_CFERR_WORST
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh: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.

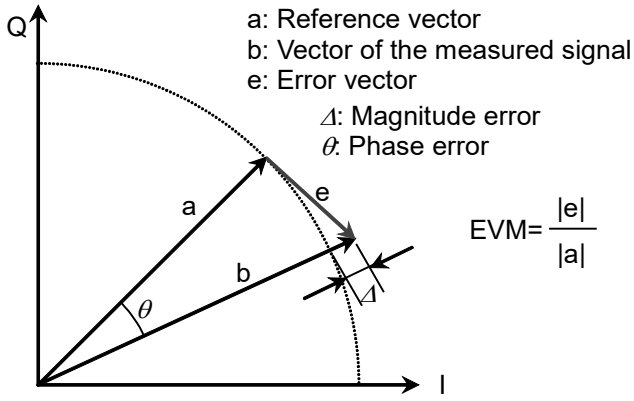


Figure 2.6.2-1 Definition of EVM

Query the EVM measurement result using the following commands:

- EVM
  `EVM`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVM`
  `EVM_L`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVML`
  `EVM_H`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVMH`
- Peak EVM
  `PEVM`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:PEVM`
- Reference Signal EVM
  `RSEVM`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:RSEVm`
- Phase Error
  `PHASEERR`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:PHERror`
- Magnitude Error
  `MAGERR`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:MERRor`

When the MX887068A-001 is installed, use the following commands to query the PSCCH measurement results:

- EVM (PSCCH)
  PSCCH_EVM
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVM
  PSCCH_EVM_L
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVML
  PSCCH_EVM_H
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVMH
- Peak EVM (PSCCH)
  PSCCH_PEVM
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PEVM
- Reference Signal EVM (PSCCH)
  PSCCH_RSEVM
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:RSEVm
- Phase Error (PSCCH)
  PSCCH_PHASEERR
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PHERror
- Magnitude Error (PSCCH)
  PSCCH_MAGERR
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:MERRor

The reference signal is defined in TS 36.211 9.8 Demodulation reference signal.
The target symbol for EVM measurement differs with the channel configuration as described in Section 2.1.6 “Setting LTE-V2X signals”. (PSSCH measurements are available.)
When PSSCH is set:

For Reference Signal EVM, symbols on reference signals for PSSCH and PSCCH are measured. For EVM and Peak EVM, symbols on other than reference signals for PSSCH and PSCCH are measured.

When PSCCH is set:

For Reference Signal EVM, symbols on a reference signal for PSCCH are measured. For EVM and Peak EVM, symbols on other than a reference signal for PSCCH are measured.

2.6.3 Carrier leakage

Carrier Leakage is an origin offset of input signal on the IQ coordinate graph. After normalizing the measured signals and ideal signals, the leakage is calculated from the vector distribution (average error of I/Q measured signals (Z(n)) from 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
  `CARRLEAK`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:CARLeakage`

2.6.4 In-band emissions for non-allocated RB

The In-band Emissions 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 36.521-1 6.5.2.3G "In-band emissions for non-allocated RB for V2X Communication" specifies three measurement ranges: Carrier Leakage, General, and IQ Image.

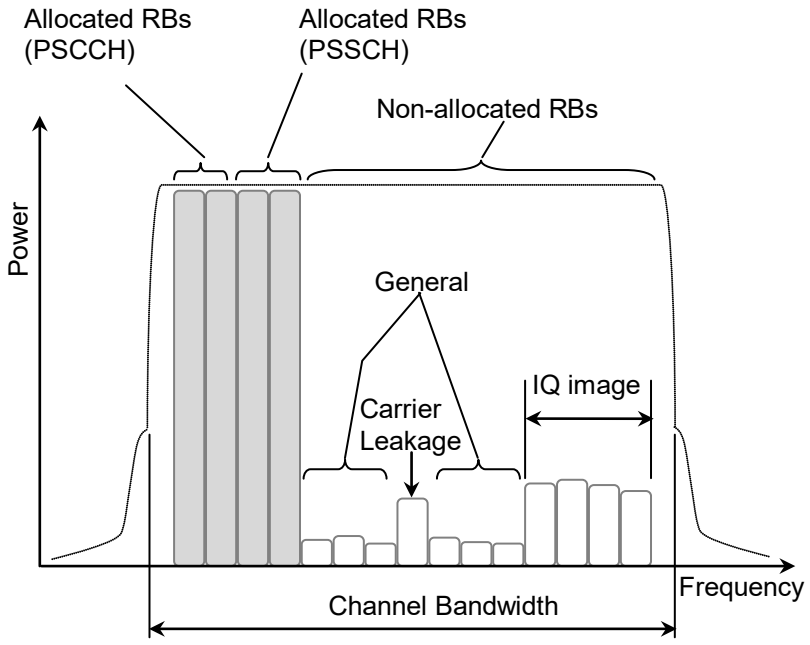


Figure 2.6.4-1 In-band Emission Measurement Range

Set the allocated RB using the UL RMC Number of RB and UL RMC StartingRB as described in Section 2.1.6 "Setting LTE-V2X signals".

Query the In-band Emissions for Non-Allocated RB measurement results using the following commands:

- In-Band Emissions - Carrier Leakage
  `INBANDE_LEAK`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions`
  `:CARLeakage`
- In-Band Emissions - General
  `INBANDE_GEN`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions`
  `:GENeral`
- In-Band Emissions - IQ Image
  `INBANDE_IMG`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions`
  `:IQIMage`

- In-Band Emissions limit - General
  `INBANDE_GENUL`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:GENeral`
- In-Band Emissions limit - IQ Image
  `INBANDE_IMGUL`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:IQIMage`
- In-Band Emissions limit - Carrier Leakage
  `INBANDE_LEAKUL`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage`
- In-Band Emissions margin
  `INBANDE_MARG`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:MARGin`
- In-Band Emissions Measured Item
  `INBANDEITEM`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:ITEM`
- In-Band Emissions Judgement
  `INBANDEPASS`
  `:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:JUDGement`

2.6.5 Spectrum Flatness

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

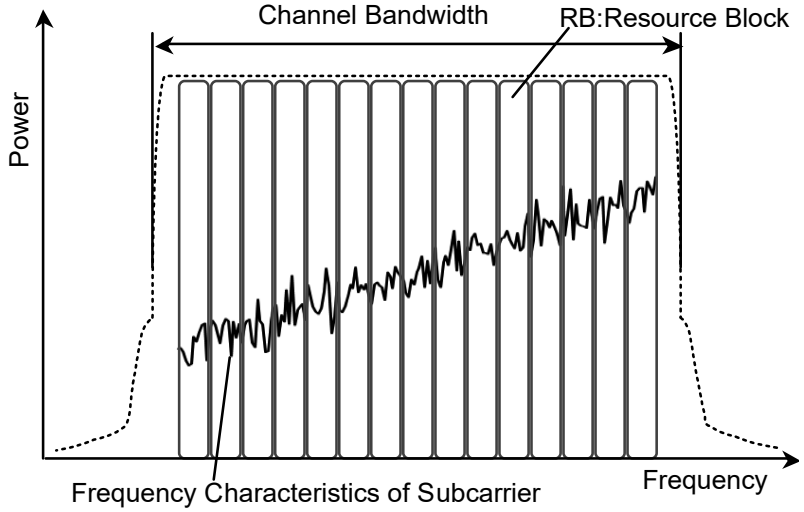


Figure 2.6.5-1 Measurement Range of Spectrum Flatness

TS 36.521-1 6.5.2.4G EVM Equalizer Spectrum Flatness for V2X transmission specifies two separate frequency ranges (Range 1 and Range 2) in the operation band with individual limit values.
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.

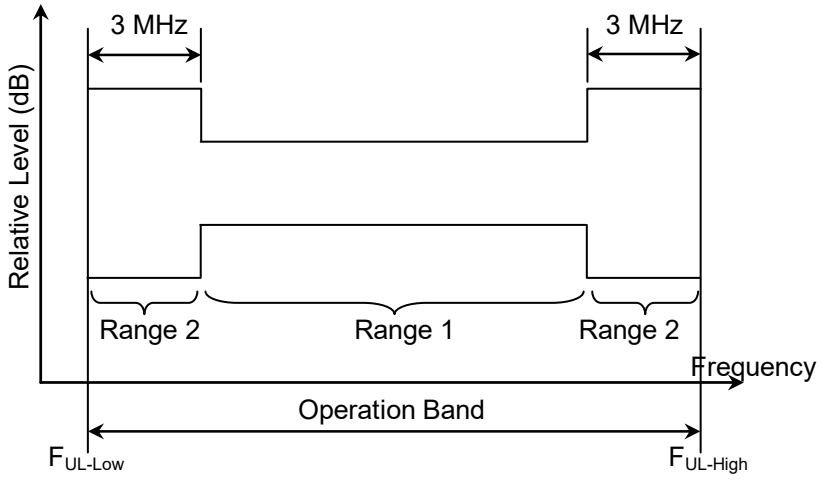


Figure 2.6.5-2 Standard Range of Spectrum Flatness

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.

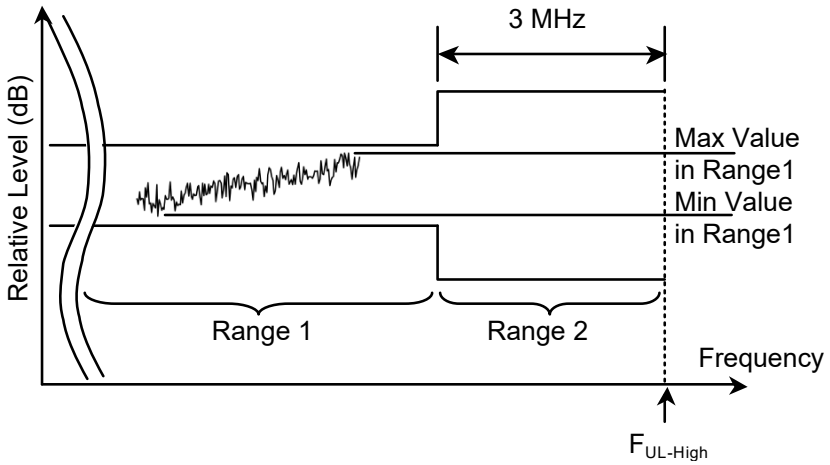
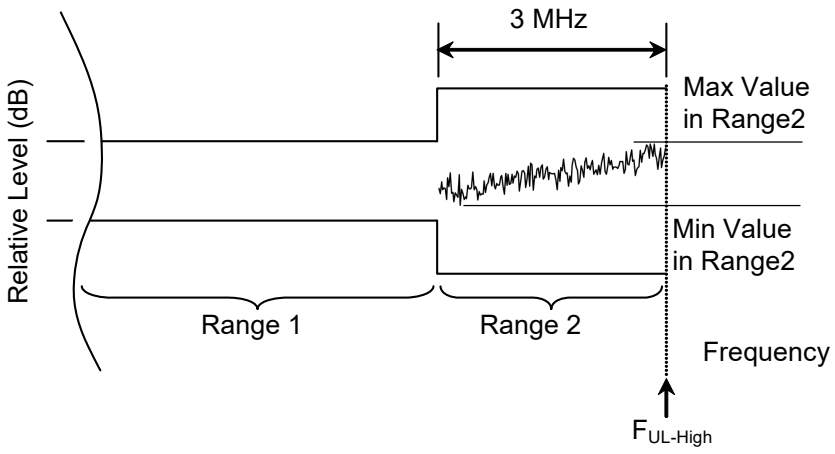


Figure 2.6.5-3 Channel Bandwidth in Range 1

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



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

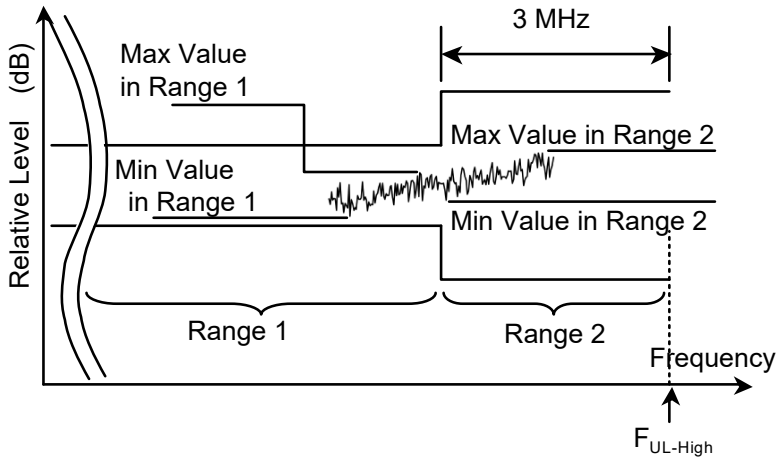


Figure 2.6.5-5 Channel Bandwidth Crossing Range 1 and Range 2

The MX887068A 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.

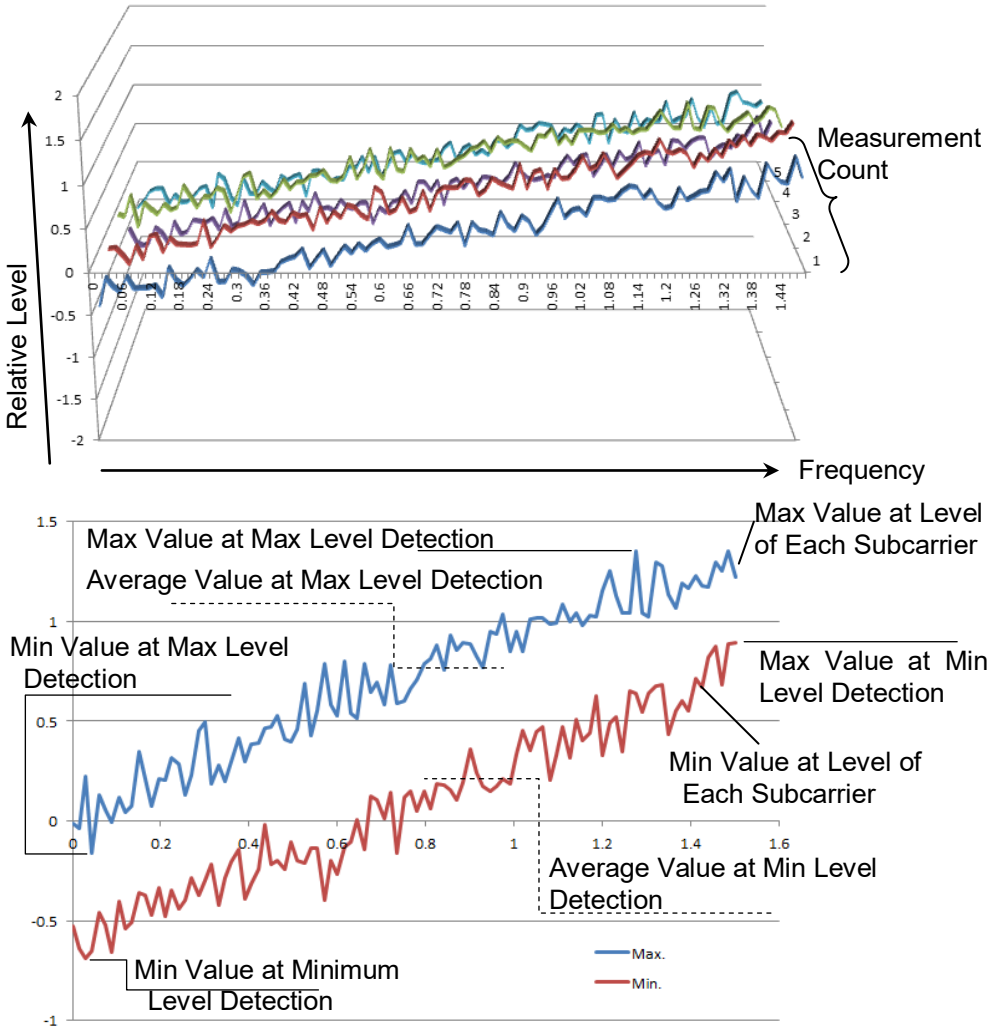


Figure 2.6.5-6 Types of Spectrum Flatness Measurement Results

- Operation band
  The range for spectrum flatness is determined by setting the operation band.
  BAND
  :CONFigure:CELLular:LV2X:FUNDamental:BAND

Query the spectrum flatness measurement results using the following commands:

- All Ripples of spectrum flatness measurement results
  SPECFLAT_RP
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP
- Range 1 Maximum Value (Spectrum Flatness - ≥ 3 MHz (R1+))
  SPECFLAT1_P
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1P
- Range 1 Minimum Value (Spectrum Flatness - ≥ 3 MHz (R1–))
  SPECFLAT1_M
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1M
- Range 1 Ripple (Spectrum Flatness - ≥ 3 MHz (RP1))
  SPECFLAT_RP1
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP1
- Range 2 Maximum Value (Spectrum Flatness - < 3 MHz (R2+))
  SPECFLAT2_P
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2P
- Range 2 Minimum Value (Spectrum Flatness - < 3 MHz (R2–))
  SPECFLAT2_M
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2M
- Range 2 Ripple (Spectrum Flatness - <3 MHz (RP2))
  SPECFLAT_RP2
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP2
- Range 2 Maximum Value – Range 1 Minimum Value (Spectrum Flatness (RP21))
  SPECFLAT_RP21
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP21
- Range 1 Maximum Value – Range 2 Minimum Value (Spectrum Flatness (RP12))
  SPECFLAT_RP12
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP12
- Spectrum Flatness Measured Item
  SPECFLATITEM
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:ITEM
- Spectrum Flatness Judgement
  SPECFLATPPPASS
  :FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness
  :JUDGement

2.7 Capturing Waveform Data

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

- Waveform

  `WAVEFMEAS`

  `:FETCh:CELLular:LV2X:FUNDamental:TRACe`

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

Table 2.7-1 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	15 kHz
Constellation (Q)	4	
EVM (Average)	5	Demod symbol
EVM (Maximum)	6	
Phase Error (Average)	7	Demod symbol
Phase Error (Maximum)	8	
Magnitude Error (Average)	9	Demod symbol
Magnitude Error (Maximum)	10	
In-band Emissions	11	180 kHz
dB (Average)		
dB (Maximum)	12	
dBc (Average)	13	
dBc (Maximum)	14	
Spectrum Flatness	15	15 kHz
(Average)		
(Maximum)	16	
(Minimum)	17	
PSCCH Constellation (I)	18	15 kHz
PSCCH Constellation (Q)	19	
PSCCH EVM (Average)	20	Demod symbol
PSCCH EVM (Maximum)	21	
PSCCH Phase Error (Average)	22	Demod symbol
PSCCH Phase Error (Maximum)	23	
PSCCH Magnitude Error (Average)	24	Demod symbol
PSCCH Magnitude Error (Maximum)	25	

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

Table 2.7-2 Channel Bandwidth and Number of Data

Measurement Item	Channel Bandwidth (MHz)	
	10	20
Occupied Bandwidth	299	597
Spectrum Emission Mask	597	1043
Constellation	600	1200
EVM	600	1200
Phase Error	600	1200
Magnitude Error	600	1200
In-band Emissions	50	100
Spectrum Flatness	600	1200

2.8 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*.

2.8.1 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 MX887068A.
2. Set the following measurement conditions.

Test Port	Port 1
Input Level	–10.0 dBm
Uplink Frequency	3750 MHz
Channel Bandwidth	10 MHz
RMC Configuration	PSSCH
RMC Modulation Method	QPSK
Number of RBs	48
Start RB Number	2
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. Set the Spectrum Emission Mask.

Additional Spectrum Emission	NS_01

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

```
; Sample program for Spectrum Emission Mask
; Anritsu Corporation November,2019
; 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 "LTEV2X".
sendln 'STDSEL LTEV2X'
call check_error_code

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

; Set Input Range to -20.0 dBm".
sendln 'ILVL -20.0DBM'
call check_error_code

; Set center frequency to "5890 000 000 Hz".
sendln 'ULFREQ 5890000000HZ'
call check_error_code

;************************************************;
; Set Channel Bandwidth to "10MHZ".
sendln 'BANDWIDTH 10MHZ'
call check_error_code

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

; Set UL RMC Modulation to "QPSK".
```

```
sendln 'ULRMC_MOD QPSK'
call check_error_code

; Set UL RMC Number of RB to "48".
sendln 'ULRMC_RB 48'
call check_error_code

; Set UL RMC Starting RB to "2".
sendln 'ULRB_START 2'
call check_error_code

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

; Set Additional Spectrum Emission to "NS_01".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission NS_01'
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 Judgement
sendln 'SEM?'
call check_error_code

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

; Query Spectrum data
sendln 'WAVEFMEAS? 2,0,597'
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
```

2.8.2 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 MX887068A.
2. Set the following measurement conditions.

Test Port	Port 1
Input Level	–10.0 dBm
Operation band	47
Uplink Frequency	3750 MHz
Channel Bandwidth	10 MHz
RMC Configuration	PSSCH
RMC Modulation	QPSK
Number of RBs	48
Start RB Number	2
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	
In-band Emissions	General, IQ Image, Carrier Leakage
Spectrum Flatness	Max value, min value, and ripple of Range 1
	Max value, min value, and ripple of Range 2
	Difference between max value of Range 2 and min value of Range 1
	Difference between max value of Range 1 and min value of Range 2
PSCCH Frequency	
PSCCH Frequency Error	
PSCCH EVM	
PSCCH Peak EVM	
PSCCH Reference Signal EVM	
PSCCH Phase Error	
PSCCH Magnitude Error	

```
; Sample program for Modulation Analysis
; Anritsu Corporation November,2019
; 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 "LTEV2X".
sendln ':CONF:CELL:MEAS:STAN LTEV2X'
call check_error_code

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

; Set Input Range to "-20.0 dBm".
sendln ':CONFigure:CELLular:MEASurement:RFSettings:LEVel -20.0'
call check_error_code

; Set Operation band to "47".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:BAND 47'
call check_error_code

; Set center frequency to "5890MHZ".
sendln ':CONFigure:CELLular:MEASurement:RFSettings:FREQuency 5890MHZ'
call check_error_code

;************************************************;
; Set UL Channel Bandwidth to "10MHZ".
sendln ':CONFigure:CELLular:LV2X:CBANdwidth 10MHZ'
call check_error_code

; Set RMC Configuration to "PSSCH".
```

```
sendln ':CONFigure:CELLular:LV2X:CTYPe PSSCH'
call check_error_code

; Set UL RMC Modulation to "QPSK".
sendln ':CONFigure:CELLular:LV2X:MODulation:MSCHeme QPSK'
call check_error_code

; Set UL RMC Number of RB to "48".
sendln ':CONFigure:CELLular:LV2X:RBALlocation:NRB 48'
call check_error_code

; Set UL RMC Starting RB to "2".
sendln ':CONFigure:CELLular:LV2X:RBALlocation:ORB 2'
call check_error_code

; Set Trigger Source to "VIDEO".
sendln ':TRIGger:CELLular:LV2X:FUNDamental:SOURce VIDEO'
call check_error_code

; Set Measurement of Transmit Power to "OFF".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:POWer:SET OFF'
call check_error_code

; Set Measurement of Occupied Bandwidth to "OFF".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:OBW:SET OFF'
call check_error_code

; Set Measurement of Spectrum Emission Mask to "OFF".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET OFF'
call check_error_code

; Set Measurement of Adjacent Channel Leakage power Ratio to "OFF".
sendln ':CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET OFF'
call check_error_code

; Set Measurement of Modulation Analysis to "ON","100 times".
sendln ':CONFigure:CELLular:LV2X: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:LV2X:FUND:MOD:CFR? AVG'
call check_error_code

; Query Frequency Error
sendln ':FETC:CELL:LV2X:FUND:MOD:FERR? TTL'
call check_error_code

; Query EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:EVM? TTL'
call check_error_code

; Query Peak EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:PEVM? TTL'
call check_error_code

; Query Demodulation Reference Signal EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:RSEV? TTL'
call check_error_code

; Query Phase Error
sendln ':FETC:CELL:LV2X:FUND:MOD:PHER? TTL'
call check_error_code

; Query Magnitude Error
sendln ':FETC:CELL:LV2X:FUND:MOD:MERR? TTL'
call check_error_code

; Query Carrier Leakage
```

```
sendln ':FETC:CELL:LV2X:FUND:MOD:CARL? TTL'
call check_error_code

; Query Inband Emission - General
sendln ':FETC:CELL:LV2X:FUND:MOD:IEM:GEN? TTL'
call check_error_code

; Query Inband Emission - IQ Image
sendln ':FETC:CELL:LV2X:FUND:MOD:IEM:IQIM? TTL'
call check_error_code

; Query Inband Emission - Carrier Leakage
sendln ':FETC:CELL:LV2X:FUND:MOD:IEM:CARL? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Maximum
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:R1P? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Minimum
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:R1M? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Ripple
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:RP1? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Maximum
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:R2P? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Minimum
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:R2M? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Ripple
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:RP2? TTL'
call check_error_code

; Query Spectrum Flatness - Range 2 Max to Range 1 Min
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:RP21? TTL'
call check_error_code

; Query Spectrum Flatness - Range 1 Max to Range 2 Min
```

```
sendln ':FETC:CELL:LV2X:FUND:MOD:ESFL:RP12? TTL'
call check_error_code

; Query PSCCH Frequency
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:CFR? AVG'
call check_error_code

; Query PSCCH Frequency Error
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:FERR? TTL'
call check_error_code

; Query PSCCH EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:EVM? TTL'
call check_error_code

; Query PSCCH Peak EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:PEVM? TTL'
call check_error_code

; Query PSCCH Demodulation Reference Signal EVM
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:RSEV? TTL'
call check_error_code

; Query PSCCH Phase Error
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:PHER? TTL'
call check_error_code

; Query PSCCH Magnitude Error
sendln ':FETC:CELL:LV2X:FUND:MOD:PSCC:MERR? 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 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
4.2 Details of Commands 4-17
4.2.1 Common commands 4-18
4.2.2 Fundamental Measurement Commands 4-33

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. A | B | C | D indicates a choice of A, B, C, and D.
{ }	Curly brackets are used to group options. For A | B({C | D}), choose A, B(C), or B(D).

4.1.1 Common commands

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	-----	-----

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 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
Channel Bandwidth	:CONFigure:CELLular:LV2X:CBANdwidth <bw>	:CONFigure:CELLular:LV2X:CBANdwidth?	<bw>
Uplink Channel	:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel <ulchan>	:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel?	<ulchan>
Uplink Frequency	:CONFigure:CELLular:MEASurement:RFSettings:FREQuency <ulfreq>	:CONFigure:CELLular:MEASurement:RFSettings:FREQuency?	<ulfreq>
Downlink Channel	:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel <dlchan>	:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel?	<dlchan>
Downlink Frequency	:CONFigure:CELLular:GENerator:RFSettings:FREQuency <dlfreq>	:CONFigure:CELLular:GENerator:RFSettings:FREQuency?	<dlfreq>
Operation band	:CONFigure:CELLular:LV2X:FUNDamental:BAND <band>	:CONFigure:CELLular:LV2X:FUNDamental:BAND?	<band>
Input Level	:CONFigure:CELLular:MEASurement:RFSettings:LEVel <lvl>	:CONFigure:CELLular:MEASurement:RFSettings:LEVel?	<lvl>
Output Level (Cell Total)	:CONFigure:CELLular:GENerator:RFSettings:LEVel <lvl>	:CONFigure:CELLular:GENerator:RFSettings:LEVel?	<lvl>

LTE-V2X Settings

Function	Command	Query	Response
RMC Configuration	:CONFigure:CELLular:LV2X:CTYPe <object>	:CONFigure:CELLular:LV2X:CTYPe?	<object>
UL RMC Number of RB	:CONFigure:CELLular:LV2X:RBALlocation:NRB <nrb>	:CONFigure:CELLular:LV2X:RBALlocation:NRB?	<nrb>
UL RMC Starting RB	:CONFigure:CELLular:LV2X:RBALlocation:ORB <start>	:CONFigure:CELLular:LV2X:RBALlocation:ORB?	<start>
UL RMC Modulation	:CONFigure:CELLular:LV2X:MODulation:MSCHeme <mod>	:CONFigure:CELLular:LV2X:MODulation:MSCHeme?	<mod>
UL RMC MCS Index	:CONFigure:CELLular:LV2X:MCS <mcs>	-----	-----
Trigger Source	:TRIGger:CELLular:LV2X:FUNDamental:SOURce <source>	:TRIGger:CELLular:LV2X:FUNDamental:SOURce?	<source>
Trigger Level	:TRIGger:CELLular:LV2X:FUNDamental:LEVel <lvl>	:TRIGger:CELLular:LV2X:FUNDamental:LEVel?	<lvl>
Trigger Delay	:TRIGger:CELLular:LV2X:FUNDamental:DELay <delay>	:TRIGger:CELLular:LV2X:FUNDamental:DELay?	<delay>
Trigger Timeout	:TRIGger:CELLular:LV2X:FUNDamental:TOUT <time>	:TRIGger:CELLular:LV2X:FUNDamental:TOUT?	<time>
Minimum Trigger Gap	:TRIGger:CELLular:LV2X:FUNDamental:MGAP <time>	:TRIGger:CELLular:LV2X:FUNDamental:MGAP?	<time>
Measurement Offset	:CONFigure:CELLular:LV2X:FUNDamental:MOFFset <time>	:CONFigure:CELLular:LV2X:FUNDamental:MOFFset?	<time>
RB Allocation	:CONFigure:CELLular:LV2X:RBALlocation <mode>	:CONFigure:CELLular:LV2X:RBALlocation?	<mode>

Fundamental Measurement Parameters

Function	Command	Query	Response
additionalSpectrumEmission	:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission <sib2_ns>	:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission?	<sib2_ns>
All Measurement Items Off	:CONFigure:CELLular:LV2X:FUNDamental:AMITems:OFF	-----	-----
Power Measurement On/Off and Meas. Count	:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET <on_off>[,<count>]	:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET?	<on_off>,<count>
Occupied Bandwidth On/Off and Meas. Count	:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET <on_off>[,<count>]	:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET?	<on_off>,<count>
Spectrum Emission Mask On/Off and Meas. Count	:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET <on_off>[,<count>]	:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET?	<on_off>,<count>
Adjacent Channel Leakage Ratio On/Off and Meas. Count	:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET <on_off>[,<count>]	:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET?	<on_off>,<count>
Modulation Analysis On/Off and Meas. Count	:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET <on_off>[,<count>]	:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET?	<on_off>,<count>

Results

Function	Command	Query	Response
Tx Power	-----	:FETCh:CELLular:LV2X:FUNDamental:POWer:TXPower? [<mode>]	<pwr>|{<avg>,<max>,<min>}|{<s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)>}
Channel Power	-----	:FETCh:CELLular:LV2X:FUNDamental:POWer:CHPower? [<mode>]	<pwr>|{<avg>,<max>,<min>}|{<s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)>}
OBW	-----	:FETCh:CELLular:LV2X:FUNDamental:OBW?	<bw>
OBW Frequency	-----	:FETCh:CELLular:LV2X:FUNDamental:OBW:FREQuency? <pos>	<freq>
ACLR	-----	:FETCh:CELLular:LV2X:FUNDamental:ACLR? [<mode>]	{<aclr(E_LOW1)>,<aclr(E_UP1)>}|{<avg(E_LOW1)>,<avg(E_UP1)>,<max(E_LOW1)>,<max(E_UP1)>,<min(E_LOW1)>,<min(E_UP1)>}

Results (Cont'd)

Function	Command	Query	Response
SEM Peak Value (Lower)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer?	<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>
SEM Peak Value (Upper)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer?	<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>
SEM Peak Value (Detail) (Lower)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer:DETail?	<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>,<f_M5>,<l_M5>,<f_M6>,<l_M6>,<f_M7>,<l_M7>,<f_M8>,<l_M8>,<f_M9>,<l_M9>
SEM Peak Value (Detail) (Upper)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer:DETail?	<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>,<f_5>,<l_5>,<f_6>,<l_6>,<f_7>,<l_7>,<f_8>,<l_8>,<f_9>,<l_9>
SEM Template Margin (Lower)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer?	<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>
SEM Template Margin (Upper)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer?	<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>
SEM Template Margin (Detail) (Lower)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer:DETail?	<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>,<f_M5>,<l_M5>,<f_M6>,<l_M6>,<f_M7>,<l_M7>,<f_M8>,<l_M8>,<f_M9>,<l_M9>
SEM Template Margin (Detail) (Upper)	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer:DETail?	<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>,<f_5>,<l_5>,<f_6>,<l_6>,<f_7>,<l_7>,<f_8>,<l_8>,<f_9>,<l_9>
SEM Judgement	-----	:FETCh:CELLular:LV2X:FUNDamental:SEMask:JUDGement?	<judgement>

Results (Cont'd)

Function	Command	Query	Response
Carrier Frequency	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:CFRequency? [<mode>]	<freq>
Carrier Frequency Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor? [<mode>]	{<cfreq_ppm>,<cfreq_Hz>}|{<avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<min_ppm>,<min_Hz>}
Carrier Frequency Error (Worst)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor:WORSt?	<cferr_ppm>,<cferr_Hz>

Results (Cont'd)

Function	Command	Query	Response
PSCCH Carrier Frequency	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:CFRequency? [<mode>]	<freq>
PSCCH Carrier Frequency Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor? [<mode>]	{<cfreq_ppm>,<cfreq_Hz>}|{<avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<min_ppm>,<min_Hz>}
PSCCH Carrier Frequency Error (Worst)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor:WORSt?	<cferr_ppm>,<cferr_Hz>

Results (Cont'd)

Function	Command	Query	Response
EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVM? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
EVM (Low)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVML? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
EVM (High)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVMH? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
Peak EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PEVM? [<mode>]	<pevm>|{<avg>,<max>,<min>}
Reference Signal EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:RSEVm? [<mode>]	rsevm|{avg,max,min}{s,rsevm(1),rsevm(2),…,rsevm(s)}
Phase Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PHERror? [<mode>]	<phase>|{<avg>,<max>,<min>}
Magnitude Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:MERRor? [<mode>]	<magnitude>|{<avg>,<max>,<min>}

Results (Cont'd)

Function	Command	Query	Response
PSCCH EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVM? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
PSCCH EVM (Low)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVML? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
PSCCH EVM (High)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVMH? [<mode>]	<evm>}|{<avg>,<max>,<min>|{<s>,<evm(1)>,<evm(2)>,…,<evm(s)>}
PSCCH Peak EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PEVM? [<mode>]	<pevm>|{<avg>,<max>,<min>}
PSCCH Reference Signal EVM	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:RSEVm? [<mode>]	rsevm|{avg,max,min}{s,rsevm(1),rsevm(2),…,rsevm(s)}
PSCCH Phase Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PHERror? [<mode>]	<phase>|{<avg>,<max>,<min>}
PSCCH Magnitude Error	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:MERRor? [<mode>]	<magnitude>|{<avg>,<max>,<min>}
Carrier Leak	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:CARLeakage? [<mode>]	<cleakage>|{<avg>,<max>,<min>}

Results (Cont'd)

Function	Command	Query	Response
In-Band Emissions - General	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:GENeral? [<mode>]	<ibe>|{<avg>,<max>,<min>}|{<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>}
In-Band Emissions - IQ Image	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:IQIMage? [<mode>]	<ibe>|{<avg>,<max>,<min>}|{<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>}
In-Band Emissions - Carrier Leakage	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:CARLeakage? [<mode>]	<ibe>|{<avg>,<max>,<min>}|{<s>,<ibe(1)>,<ibe(2)>,…,<ibe(s)>}
In-Band Emissions Judgement	-----	:FETCh:CELLular:LV2x:FUNDamental:MODulation:IEMissions:JUDGement?	<judge>
In-Band Emissions limit - General	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:GENeral?	<level>
In-Band Emissions limit - IQ Image	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?	<level>
In-Band Emissions limit - Carrier Leakage	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?	<level>
In-Band Emissions Margin	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:MARGin?	<margin>
In-Band Emissions Measured Item	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:ITEM?	<flag>

Results (Cont'd)

Function	Command	Query	Response
Spectrum Flatness - ≥ 3 MHz (R1+)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1P? [<mode>]	<sflatness>|{<avg>,<max>,<min>}
Spectrum Flatness - ≥ 3 MHz (R1–)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1M? [<mode>]	<sflatness>|{<avg>,<max>,<min>}
Spectrum Flatness - ≥ 3 MHz (RP1)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP1? [<mode>]	<sflatness>|{<avg>,<max>,<min>}|{<s>,<sflatness(1)>,…,<sflatness(s)>}
Spectrum Flatness - < 3 MHz (R2+)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2P? [<mode>]	<sflatness>|{<avg>,<max>,<min>}
Spectrum Flatness - < 3 MHz (R2–)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2M? [<mode>]	<sflatness>|{<avg>,<max>,<min>}
Spectrum Flatness - < 3 MHz (RP2)	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP2? [<mode>]	<sflatness>|{<avg>,<max>,<min>}|{<s>,<sflatness(1)>,…,<sflatness(s)>}
Spectrum Flatness - RP12	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP12? [<mode>]	<sflatness>|{<avg>,<max>,<min>}|{<s>,<sflatness(1)>,…,<sflatness(s)>}
Spectrum Flatness - RP21	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP21? [<mode>]	<sflatness>|{<avg>,<max>,<min>}|{<s>,<sflatness(1)>,…,<sflatness(s)>}

Results (Cont'd)

Function	Command	Query	Response
Spectrum Flatness - RP Total	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP? [<mode>]	<sflatness(RP1)>,<sflatness(RP2)>,<sflatness(RP12)>,<sflatness(RP21)>|<avg(RP1)>,<avg(RP2)>,<avg(RP12)>,<avg(RP21)>,<max(RP1)>,<max(RP2)>,<max(RP12)>,<max(RP21)>,<min(RP1)>,<min(RP2)>,<min(RP12)>,<min(RP21)>|<s>,sflatness(RP1)(1)>,<sflatness(RP2)(1)>,<sflatness(RP12)(1)>,<sflatness(RP21)(1)>,…,<sflatness(RP1)(s)>,<sflatness(RP2)(s)>,<sflatness(RP12)(s)>,<sflatness(RP21)(s)>
Spectrum Flatness Measured Item	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:ITEM?	<flag>
Spectrum Flatness Judgement	-----	:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:JUDGement?	<judge>
Detected UL RMC Number of RB	-----	:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:NRB?	<nrb>
Detected UL RMC Starting RB	-----	:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:ORB?	<start>
Waveform	-----	:FETCh:CELLular:LV2X:FUNDamental:TRACe? <format>,<position>,<length>[,<symbol>]	<data(1)>,…,<data(length)>

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 measurement.

Command

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

Example of Use

To stop the measurement:

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

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

Waveform File Select

Function

Selects or 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 0 from the waveform files loaded in 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.
:SOURce:GPRF:GENerator:ARB:FILE:LOAD
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.
The following command can be used to query the names of the waveform files that have been loaded into waveform memory.
:SOURce:GPRF:GENerator:ARB:WAVeform:NAME?
For details of the command, refer to Chapter 5 "SCPI Command Reference" in the *MU887000A TRX Test Module Operation Manual*.

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:SEQuencer: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 set 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 set 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/disable 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	(requires MX887010A)
SEQ	Sequence	(requires MX887010A)
Default	COMMON	

Details

Switch the measurement standard and sequence measurement according to the application software. If this command is sent during measurement, measurement stops to prepare for the new standard. The old measurement results are cleared.

Common hardware settings, such as Downlink Frequency and Input Level, can be set for each measurement standard.

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 LTEV2X to execute the commands described in Section 4.2.2 “Fundamental measurement commands”.

:FETCh:CELLular:MEASurement:STATe?

Measurement Status

Function

Queries the measurement status.

Query

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

Response

<m_status>

<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

Details

This can be used either during measurement or while measurement is stopped.
The value received from MX887068A is 0, 2, 5, 9, or 12.

Example of Use

To query the 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.
Sending this command during measurement, aborts measurement once and restarts it.
The measurement questionable register 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:QUEStionable:MEASure[:EVENt]
For the details of questionable 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 When using MX887010A, MX887011A, MX887012A, MX887013A, MX887014A, MX887015A, MX887016A, MX887017A, MX887018A, MX887019A, MX887065A, MX887067A, or MX887068A
	SRW	Short Range Wireless application When using MX887030A, MX887031A, MX887032A, MX887033A, MX887040A, or MX887050A
	LRWPAN	IEEE 802.15.4 application When using MX887060A
	ZWAVE	Z-Wave application When using MX887061A
	FMAUDIO	FM AUDIO application When using MX887070A

Note: MU887002A does not support MX887070A.

Details

Set the parameter to CELLULAR and send the command before using the MX887068A.

Example of Use

To set the application software to CELLULAR:

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

Remarks

When using the MX887068A, set the application to CELLULAR using :INSTrument[:SELect], and then set the standard to LTEV2X using :CONFigure:CELLular:MEASurement:STANdard.

: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

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 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.

Example of Use

To set Test Port 1 as RF signal input test port and Test Port 2 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>
```

<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>

<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 command.

Command

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

Query

```
:SYSTem:LANGuage?
```

Response

```
<mode>
```

Parameter

<mode>	Language mode
NATive	Native
SCPI	SCPI
Default	NATive

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 <dlfreq>
```

Query

```
:CONFigure:CELLular:GENerator:RFSettings:FREQuency?
```

Response

```
<dlfreq>
```

Parameter

<dlfreq>		Downlink frequency
	Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
	Resolution	1 Hz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
	Default	5890 000 000 Hz
	Response unit	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.

Example of Use

To set the downlink frequency to 5890 MHz:

```
:CONF:CELL:GEN:RFS:FREQ 5890MHZ
:CONF:CELL:GEN:RFS:FREQ?
>5890000000
```

:CONFigure:CELLular:GENerator:RFSettings:LEVel

Output Level (Cell Total)

Function

Sets or queries the RF signal total output level of all channels.

Command

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

Query

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

Response

```
<lvl>
```

Parameter

<lvl>	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	400 MHz < frequency ≤ 6000 MHz	
	–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	
Response 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 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:LV2X:CBANdwidth

Channel Bandwidth

Function

Sets or queries the channel bandwidth.

Command

```
:CONFigure:CELLular:LV2X:CBANdwidth <bw>
```

Query

```
:CONFigure:CELLular:LV2X:CBANdwidth?
```

Response

```
<bw>
```

Parameter

<bw>	Channel bandwidth
10MHZ	10 MHz
20MHZ	20 MHz
Default	10 MHz

Example of Use

To set the channel bandwidth to 10 MHz:

```
:CONF:CELL:LV2X:CBAN 10MHZ
:CONF:CELL:LV2X:CBAN?
> 10MHZ
```

Remarks

When the Channel Bandwidth is updated, the related UL RMC Number of RB and UL RMC Starting RB are changed accordingly.
UL RMC Number of RB is set to the maximum, and UL RMC Starting RB is set to the minimum.

:CONFigure:CELLular:LV2X:CTYPe

RMC Configuration

Function

Sets or queries the Uplink Channel configuration when Channel Coding set to RMC.

Command

```
:CONFigure:CELLular:LV2X:CTYPe <object>
```

Query

```
:CONFigure:CELLular:LV2X:CTYPe?
```

Response

```
<object>
```

Parameter

<object>	Channel configuration
PSSCH	PSSCH
PSCCH	PSCCH
Default	PSSCH

Examples of Use

To sets the Uplink Channel configuration to PSSCH

```
:CONF:CELL:LV2X:CTYP PSSCH
:CONF:CELL:LV2X:CTYP?
> PSSCH
```

Remarks

When PSSCH is set, both PSSCH and PSCCH are measured. When PSCCH is set, only PSCCH is measured.

:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET

Adjacent Channel Leakage Ratio On/Off and Meas. Count

Function

Enables ACLR measurement and sets measurement count, or queries settings.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET <on_off>[,<count>]
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET?
```

Response

```
<on_off>,<count>
```

Parameters

<on_off>	Enables/disables measurement
ON	Executes the measurement
OFF	Disables measurement
Default	OFF
<count>	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Examples of Use

To set the ACLR measurement to on and set the measurement count to 100:

```
:CONF:CELL:LV2X:FUND:ACLR:SET ON,100
:CONF:CELL:LV2X:FUND:ACLR:SET?
> ON,100
```

:CONFigure:CELLular:LV2X:FUNDamental:AMITems:OFF

All Measurement Items Off

Function

Disables all fundamental measurement items at one time.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:AMITems:OFF
```

Remarks

The operation of this command is similar to turning off all the following command settings.

:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET
:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET
:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET
:CONFigure:CELLular:LV2X:FUNDamental:ACLR:SET
:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET

Example of Use

To set all fundamental measurements to off at one time:

```
:CONF:CELL:LV2X:FUND:AMIT:OFF
```

:CONFigure:CELLular:LV2X:FUNDamental:BAND

Operation band

Function

Sets or queries the operation band.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:BAND <band>
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:BAND?
```

Response

```
<band>
```

Parameter

<band>	Operation band
Range	1 to 84
Resolution	1
Default	47
Suffix code	None

Details

When the Operation band is updated, the related Downlink Channel, Uplink Channel, Downlink Frequency, and Uplink Frequency are changed accordingly.

Example of Use

To set the operation band to 10:

```
:CONF:CELL:LV2X:FUND:BAND 10
:CONF:CELL:LV2X:FUND:BAND?
> 10
```

:CONFigure:CELLular:LV2X:FUNDamental:MOFFset

Measurement Offset

Function

Sets and queries the offset value of the analysis start time in symbols during power trigger.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:MOFFset <time>
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:MOFFset?
```

Response

```
<time>
```

Parameters

<time>	Measurement Offset (Number of Symbol)
Range	0 to 6.0
Resolution	0.1
Default	0.0
Suffix code	None

Details

This setting is enabled when Trigger Source is set to VIDEO.

Example of Use

To set the Measurement Offset to 5.0:

```
:CONF:CELL:LV2X:FUND:MOFF 5.0
:CONF:CELL:LV2X:FUND:MOFF?
> 5.0
```

:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET

Modulation Analysis On/Off and Meas. Count

Function

Enables the Modulation Analysis Measurement and sets the measurement count, and queries the settings.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET <on_off>[,<count>]
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:MODulation:SET?
```

Response

```
<on_off>,<count>
```

Parameters

<on_off>	Enables/disables measurement
ON	Enables measurement
OFF	Disables measurement
Default	ON
<count>	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To enable the Modulation Analysis measurement and set the measurement count to 100:

```
:CONF:CELL:LV2X:FUND:MOD:SET ON,100
:CONF:CELL:LV2X:FUND:MOD:SET?
> ON,100
```

:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET

Occupied Bandwidth On/Off and Meas. Count

Function

Enables the Occupied Bandwidth measurement and sets the measurement count, or queries the settings.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET <on_off>[,<count>]
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:OBW:SET?
```

Response

```
<on_off>,<count>
```

Parameters

<on_off>	Enables/disables measurement
ON	Enables measurement
OFF	Disables measurement
Default	OFF
<count>	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To turn Occupied Bandwidth measurement on and set the measurement count to 50:

```
:CONF:CELL:LV2X:FUND:OBW:SET ON,50
:CONF:CELL:LV2X:FUND:OBW:SET?
> ON,50
```

:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET

Power Measurement On/Off and Meas. Count

Function

Enables the Tx Power measurement and sets the measurement count, or queries the settings.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET <on_off>[,<count>]
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:POWer:SET?
```

Response

```
<on_off>,<count>
```

Parameters

<on_off>	Enables/disables measurement
ON	Enables measurement
OFF	Disables measurement
Default	OFF
<count>	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To turn Transmit Power measurement ON and set the measurement count to 100:

```
:CONF:CELL:LV2X:FUND:POW:SET ON,100
:CONF:CELL:LV2X:FUND:POW:SET?
> ON,100
```

:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission

additionalSpectrumEmission

Function

Sets or queries the additionalSpectrumEmission.
This setting determines the Spectrum Emission Mask frequency range.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission <sib2_ns>
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:SEMask:ASEMission?
```

Response

```
<sib2_ns>
```

Parameter

<sib2_ns>	additionalSpectrumEmission
NS_01	NS_01
NS_33	NS_33
NS_34	NS_34
Default	NS_01

Example of Use

To set the additionalSpectrumEmission to NS_33:

```
:CONF:CELL:LV2X:FUND:SEM:ASEM NS_33
:CONF:CELL:LV2X:FUND:SEM:ASEM?
> NS_33
```

:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET

Spectrum Emission Mask On/Off and Meas. Count

Function

Enables the Spectrum Emission Mask (SEM) Measurement and sets or queries measurement count.

Command

```
:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET <on_off>[,<count>]
```

Query

```
:CONFigure:CELLular:LV2X:FUNDamental:SEMask:SET?
```

Response

```
<on_off>,<count>
```

Parameters

<on_off>	Enables/disables the measurement
ON	Enables the measurement
OFF	Disables the measurement
Default	OFF
<count>	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To enable the SEM measurement and set the measurement count to 100:

```
:CONF:CELL:LV2X:FUND:SEM:SET ON,100
:CONF:CELL:LV2X:FUND:SEM:SET?
> ON,100
```

:CONFigure:CELLular:LV2X:MCS

UL RMC MCS Index

Function

Sets the MCS Index for the uplink signal.

Command

```
:CONFigure:CELLular:LV2X:MCS <mcs>
```

Parameter

<mcs>	MCS Index for the uplink signal
Range	0 to 28
Resolution	1
Default	–
Suffix code	None

Details

When the UL RMC MCS Index is updated, the UL RMC Modulation setting is changed accordingly.
Refer to Table 2.1.6-1.

Example of Use

To set the MCS Index for the uplink signal to 28:

```
:CONF:CELL:LV2X:MCS 28
```

:CONFigure:CELLular:LV2X:MODulation:MSCHeme

UL RMC Modulation

Function

Sets or queries the PSSCH modulation scheme for the uplink signal. When the UL RMC MCS Index is set, this parameter is changed accordingly.

Command

```
:CONFigure:CELLular:LV2X:MODulation:MSCHeme <mod>
```

Query

```
:CONFigure:CELLular:LV2X:MODulation:MSCHeme?
```

Response

```
<mod>
```

Parameter

<mod>	Modulation scheme
QPSK	QPSK modulation
16QAM	16QAM modulation
AUTO	Automatic identification
Default	QPSK

Example of Use

To set the modulation scheme for the uplink signal to 16QAM:

```
:CONF:CELL:LV2X:MOD:MSCH 16QAM
:CONF:CELL:LV2X:MOD:MSCH?
> 16QAM
```

:CONFigure:CELLular:LV2X:RBALlocation

RB Allocation

Function

Sets or queries whether the number of RBs (Resource Blocks) and the starting RB number allocated to PSSCH for the uplink signal are automatically detected or manually set.

Command

```
:CONFigure:CELLular:LV2X:RBALlocation <mode>
```

Query

```
:CONFigure:CELLular:LV2X:RBALlocation?
```

Response

```
<mode>
```

Parameters

<mode>	Automatic detection / Manual setting
AUTO	Automatic detection
SET	Manual setting
Default	SET

Details

When SET is selected, measurement is performed according to the settings for UL RMC Number of RB and UL RMC Starting RB.

Example of Use

To set the RB Allocation to AUTO:

```
:CONF:CELL:LV2X:RBAL AUTO
:CONF:CELL:LV2X:RBAL?
> AUTO
```

:CONFigure:CELLular:LV2X:RBALlocation:NRB

UL RMC Number of RB

Function

Sets or queries the number of RBs (Resource Blocks) assigned to PSSCH for the uplink signal.

Command

```
:CONFigure:CELLular:LV2X:RBALlocation:NRB <nrb>
```

Query

```
:CONFigure:CELLular:LV2X:RBALlocation:NRB?
```

Response

```
<nrb>
```

Parameter

<nrb>	Number of RBs Numbers represented by the expression of (2^X) × (3^Y) × (5^Z), (X, Y, Z ≥ 0, integer)	
Range	0 to 48	When channel bandwidth is 10 MHz
	0 to 98	When channel bandwidth is 20 MHz
Resolution	1	
Default	48	
Suffix code	None	

Details

When the UL RMC Number of RB is updated, the UL RMC Starting RB is set to minimum.
When the UL RMC Number of RB is set to 0, Modulation Analysis is not performed.

Example of Use

To set the number of RBs to 6:

```
:CONF:CELL:LV2X:RBAL:NRB 6
:CONF:CELL:LV2X:RBAL:NRB?
> 6
```

:CONFigure:CELLular:LV2X:RBALlocation:ORB

UL RMC Starting RB

Function

Sets or queries the starting RB number for the uplink signal.

Command

```
:CONFigure:CELLular:LV2X:RBALlocation:ORB <start>
```

Query

```
:CONFigure:CELLular:LV2X:RBALlocation:ORB?
```

Response

```
<start>
```

Parameter

<start>	starting RB number
Range	2 to (RBmax – RBn) RBmax = 50 When channel bandwidth is 10 MHz RBmax = 100 When channel bandwidth is 20 MHz RBn is set using the :CONFigure:CELLular:LV2X:RBALlocation:NRB command.
Resolution	1
Default	2
Suffix code	None

Details

The UL RMC starting RB number for the uplink signal is reset to 2 when the Channel Bandwidth or UL RMC Number of RB is updated.

Example of Use

To set the starting RB number to 6:

```
:CONF:CELL:LV2X:RBAL:ORB 6
:CONF:CELL:LV2X:RBAL:ORB?
> 6
```

:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel

Downlink Channel

Function

Sets or queries the Downlink Channel.

Command

```
:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel <dlchan>
```

Query

```
:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel?
```

Response

```
<dlchan>
```

Parameter

<dlchan>	Downlink Channel
Range	0 to 262143
Resolution	1
Default	54890
Suffix code	None

Details

When the Downlink Channel parameter is updated, the related Uplink Channel parameter and Downlink Frequency and Operation Band are changed accordingly.
For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-2 “Relationship between Uplink Channel Number and Downlink Channel Number” and to Table 2.1.6-3 “E-UTRA Channel Numbers (N_{DL}, N_{UL}) and TX-RX Frequency Separation (Freq. Sep)”.

Example of Use

To set the Downlink Channel to 54890:

```
:CONF:CELL:MEAS:RFS:DLCH 54890
:CONF:CELL:MEAS:RFS:DLCH?
> 54890
```

:CONFigure:CELLular:MEASurement:RFSettings:FREQuency

Uplink Frequency

Function

Sets or queries the Uplink frequency.

Command

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency <ulfreq>
```

Query

```
:CONFigure:CELLular:MEASurement:RFSettings:FREQuency?
```

Response

```
<ulfreq>
```

Parameter

<ul_freq>		Uplink frequency
	Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
	Resolution	1 Hz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
	Default	5890 000 000 Hz
	Response unit	Hz

Details

This sets the Tx frequency for the mobile station.

Updating this Uplink frequency does not affect the Uplink Channel parameters.

Example of Use

To set the Uplink frequency to 5890 MHz:

```
:CONF:CELL:MEAS:RFS:FREQ 5890MHZ
:CONF:CELL:MEAS:RFS:FREQ?
>5890000000
```

: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 <lvl>
```

Query

```
:CONFigure:CELLular:MEASurement:RFSettings:LEVel?
```

Response

```
<lvl>
```

Parameter

<lvl>	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)
Resolution	0.1 dB
Suffix code	DBM (uses dBm when omitted)
Default	–1.0 dBm
Response 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, the MU887000A Port 1/Port 2 setting range is –60.0 to +40.0 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:MEASurement:RFSettings:ULCHannel

Uplink Channel

Function

Sets or queries the Uplink Channel.

Command

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel <ulchan>
```

Query

```
:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel?
```

Response

```
<ulchan>
```

Parameter

<ulchan>	Uplink Channel
Range	0 to 262143
Resolution	1
Default	54890
Suffix code	None

Details

When the Uplink Channel is updated, the related Downlink Channel, Uplink Frequency, Downlink Frequency and Operation Band are changed accordingly.
For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-2 “Relationship between Uplink Channel Number and Downlink Channel Number” and to Table 2.1.6-3 “E-UTRA Channel Numbers (N_{DL}, N_{UL}) and TX-RX Frequency Separation (Freq. Sep)”.

Example of Use

To set the Uplink Channel to 54890:

```
:CONF:CELL:MEAS:RFS:ULCH 54890
:CONF:CELL:MEAS:RFS:ULCH?
> 54890
```

:FETCh:CELLular:LV2X:FUNDamental:ACLR?

ACLR

Function

Queries the results of all frequency offsets in Adjacent Channel Leakage Power Ratio (ACLR) measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:ACLR? [<mode>]
```

Response

```
<aclr(E_LOW1)>,<aclr(E_UP1)
<avg(E_LOW1)>,<avg(E_UP1)>,
<max(E_LOW1)>,<max(E_UP1)>,
<min(E_LOW1)>,<min(E_UP1)>
```

<mode> = AVG, MAX, MIN, DVT

<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Average
<aclr(offset)>	Measurement result in specified Storage mode
<avg(offset)>	Measurement result (Average)
<max(offset)>	Measurement result (Maximum)
<min(offset)>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB
offset	
E_LOW1	E-UTRA Lower adjacent channel
E_UP1	E-UTRA Upper adjacent channel

Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.
Refer to Table 2.5-1 “Adjacent Channel Measurement Bandwidth (MHz)” for details.

Example of Use

To the query average of ACLR measurement results:

```
:FETC:CELL:LV2X:FUND:ACLR? AVG
> 3.00,3.01
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:CARLeakage?

Carrier Leak

Function

Queries the Carrier Leak measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:CARLeakage? [<mode>]
```

Response

`<cleakage>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Average
<cleakage>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dBc

Example of Use

To query the average of Carrier Leak measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:CARL? AVG
> 1.05
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:CFRequency?

Carrier Frequency

Function

Queries the Carrier Frequency measurement result.

Query

```
:FETCh:CELLular:LV2X: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:LV2X:FUND:MOD:CFR?
> 5890000000
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:ITEM?

Spectrum Flatness Measured Item

Function

Queries whether each spectrum flatness measurement items is measured or not.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:ITEM?
```

Response

```
<flag>
```

Parameter

<flag>		Measured/Not measured flag (0 to 3)
		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:LV2X:FUND:MOD:ESFL:ITEM?
> 2
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:JUDGement?

Spectrum Flatness Judgement

Function

Queries the judgement of Spectrum Flatness measurement result.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:JUDGement?
```

Response

```
<judge>
```

Parameter

<judge>	Judgement
PASS	Pass
FAIL	Fail
–	Not measured

Example of Use

To query the judgement of Spectrum Flatness measurement result:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:JUDG?
> PASS
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1M?

Spectrum Flatness - ≥ 3 MHz (R1–)

Function

Queries the minimum values in Spectrum Flatness measurement results in Range 1.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1M? [<mode>]
```

Response

`<sflatness>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Minimum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of minimum value in Spectrum Flatness measurement results in Range 1:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:R1M? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1P?

Spectrum Flatness - ≥ 3 MHz (R1+)

Function

Queries the maximum values in Spectrum Flatness measurement results in Range 1.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R1P? [<mode>]
```

Response

<sflatness>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of maximum value in Spectrum Flatness measurement results in Range 1:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:R1P? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2M?

Spectrum Flatness - < 3 MHz (R2–)

Function

Queries the minimum values in Spectrum Flatness measurement results in Range 2.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2M? [<mode>]
```

Response

`<sflatness>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Minimum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of the minimum value in Spectrum Flatness measurement results in Range 2:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:R2M? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2P?

Spectrum Flatness - < 3 MHz (R2+)

Function

Queries the maximum values in the results of Spectrum Flatness measurement in Range 2.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:R2P? [<mode>]
```

Response

<sflatness>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of the maximum value in Spectrum Flatness measurement results in Range 2:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:R2P? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP?

Spectrum Flatness - RP Total

Function

Queries all results of ripple measurements of Spectrum Flatness.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP? [<mode>]
```

Response

```
<sflatness(RP1)>,<sflatness(RP2)>,<sflatness(RP12)>,<sflatness(RP21)>
                                                    <mode> = AVG, MAX, MIN, DVT
<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> = TTL
<s>,sflatness(RP1)(1)>,<sflatness(RP2)(1)>,<sflatness(RP12)(1)>,<sflatness(RP21)(1)>,...,
<sflatness(RP1)(s)>,<sflatness(RP2)(s)>,<sflatness(RP12)(s)>,<sflatness(RP21)(s)>
                                                    <mode> = IND
```

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<sflatness(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

Queries the average results of all ripple measurements of Spectrum Flatness:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:RP? AVG
> 0.04,0.03,0.06,0.05
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP1?

Spectrum Flatness - ≥ 3 MHz (RP1)

Function

Queries the ripple values in Spectrum Flatness measurement results in Range 1.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP1? [<mode>]
```

Response

<sflatness>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s>,<sflatness(1)>,…,<sflatness(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
IND	Individual measurement result
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<sflatness(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of ripple value in Spectrum Flatness measurement results in Range 1:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:RP1? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP12?

Spectrum Flatness - RP12

Function

Queries the difference between maximum value in Range 1 and minimum value in Range 2 of Spectrum Flatness measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP12? [<mode>]
```

Response

`<sflatness>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s>,<sflatness(1)>,…,<sflatness(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<sflatness(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of difference between maximum value in Range 1 and minimum value in Range 2:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:RP12? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP2?

Spectrum Flatness - < 3 MHz (RP2)

Function

Queries the ripple values in Spectrum Flatness measurement results in Range 2.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP2? [<mode>]
```

Response

`<sflatness>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s>,<sflatness(1)>,…,<sflatness(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<sflatness(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of ripple value in Spectrum Flatness measurement results in Range 2:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:RP2? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP21?

Spectrum Flatness - RP21

Function

Queries the difference between maximum value in Range 2 and minimum value in Range 1 of Spectrum Flatness measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:ESFLatness:RP21? [<mode>]
```

Response

`<sflatness>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s>,<sflatness(1)>,…,<sflatness(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<sflatness(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of difference between maximum value in Range 2 and minimum value in Range 12:

```
:FETC:CELL:LV2X:FUND:MOD:ESFL:RP21? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVM?

EVM

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVM? [<mode>]
```

Response

<evm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,evm(1)>,<evm(2)>,…,<evm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:EVM? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVMH?

EVM (High)

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVMH? [<mode>]
```

Response

`<evm>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s,evm(1)>,<evm(2)>,…,<evm(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:EVMH? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVML?

EVM (Low)

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:EVML? [<mode>]
```

Response

<evm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,evm(1)>,<evm(2)>,…,<evm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:EVML? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor?

Carrier Frequency Error

Function

Queries the Frequency Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor? <mode>
```

Response

```
<cfreq_ppm>,<cfreq_Hz>                                    <mode> = AVG, MAX, MIN, DVT, Omitted
<avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<min_ppm>,<min_Hz>  <mode> = TTL
```

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Worst
<cfreq_ppm>	Measurement result in ppm in specified Storage mode
<cfreq_Hz>	Measurement results in Hz in specified Storage mode
<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)
Resolution	0.01 ppm
Resolution	0.1 Hz
Unit	ppm
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the average of Frequency Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:FERR? AVG
> 0.03
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor:WORSt?

Carrier Frequency Error (Worst)

Function

Queries the worst value of Frequency Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:FERRor:WORSt?
```

Response

```
<cferr_ppm>,<cferr_Hz>
```

Parameters

<cferr_ppm>	Worst value in Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
<cferr_Hz>	Worst value in Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of Frequency Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:FERR:WORS?
> 0.03,60.0
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:CARLeakage?

In-Band Emissions - Carrier Leakage

Function

Queries the in-band emissions (Carrier Leakage) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:CARLeakage? [<mode>]
```

Response

`<ibe>`	<mode> =AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s,ibe(1)>,<ibe(2)>,…,<ibe(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of in-band emissions (Carrier Leakage) measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:IEM:CARL? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:GENeral?

In-Band Emissions - General

Function

Queries in-band emissions (General) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:GENeral? [<mode>]
```

Response

<ibe>	<mode> =AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,ibe(1)>,<ibe(2)>,…,<ibe(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of in-band emissions (General) measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:IEM:GEN? AVG
> 0.04
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:IQIMage?

In-Band Emissions - IQ Image

Function

Queries in-band emissions (IQ Image) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:IQIMage? [<mode>]
```

Response

<ibe>	<mode> =AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,ibe(1)>,<ibe(2)>,…,<ibe(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

Example of Use

To query the average of in-band emissions (IQ Image) measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:IEM:IQIM? AVG
> 0.04
```

:FETCh:CELLular:LV2X: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:LV2X:FUNDamental:MODulation:IEMissions:ITEM?
```

Response

```
<flag>
```

Parameter

<flag>		Measured/Not measured flag (0 to 7)
		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:LV2X:FUND:MOD:IEM:ITEM?
> 4
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:JUDGement?

In-Band Emissions Judgement

Function

Queries the judgement on the in-band emission measurement results.

Query

```
:FETCh:CELLular:LV2X: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 results:

```
:FETC:CELL:LV2X:FUND:MOD:IEM:JUDG?
> PASS
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?

In-Band Emissions limit - Carrier Leakage

Function

Queries the limit of in-band emission measurement (Carrier Leakage).

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?
```

Response

```
<level>
```

Parameter

<level>	Limit
Resolution	0.1 dB
Unit	dBc

Example of Use

To query the limit of in-band emission measurement (Carrier Leakage) :

```
:FETC:CELL:LV2X:FUND:MOD:IEM:LIM:CARL?
> 1.5
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:GENeral?

In-Band Emissions limit - General

Function

Queries the limit of the in-band emission measurement (General).

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:GENeral?
```

Response

```
<level>
```

Parameter

<level>	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of the in-band emission measurement (General) :

```
:FETC:CELL:LV2X:FUND:MOD:IEM:LIM:GEN?
> 2.0
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?

In-Band Emissions limit - IQ Image

Function

Queries the limit of in-band emission measurement (IQ Image).

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?
```

Response

```
<level>
```

Parameter

<level>	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of in-band emission measurement (IQ Image) :

```
:FETC:CELL:LV2X:FUND:MOD:IEM:LIM:IQIM?
> 1.5
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:IEMissions:LIMit:MARGin?

In-Band Emissions Margin

Function

Queries the worst margin in the entire bandwidth for in-band emission measurement.

Query

```
:FETCh:CELLular:LV2X: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 for modulation analysis:

```
:FETC:CELL:LV2X:FUND:MOD:IEM:LIM:MARG?
> 1.05
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:MERRor?

Magnitude Error

Function

Queries the Magnitude Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:MERRor? [<mode>]
```

Response

`<magnitude>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL

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 results:

```
:FETC:CELL:LV2X:FUND:MOD:MERR? AVG
> 1.05
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PEVM?

Peak EVM

Function

Queries the EVM (Error Vector Magnitude) Peak measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PEVM? [<mode>]
```

Response

<pevm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

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 EVM Peak measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PEVM? AVG
> 1.75
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PHERror?

Phase Error

Function

Queries the Phase Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PHERror? [<mode>]
```

Response

<phase>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

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 degree
Unit	degree

Example of Use

To query the average of Phase Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PHER? AVG
> 1.55
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:CFRequency?

PSCCH Carrier Frequency

Function

Queries the PSCCH Carrier Frequency measurement result.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:CFRequency? [<mode>]
```

Response

```
<freq>
```

Parameters

<mode>	Storage mode
AVG	Average
Omitted	Average
<freq>	Carrier frequency
Resolution	1 Hz
Unit	Hz

Example of Use

To query the result of PSCCH Carrier Frequency measurement:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:CFR?
> 5890000000
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVM?

PSCCH EVM

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVM? [<mode>]
```

Response

<evm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,evm(1)>,<evm(2)>,…,<evm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:EVM? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVMH?

PSCCH EVM (High)

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVMH? [<mode>]
```

Response

<evm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,evm(1)>,<evm(2)>,…,<evm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:EVMH? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVML?

PSCCH EVM (Low)

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:EVML? [<mode>]
```

Response

<evm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,evm(1)>,<evm(2)>,…,<evm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<evm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<evm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:EVML? AVG
> 1.50
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor?

PSCCH Carrier Frequency Error

Function

Queries the PSCCH Frequency Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor? [<mode>]
```

Response

```
<cfreq_ppm>,<cfreq_Hz>
```
<mode> = AVG, MAX, MIN, DVT, Omitted

```
<avg_ppm>,<avg_Hz>,<max_ppm>,<max_Hz>,<min_ppm>,<min_Hz>
```
<mode> = TTL

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Worst
<cfreq_ppm>	Measurement result in ppm in specified Storage mode
<cfreq_Hz>	Measurement results in Hz in specified Storage mode
<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)
Resolution	0.01 ppm
Resolution	0.1 Hz
Unit	ppm
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the average of PSCCH Frequency Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:FERR? AVG
> 0.03
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor:WORSt?

PSCCH Carrier Frequency Error (Worst)

Function

Queries the worst value of PSCCH Frequency Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:FERRor:WORSt?
```

Response

```
<cferr_ppm>,<cferr_Hz>
```

Parameters

<cferr_ppm>	Worst value of Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
<cferr_Hz>	Worst value of Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of PSCCH Frequency Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:FERR:WORS?
> 0.03,60.0
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:MERRor?

PSCCH Magnitude Error

Function

Queries the PSCCH Magnitude Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:MERRor? [<mode>]
```

Response

<magnitude>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

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 PSCCH Magnitude Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:MERR? AVG
> 1.05
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PEVM?

PSCCH Peak EVM

Function

Queries the PSCCH EVM (Error Vector Magnitude) Peak measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PEVM? [<mode>]
```

Response

<pevm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL

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 PSCCH EVM Peak measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCCh:PEVM? AVG
> 1.75
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PHERror?

PSCCH Phase Error

Function

Queries the PSCCH Phase Error measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:PHERror? [<mode>]
```

Response

`<phase>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL

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 degree
Unit	degree

Example of Use

To query the average of PSCCH Phase Error measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:PHER? AVG
> 1.55
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:RSEVm?

PSCCH Reference Signal EVM

Function

Queries the PSCCH Reference Signal EVM measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:PSCCh:RSEVm? [<mode>]
```

Response

<rsevm>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s,rsevm(1)>,<rsevm(2)>,…,<rsevm(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<rsevm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<rsevm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of PSCCH Reference Signal EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:PSCC:RSEV? AVG
> 1.51
```

:FETCh:CELLular:LV2X:FUNDamental:MODulation:RSEVm?

Reference Signal EVM

Function

Queries the Reference Signal EVM measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:MODulation:RSEVm? [<mode>]
```

Response

`<rsevm>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s,rsevm(1)>,<rsevm(2)>,…,<rsevm(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<rsevm>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<rsevm(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
<s>	Measurement count

Example of Use

To query the average of Reference Signal EVM measurement results:

```
:FETC:CELL:LV2X:FUND:MOD:RSEV? AVG
> 1.51
```

:FETCh:CELLular:LV2X:FUNDamental:OBW?

OBW

Function

Queries the Occupied Bandwidth (OBW) measurement result.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:OBW?
```

Response

```
<bw>
```

Parameter

<bw>	Occupied Bandwidth
Resolution	1 kHz
Unit	MHz

Example of Use

To query the OBW measurement result:

```
:FETC:CELL:LV2X:FUND:OBW?
> 3.840
```

:FETCh:CELLular:LV2X:FUNDamental:OBW:FREQuency?

OBW Frequency

Function

Queries the upper, lower and center frequency of Occupied Bandwidth measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:OBW:FREQuency? <pos>
```

Response

```
<freq>
```

Parameters

<pos>	Offset type of OBW
UPPER	Upper frequency
LOWER	Lower frequency
CENTER	Center frequency
<freq>	Offset frequency for the offset type (pos)
Resolution	1 kHz
Unit	MHz

Example of Use

To query the upper frequency of Occupied Bandwidth measurement results:

```
:FETC:CELL:LV2X:FUND:OBW:FREQ? UPPER
> 5890.920
```

:FETCh:CELLular:LV2X:FUNDamental:POWer:CHPower?

Channel Power

Function

Queries the Channel Power measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:POWer:CHPower? [<mode>]
```

Response

<pwr>	<mode> = AVG, MAX, MIN, DVT
<avg>,<max>,<min>	<mode> = TTL
<s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)>	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<pwr>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<pwr(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dBm
<s>	Measurement count

Example of Use

To query the average of Channel Power measurement results:

```
:FETC:CELL:LV2X:FUND:POW:CHP? AVG
> -20.00
```

:FETCh:CELLular:LV2X:FUNDamental:POWer:TXPower?

Tx Power

Function

Queries the Tx power measurement results.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:POWer:TXPower? [<mode>]
```

Response

`<pwr>`	<mode> = AVG, MAX, MIN, DVT
`<avg>,<max>,<min>`	<mode> = TTL
`<s>,<pwr(1)>,<pwr(2)>,…,<pwr(s)>`	<mode> = IND

Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
<pwr>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<pwr(n)>	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dBm
<s>	Measurement count

Example of Use

To query the average of Tx Power measurement results:

```
:FETC:CELL:LV2X:FUND:POW:TXP? AVG
> -20.00
```

:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:NRB?

Detected UL RMC Number of RB

Function

Queries the number of RBs (Resource Blocks) allocated to PSSCH for the detected uplink signal.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:NRB?
```

Response

```
<nrb>
```

Parameter

<nrb>	Number of RBs Numbers represented by the expression of (2^X) × (3^Y) × (5^Z), (X, Y, Z ≥ 0, integer)	
Range	0 to 48	When channel bandwidth is 10 MHz
	0 to 98	When channel bandwidth is 20 MHz
Resolution	1	
Default	48	
Suffix code	None	

Details

This setting is enabled only when RB Allocation is set to AUTO.

Example of Use

To query the number of RBs:

```
:FETC:CELL:LV2X:FUNDamental:RBAL:NRB?
> 6
```

:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:ORB?

Detected UL RMC Starting RB

Function

Queries the PSSCH starting RB number for the detected uplink signal.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:RBALlocation:ORB?
```

Response

```
<start>
```

Parameter

<start>		Starting RB number
Range		2 to (RBmax – RBn)
	RBmax = 50	When channel bandwidth is 10 MHz
	RBmax = 100	When channel bandwidth is 20 MHz
	RBn is queried using the :FETCh:CELLular:LV2X:FUNDamental:RBALlocation:NRB? command.	
Resolution		1
Default		2
Suffix code		None

Details

This setting is enabled only when RB Allocation is set to AUTO.

Example of Use

To query the starting RB number:

```
:FETC:CELL:LV2X:FUND:RBAL:ORB?
> 6
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:JUDGement?

SEM Judgement

Function

Queries the judgement result of Spectrum Emission Mask measurement.
Fail when any part of spectrum exceeds limit, otherwise Pass.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:JUDGement?
```

Response

```
<judgement>
```

Parameter

<judgement>	Result
PASS	Pass
FAIL	Fail
–	Not measured

Example of Use

To query the judgement result whether the spectrum is within the limit:

```
:FETC:CELL:LV2X:FUND:SEM:JUDG?
> PASS
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer?

SEM Peak Value (Lower)

Function

Queries the peak levels with offset frequency at each of lower side ranges of Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer?
```

Response

```
<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>
```

Parameters

<l_M1> to <l_M4>	Peak level at each of lower side Range 1 to Range 4	
	Resolution	0.01 dB
	Unit	dBm
<f_M1> to <f_M4>	Offset frequency of peak level at each of lower side Range 1 to Range 4	
	Resolution	1 kHz
	Unit	MHz

Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To the query peak levels with offset frequency at each of lower side ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:LEV:LOW?
> -3.000,-20.00,-5.000,-30.00,-8.000,-40.00,-9.500,-50.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer:DETail?

SEM Peak Value (Detail) (Lower)

Function

Queries the peak levels with offset frequency at each of lower side 9 ranges of Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:LOWer:DETail?
```

Response

```
<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>,<f_M5>,<l_M5>,<f_M6>,<l_M6>,<f_M7>,<l_M7>,<f_M8>,<l_M8>,<f_M9>,<l_M9>
```

Parameters

<l_M1> to <l_M9>	Peak level at each of lower side range of Range 1 to Range 9
Resolution	0.01 dB
Unit	dBm
<f_M1> to <f_M9>	Offset frequency of peak level at each of lower side range of Range 1 to Range 9
Resolution	1 kHz
Unit	MHz

Details

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for details.

Example of Use

To query the peak levels with offset frequency at each of lower side of 9 ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:LEV:LOW:DET?
>
-0.500,3.00,-1.500,3.00,-2.600,3.00,-3.500,3.00,-5.500,3.00,-8.000,3.00,-12.500,3.00,-17.500,3.00,-22.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer?

SEM Peak Value (Upper)

Function

Queries the peak levels with offset frequency at each of upper side ranges of Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer?
```

Response

```
<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>
```

Parameters

<l_1> to <l_4>		Peak level in each of upper Range 1 to Range 4
	Resolution	0.01 dB
	Unit	dBm
<f_1> to <f_4>		Offset frequency of peak level in each of upper Range 1 to Range 4
	Resolution	1 kHz
	Unit	MHz

Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the peak levels with offset frequency at each of upper side ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:LEV:UPP?
> 3.000,-20.00,5.000,-30.00,8.000,-40.00,9.500,-50.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer:DETail?

SEM Peak Value (Detail) (Upper)

Function

Queries the peak levels with offset frequency at each of upper side of nine ranges of Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:LEVel:UPPer:DETail?
```

Response

```
<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>,<f_5>,<l_5>,<f_6>,<l_6>,<
f_7>,<l_7>,<f_8>,<l_8>,<f_9>,<l_9>
```

Parameters

<l_1> to <l_9>	Peak level in each of upper Range 1 to Range 9
Resolution	0.01 dB
Unit	dBm
<f_1> to <f_9>	Offset frequency of peak level in each of upper Range 1 to Range 9
Resolution	1 kHz
Unit	MHz

Details

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for details.

Example of Use

To query the peak levels with offset frequency at each of upper side of nine ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:LEV:UPP:DET?
>
0.500,3.00,1.500,3.00,2.600,3.00,3.500,3.00,5.500,3.00,8.000,3.00,12.500,
3.00,17.500,3.00,22.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer?

SEM Template Margin (Lower)

Function

Queries the level margins at each of lower side ranges in Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer?
```

Response

```
<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>
```

Parameters

<l_M1> to <l_M4>	Level margin in each of lower Range 1 to Range 4
Resolution	0.01 dB
Unit	dB
<f_M1> to <f_M4>	Offset frequency where level margin in each of lower Range 1 to Range 4 measured
Resolution	1 kHz
Unit	MHz

Details

The level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

Refer to Table 2.4-1 Frequency Ranges of Range 1 to Range 4 for the frequency range for the measurement.

Example of Use

To query the level margins with frequency where margin measured at each of lower side ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:MARG:LOW?
> -3.000,3.00,-5.000,3.00,-8.000,3.00,-9.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer:DETail?

SEM Template Margin (Detail) (Lower)

Function

Queries the level margins at each of lower side of 9 ranges in Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:LOWer:DETail?
```

Response

```
<f_M1>,<l_M1>,<f_M2>,<l_M2>,<f_M3>,<l_M3>,<f_M4>,<l_M4>,<f_M5>,<l_M5>,<f_
M6>,<l_M6>,<f_M7>,<l_M7>,<f_M8>,<l_M8>,<f_M9>,<l_M9>
```

Parameters

<l_M1> to <l_M9>	Level margin in each of lower Range 1 to Range 9
Resolution	0.01 dB
Unit	dB
<f_M1> to <f_M9>	Offset frequency where level margin in each of lower Range 1 to Range 9 measured
Resolution	1 kHz
Unit	MHz

Details

The level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results”.

Example of Use

To query the level margins with frequency where margin measured at each of lower side of 9 ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:MARG:LOW:DET?
>
-0.500,3.00,-1.500,3.00,-2.600,3.00,-3.500,3.00,-5.500,3.00,-8.000,3.00,-
12.500,3.00,-17.500,3.00,-22.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer?

SEM Template Margin (Upper)

Function

Queries the level margins at each of upper side range in Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer?
```

Response

```
<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>
```

Parameters

<l_1> to <l_4>	Level margin in each of upper Range 1 to Range 4
Resolution	0.01 dB
Unit	dB
<f_1> to <f_4>	Offset frequency where level margin in each of upper Range 1 to Range 4 measured
Resolution	1 kHz
Unit	MHz

Details

Level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the level margins with frequency where margin measured at each of upper side ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:MARG:UPP?
> 3.000,3.00,5.000,3.00,8.000,3.00,9.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer:DETail?

SEM Template Margin (Detail) (Upper)

Function

Queries the level margins at each of upper side of 9 ranges in Spectrum Emission Mask measurement.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:SEMask:MARGin:UPPer:DETail?
```

Response

```
<f_1>,<l_1>,<f_2>,<l_2>,<f_3>,<l_3>,<f_4>,<l_4>,<f_5>,<l_5>,<f_6>,<l_6>,<f_7>,<l_7>,<f_8>,<l_8>,<f_9>,<l_9>
```

Parameters

<l_1> to < l_9>	Level margin in each of upper side range of Range 1 to Range 9
Resolution	0.01 dB
Unit	dB
<f_1> to <f_9>	Offset frequency where level margin measured in each of upper side range of Range 1 to Range 9
Resolution	1 kHz
Unit	MHz

Details

The level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results”.

Example of Use

To query the level margins with frequency where margin measured at each of upper side of 9 ranges of Spectrum Emission Mask measurement:

```
:FETC:CELL:LV2X:FUND:SEM:MARG:UPP:DET?
>
0.500,3.00,1.500,3.00,2.600,3.00,3.500,3.00,5.500,3.00,8.000,3.00,12.500,3.00,17.500,3.00,22.500,3.00
```

:FETCh:CELLular:LV2X:FUNDamental:TRACe?

Waveform

Function

Queries the spectrum waveform data of each measurement result.

Query

```
:FETCh:CELLular:LV2X:FUNDamental:TRACe? <format>,<position>,<length>[,<symbol>]
```

Response

```
<data(1)>,<data(2)>,…,<data(length)>
```

Parameter

<format>	Format
1	Occupied Bandwidth
2	Spectrum Emission Mask (SEM)
3	Constellation (I)
4	Constellation (Q)
5	EVM (Average)
6	EVM (Maximum)
7	Phase Error (Average)
8	Phase Error (Maximum)
9	Magnitude Error (Average)
10	Magnitude Error (Maximum)
11	In-band Emissions (dB) (Average)
12	In-band Emissions (dB) (Maximum)
13	In-band Emissions (dBc) (Average)
14	In-band Emissions (dBc) (Maximum)
15	Spectrum Flatness (Average)
16	Spectrum Flatness (Maximum)
17	Spectrum Flatness (Minimum)
18	PSCCH Constellation (I)
19	PSCCH Constellation (Q)
20	PSCCH EVM (Average)
21	PSCCH EVM (Maximum)
22	PSCCH Phase Error (Average)
23	PSCCH Phase Error (Maximum)
24	PSCCH Magnitude Error (Average)
25	PSCCH Magnitude Error (Maximum)

<position> Start point of waveform data

Resolution 1

Range

Format	Channel Bandwidth	
	10 MHz	20 MHz
1	0 to 298	0 to 596
2	0 to 596	0 to 1042
3 to 10, 15 to 25	0 to 599	0 to 1199
11 to 14	0 to 49	0 to 99

<length> Number of read data

Resolution 1

Range

Format	Channel Bandwidth	
	10 MHz	20 MHz
1	1 to 299	1 to 597
2	1 to 597	1 to 1043
3 to 10, 15 to 25	1 to 600	1 to 1200
11 to 14	1 to 50	1 to 100

<symbol> Position of SC-FDMA symbol

Resolution 1

Range When format is 3 to 10

0 to 6

<data(n)> Waveform data

format	Resolution	Unit
2	0.01 dB	dBm
3, 4, 18, 19	0.0001	None
5, 6, 9, 10, 20, 21, 24, 25	0.01 %	%
7, 8, 22, 23	0.01 degree	degree
1, 11, 12, 15, 16, 17	0.01 dB	dB
13, 14	0.01 dB	dBc

Details

Average in the above formats is equivalent to the average waveform of a spectrum analyzer.
Maximum in the above formats is equivalent to the peak-hold waveform of a spectrum analyzer.

Example of Use

To query the EVM (Average) of 768 spectrum waveform data from 257 of each measurement result:

```
:FETC:CELL:LV2X:FUND:TRAC? 5,256,768,1
> 2.00,2.01,2.00,…,2.10
```

:TRIGger:CELLular:LV2X:FUNDamental:DELay

Trigger Delay

Function

Sets or queries the Trigger Delay.

Command

```
:TRIGger:CELLular:LV2X:FUNDamental:DELay <delay>
```

Query

```
:TRIGger:CELLular:LV2X:FUNDamental:DELay?
```

Response

```
<delay>
```

Parameter

<delay>	Trigger Delay
Range	0 to 10.000 ms
Resolution	0.001 ms
Default	0.000 ms
Suffix code	S, MS, US, NS (uses ms when omitted)
Response unit	ms

Details

This parameter is valid when Trigger Source is set to other than Freerun.

Example of Use

To set the trigger delay to 0.001 ms:

```
:TRIG:CELL:LV2X:FUND:DEL 0.001
:TRIG:CELL:LV2X:FUND:DEL?
>0.001
```

:TRIGger:CELLular:LV2X:FUNDamental:LEVel

Trigger Level

Function

Sets or queries the Trigger Level.

Command

```
:TRIGger:CELLular:LV2X:FUNDamental:LEVel <lvl>
```

Query

```
:TRIGger:CELLular:LV2X:FUNDamental:LEVel?
```

Response

```
<lvl>
```

Parameter

<lvl>	Trigger Level
Range	–40 to 0 dB
Resolution	1 dB
Default	–30 dB
Suffix code	DB

Details

This parameter is valid only when Trigger Source is set to VIDEO.

Example of Use

To set the trigger level to –30 dB:

```
:TRIG:CELL:LV2X:FUND:LEV -30
:TRIG:CELL:LV2X:FUND:LEV?
> -30
```

:TRIGger:CELLular:LV2X:FUNDamental:MGAP

Minimum Trigger Gap

Function

Sets or queries the minimum time that the signal falls below the trigger level during power trigger.

Command

```
:TRIGger:CELLular:LV2X:FUNDamental:MGAP <time>
```

Query

```
:TRIGger:CELLular:LV2X:FUNDamental:MGAP?
```

Response

```
<time>
```

Parameters

<time>	Minimum Trigger Gap
Range	0 to 10.0 ms
Resolution	0.1 ms
Default	0.0 ms
Suffix code	NS, US, MS, S (uses ms when omitted)
Response unit	ms

Details

This parameter is valid when Trigger Source is set to VIDEO.

Examples of Use

To set the Minimum Trigger Gap to 5 ms:

```
TRIG:CELL:LV2X:FUND:MGAP 5MS
TRIG:CELL:LV2X:FUND:MGAP?
> 5.0
```

:TRIGger:CELLular:LV2X:FUNDamental:SOURce

Trigger Source

Function

Sets or queries the Trigger Source.

Command

```
:TRIGger:CELLular:LV2X:FUNDamental:SOURce <source>
```

Query

```
:TRIGger:CELLular:LV2X:FUNDamental:SOURce?
```

Response

```
<source>
```

Parameter

<source>	Trigger Source
VIDEO	Power
FREERUN	Free run
Default	VIDEO

Example of Use

To set the trigger source to Power:

```
:TRIG:CELL:LV2X:FUND:SOUR VIDEO
:TRIG:CELL:LV2X:FUND:SOUR?
> VIDEO
```

:TRIGger:CELLular:LV2X:FUNDamental:TOUT

Trigger Timeout

Function

Sets or queries the trigger timeout.

Command

```
:TRIGger:CELLular:LV2X:FUNDamental:TOUT <time>
```

Query

```
:TRIGger:CELLular:LV2X:FUNDamental:TOUT?
```

Response

```
<time>
```

Parameter

<time>	Trigger Timeout
Range	1 to 60 s
Resolution	1 s
Default	10 s
Suffix code	S, MS, US, NS (uses s when omitted)
Response unit	s

Example of Use

To set the Trigger timeout time to 5 s:

```
:TRIG:CELL:LV2X:FUND:TOUT 5
:TRIG:CELL:LV2X:FUND:TOUT?
> 5
```

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
5.2 Details of Commands 5-15
5.2.1 Common commands 5-16
5.2.2 Fundamental measurement commands 5-33

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. A | B | C | D indicates a choice of A, B, C, and D.
{ }	Curly brackets are used to group options. 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]

Measure

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?	-----
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
Channel Bandwidth	BANDWIDTH bw	BANDWIDTH?	bw
Uplink Channel	ULCHAN ulchan	ULCHAN?	ulchan
Uplink Frequency	TXFREQ ulfreq ULFREQ ulfreq	TXFREQ? ULFREQ?	ulfreq
Downlink Channel	DLCHAN dlchan	DLCHAN?	dlchan
Downlink Frequency	RXFREQ dlfreq DLFREQ dlfreq	RXFREQ? DLFREQ?	dlfreq
Operation band	BAND band	BAND?	band
Input Level	ILVL lvl	ILVL?	lvl
Output Level (Cell Total)	OLVL lvl	OLVL?	lvl

LTE-V2X Setting

Function	Command	Query	Response
RMC Configuration	CHCONFIG object	CHCONFIG?	object
UL RMC Number of RB	ULRMC_RB nrb	ULRMC_RB?	nrb
UL RMC Starting RB	ULRB_START start	ULRB_START?	start
UL RMC Modulation	ULRMC_MOD mod	ULRMC_MOD?	mod
UL RMC MCS Index	ULIMCS mcs	-----	-----
Trigger Source	TRGSRC source	TRGSRC?	source
Trigger Level	TRGLVL lvl	TRGLVL?	lvl
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
RB Allocation	RB_ALLOC mode	RB_ALLOC?	mode

Fundamental Measurement Parameters

Function	Command	Query	Response
additionalSpectrumEmission	SIB2_NS sib2_ns	SIB2_NS?	sib2_ns
All Measurement Items Off	ALLMEASITEMS_OFF	-----	-----
Power Measurement On/Off and Meas. Count	PWR_SET on_off[,count]	PWR_SET?	on_off,count
Occupied Bandwidth On/Off and Meas. Count	OBW_SET on_off[,count]	OBW_SET?	on_off,count
Spectrum Emission Mask On/Off and Meas. Count	SEM_SET on_off[,count]	SEM_SET?	on_off,count
Adjacent Channel Leakage Ratio On/Off and Meas. Count	ACLR_SET on_off[,count]	ACLR_SET?	on_off,count
Modulation Analysis On/Off and Meas. Count	MOD_SET on_off[,count]	MOD_SET?	on_off,count

Results

Function	Command	Query	Response
Tx Power	-----	POWER? [mode]	pwr|{avg,max,min}|{s,pwr(1),pwr(2),…,pwr(s)}
Channel Power	-----	CHPWR? [mode]	pwr|{avg,max,min}|{s,pwr(1),pwr(2),…,pwr(s)}
OBW	-----	OBW?	bw
OBW Frequency	-----	OBWFREQ? pos	freq
ACLR	-----	ACLR? [mode]	{aclr(E_LOW1),aclr(E_UP1)}|{avg(E_LOW1),avg(E_UP1),max(E_LOW1),max(E_UP1),min(E_LOW1),min(E_UP1)}

Results (Cont'd)

Function	Command	Query	Response
SEM Peak Value (Lower)	-----	SEMLVL_LOWER?	f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4
SEM Peak Value (Upper)	-----	SEMLVL_UPPER?	f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4
SEM Peak Value (Detail) (Lower)	-----	SEMLVL_DET_LOWER?	f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4,f_M5,l_M5,f_M6,l_M6,f_M7,l_M7,f_M8,l_M8,f_M9,l_M9
SEM Peak Value (Detail) (Upper)	-----	SEMLVL_DET_UPPER?	f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4,f_5,l_5,f_6,l_6,f_7,l_7,f_8,l_8,f_9,l_9
SEM Template Margin (Lower)	-----	SEMMARGIN_LOWER?	f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4
SEM Template Margin (Upper)	-----	SEMMARGIN_UPPER?	f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4
SEM Template Margin (Detail) (Lower)	-----	SEMMARGIN_DET_LOWER?	f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4,f_M5,l_M5,f_M6,l_M6,f_M7,l_M7,f_M8,l_M8,f_M9,l_M9
SEM Template Margin (Detail) (Upper)	-----	SEMMARGIN_DET_UPPER?	f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4,f_5,l_5,f_6,l_6,f_7,l_7,f_8,l_8,f_9,l_9
SEM Judgement	-----	SEM?	judgement

Results (Cont'd)

Function	Command	Query	Response
Carrier Frequency	-----	CARRF? [mode]	freq
Carrier Frequency Error	-----	CFERR? [mode]	{cfreq_ppm,cfreq_Hz}|{avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz}
Carrier Frequency Error (Worst)	-----	WORST_CARRFERR? unit	cferr
	-----	CFERR_WORST?	cferr_ppm,cferr_Hz
PSCCH Carrier Frequency	-----	PSCCH_CARRF? [mode]	freq
PSCCH Carrier Frequency Error	-----	PSCCH_CFERR? [mode]	{cfreq_ppm,cfreq_Hz}|{avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz}
PSCCH Carrier Frequency Error (Worst)	-----	PSCCH_WORST_CARRFERR? unit	cferr
		PSCCH_CFERR_WORST?	cferr_ppm,cferr_Hz
EVM	-----	EVM? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
EVM (Low)	-----	EVM_L? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
EVM (High)	-----	EVM_H? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
Peak EVM	-----	PEVM? [mode]	pevm|{avg,max,min}
Reference Signal EVM	-----	RSEVM? [mode]	rsevm|{avg,max,min}{s,rsevm(1),rsevm(2),…,rsevm(s)}
Phase Error	-----	PHASEERR? [mode]	phase|{avg,max,min}
Magnitude Error	-----	MAGERR? [mode]	magnitude|{avg,max,min}

Results (Cont'd)

Function	Command	Query	Response
PSCCH EVM	-----	PSCCH_EVM? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
PSCCH EVM (Low)	-----	PSCCH_EVM_L? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
PSCCH EVM (High)	-----	PSCCH_EVM_H? [mode]	evm|{avg,max,min}|{s,evm(1),evm(2),…,evm(s)}
PSCCH Peak EVM	-----	PSCCH_PEVM? [mode]	pevm|{avg,max,min}
PSCCH Reference Signal EVM	-----	PSCCH_RSEVM? [mode]	rsevm|{avg,max,min}{s,rsevm(1),rsevm(2),…,rsevm(s)}
PSCCH Phase Error	-----	PSCCH_PHASEERR? [mode]	phase|{avg,max,min}
PSCCH Magnitude Error	-----	PSCCH_MAGERR? [mode]	magnitude|{avg,max,min}
Carrier Leak	-----	CARRLEAK? [mode]	cleakage|{avg,max,min}

Results (Cont'd)

Function	Command	Query	Response
In-Band Emissions - General	-----	INBANDE_GEN? [mode]	ibe|{avg,max,min}|{s,ibe(1),ibe(2),…,ibe(s)}
In-Band Emissions - IQ Image	-----	INBANDE_IMG? [mode]	ibe|{avg,max,min}|{s,ibe(1),ibe(2),…,ibe(s)}
In-Band Emissions - Carrier Leakage	-----	INBANDE_LEAK? [mode]	ibe|{avg,max,min}|{s,ibe(1),ibe(2),…,ibe(s)}
In-Band Emissions Judgement	-----	INBANDEPASS?	judge
In-Band Emissions limit - General	-----	INBANDE_GENUL?	level
In-Band Emissions limit - IQ Image	-----	INBANDE_IMGUL?	level
In-Band Emissions limit - Carrier Leakage	-----	INBANDE_LEAKUL?	level
In-Band Emissions Margin	-----	INBANDE_MARG?	margin
In-Band Emissions Measured Item	-----	INBANDEITEM?	flag

Results (Cont'd)

Function	Command	Query	Response
Spectrum Flatness - ≥ 3 MHz (R1+)	-----	SPECFLAT1_P? [mode]	sflatness|{avg,max,min}
Spectrum Flatness - ≥ 3 MHz (R1–)	-----	SPECFLAT1_M? [mode]	sflatness|{avg,max,min}
Spectrum Flatness - ≥ 3 MHz (RP1)	-----	SPECFLAT_RP1? [mode]	sflatness|{avg,max,min}|{s,sflatness(1),…,sflatness(s)}
Spectrum Flatness - < 3 MHz (R2+)	-----	SPECFLAT2_P? [mode]	sflatness|{avg,max,min}
Spectrum Flatness - < 3 MHz (R2–)	-----	SPECFLAT2_M? [mode]	sflatness|{avg,max,min}
Spectrum Flatness - < 3 MHz (RP2)	-----	SPECFLAT_RP2? [mode]	sflatness|{avg,max,min}|{s,sflatness(1),…,sflatness(s)}
Spectrum Flatness - RP12	-----	SPECFLAT_RP12? [mode]	sflatness|{avg,max,min}|{s,sflatness(1),…,sflatness(s)}
Spectrum Flatness - RP21	-----	SPECFLAT_RP21? [mode]	sflatness|{avg,max,min}|{s,sflatness(1),…,sflatness(s)}
Spectrum Flatness - RP Total	-----	SPECFLAT_RP? [mode]	sflatness(RP1),sflatness(RP2),sflatness(RP12),sflatness(RP21)|avg(RP1),avg(RP2),avg(RP12),avg(RP21),max(RP1),max(RP2),max(RP12),max(RP21),min(RP1),min(RP2),min(RP12),min(RP21)|s,sflatness(RP1)(1),sflatness(RP2)(1),sflatness(RP12)(1),sflatness(RP21)(1),…,sflatness(RP1)(s),sflatness(RP2)(s),sflatness(RP12)(s),sflatness(RP21)(s)

Results (Cont'd)

Function	Command	Query	Response
Spectrum Flatness Measured Item	-----	SPECFLATITEM?	flag
Spectrum Flatness Judgement	-----	SPECFLATPPPASS?	judge
Detected UL RMC Number of RB	-----	DETECT_ULRMC_RB?	nrb
Detected UL RMC Starting RB	-----	DETECT_ULRB_START?	start
Waveform	-----	WAVEFMEAS? format,position,length[,symbol]	data(1),…,data(length)

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
```

Parameter

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
```

Parameter

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 turn on the modulation.

```
MOD ON
MOD?
> ON
```

MSTAT?

Measurement Status

Function

Queries the current 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

Details

This command can be used while measurement is in progress or suspended.
The value received from MX887068A is 0, 2, 5, 9, or 12.

Example of Use

To query the current measurement status:

```
MSTAT?
> 0
```

PACKAGE

Waveform File Select

Function

Selects and queries the waveform file for arbitrary waveform signal used at Downlink 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.
Multiple output test port can be set for MU887002A.

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 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.

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	(requires MX887010A)
SEQ	Sequence	(requires MX887010A)
Default	COMMON	

Details

Switch the measurement standard and sequence measurement according to the application software.
If this command is sent during measurement, measurement stops to prepare for the new standard.
The old measurement results are cleared.
Common hardware settings, such as Downlink Frequency and Input Level, can be set for each measurement standard.

Example of Use

To switch the measurement standard to SEQUENCE:

```
STDSEL SEQUENCE
STDSEL?
> SEQUENCE
```

Remarks

This parameter must be set to LTEV2X to execute the commands described in Section 5.2.2 “Fundamental measurement commands”.

SYSSEL

Application Select

Function

Sets or queries the type of application software to execute.

Command

```
SYSSEL app
```

Query

```
SYSSEL?
```

Response

```
app
```

Parameter

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

Note: MU887002A does not support MX887070A.

Details

Set the parameter to CELLULAR and send the command before using the MX887068A.

Example of Use

To set the application software to CELLULAR:

```
SYSSEL CELLULAR
SYSSEL?
> CELLULAR
```

Remarks

When using the MX887068A, set the application to CELLULAR using the SYSSEL command, and then set the standard to LTEV2X 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
```

SWP

Measurement Start (Synchronization)

Function

Sets the parameters for both specified measurement and signal transmission and executes 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 end
1	During measurement

Details

Sending this command executes one measurement execution.
For averaging results, the measurement is repeated the number of times specified by average count.

Example of Use

To start measurement:

```
SWP
```

TXMSTAT?

Tx Measurement Status

Function

Queries the current Tx measurement status.

Query

```
TXMSTAT?
```

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

Details

This command can be used while measurement is in progress or suspended.
The value received from MX887068A is 0, 2, 5, 9, or 12.

Example of Use

To query the current Tx measurement status:

```
TXMSTAT?
> 0
```

5.2.2 Fundamental measurement commands

ACLR?

ACLR

Function

Queries the results of all frequency offsets in Adjacent Channel Leakage Power Ratio (ACLR) measurement.

Query

```
ACLR? [mode]
```

Response

```
aclr(E_LOW1),aclr(E_UP1)          mode = AVG, MAX, MIN, DVT
avg(E_LOW1),avg(E_UP1),
max(E_LOW1),max(E_UP1),
min(E_LOW1),min(E_UP1)            mode = TTL
```

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Average
aclr(offset)	Measurement result in specified Storage mode
avg(offset)	Measurement result (Average)
max(offset)	Measurement result (Maximum)
min(offset)	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB
offset	
E_LOW1	E-UTRA Lower adjacent channel
E_UP1	E-UTRA Upper adjacent channel

Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.
Refer to Table 2.5-1 “Adjacent Channel Measurement Bandwidth (MHz)” for details.

Example of Use

To query the average of ACLR measurement results:

```
ACLR? AVG
> 3.00,3.01
```

ACLR_SET

Adjacent Channel Leakage Ratio On/Off and Meas. Count

Function

Enables ACLR measurement and sets measurement count, or queries settings.

Command

```
ACLR_SET on_off[,count]
```

Query

```
ACLR_SET?
```

Response

```
on_off,count
```

Parameters

on_off	Enables/disables measurement.
ON	Turns measurement on.
OFF	Disables measurement.
Default	OFF
count	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Examples of Use

To set the ACLR measurement to on and set the measurement count to 100:

```
ACLR_SET ON,100
ACLR_SET?
> ON,100
```

ALLMEASITEMS_OFF

All Measurement Items Off

Function

Disables all fundamental measurement items at one time.

Command

```
ALLMEASITEMS_OFF
```

Remarks

This command operates similarly to the following commands.

PWR_SET

OBW_SET

SEM_SET

ACLR_SET

MOD_SET

Example of Use

To set all fundamental measurements to off at one time:

```
ALLMEASITEMS_OFF
```

BAND

Operation band

Function

Sets or queries the operation band.

Command

```
BAND band
```

Query

```
BAND?
```

Response

```
band
```

Parameter

band	Operation band
Range	1 to 84
Resolution	1
Default	47
Suffix code	None

Details

When the Operation band is updated, the related Downlink Channel, Uplink Channel, Downlink Frequency, and Uplink Frequency are changed accordingly.

Example of Use

To set the operation band to 10:

```
BAND 10
BAND?
> 10
```

BANDWIDTH

Channel Bandwidth

Function

Sets or queries the channel bandwidth.

Command

```
BANDWIDTH bw
```

Query

```
BANDWIDTH?
```

Response

```
bw
```

Parameter

bw	Channel bandwidth
10MHZ	10 MHz
20MHZ	20 MHz
Default	10 MHz

Example of Use

To set the channel bandwidth to 10 MHz:

```
BANDWIDTH 10MHZ
BANDWIDTH?
> 10MHZ
```

Remarks

When the Channel Bandwidth is updated, the related UL RMC Number of RB and UL RMC Starting RB are changed accordingly.
UL RMC Number of RB is set to the maximum, and UL RMC Starting RB is set to the minimum.

CARRLEAK?

Carrier Leak

Function

Queries the Carrier Leak measurement results.

Query

```
CARRLEAK? [mode]
```

Response

`cleakage`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Average
cleakage	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dBc

Example of Use

To query the average of Carrier Leak measurement results:

```
CARRLEAK? AVG
> 1.05
```

CARRF?

Carrier Frequency

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?
> 5890000000
```

CFERR?

Carrier Frequency Error

Function

Queries the Frequency Error measurement results.

Query

```
CFERR? [mode]
```

Response

```
cfreq_ppm,cfreq_Hz                                    mode = AVG, MAX, MIN, DVT, Omitted
avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz          mode = TTL
```

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Worst
cfreq_ppm	Measurement result in ppm in specified Storage mode
cfreq_Hz	Measurement results in Hz in specified Storage mode
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)
Resolution	0.01 ppm
Resolution	0.1 Hz
Unit	ppm
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the average of Frequency Error measurement results:

```
CFERR? AVG
> 0.03
```

CFERR_WORST?

Carrier Frequency Error (Worst)

Function

Queries the worst value of Frequency Error measurement results.

Query

```
CFERR_WORST?
```

Response

```
cferr_ppm,cferr_Hz
```

Parameters

cferr_ppm	Worst value in Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
cferr_Hz	Worst value in Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of Frequency Error measurement results:

```
CFERR_WORST?
> 0.03,60.0
```

CHCONFIG

RMC Configuration

Function

Sets or queries the Uplink Channel configuration.

Command

```
CHCONFIG object
```

Query

```
CHCONFIG?
```

Response

```
object
```

Parameter

object	Channel configuration
PSSCH	PSSCH
PSCCH	PSCCH
Default	PSSCH

Examples of Use

To set the Uplink Channel configuration to PSSCH.

```
CHCONFIG PSSCH
CHCONFIG?
> PSSCH
```

Remarks

When PSSCH is set, both PSSCH and PSCCH are measured. When PSCCH is set, only PSCCH is measured.

CHPWR?

Channel Power

Function

Queries the Channel Power measurement results.

Query

```
CHPWR? [mode]
```

Response

`pwr`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode= TTL
`s,pwr(1),pwr(2),pwr(3),…,pwr(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
pwr	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
pwr(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dBm
s	Measurement count

Example of Use

To query the average of Channel Power measurement results:

```
CHPWR? AVG
> -20.00
```

DETECT_ULRB_START?

Detected UL RMC Starting RB

Function

Queries the PSSCH starting RB number for the detected uplink signal.

Query

```
DETECT_ULRB_START?
```

Response

```
start
```

Parameter

start	starting RB number	
Range	2 to (RBmax – RBn)	
	RBmax = 50	When channel bandwidth is 10 MHz
	RBmax = 100	When channel bandwidth is 20 MHz
	RBn is queried using the DETECT_ULRMC_RB? command.	
Resolution	1	
Default	2	
Suffix code	None	

Details

This setting is enabled only when RB Allocation is set to AUTO.

Example of Use

To query the starting RB number:

```
DETECT_ULRB_START?
>6
```

DETECT_ULRMC_RB?

Detected UL RMC Number of RB

Function

Queries the number of RBs (Resource Blocks) allocated to PSSCH for the detected uplink signal.

Query

```
DETECT_ULRMC_RB?
```

Response

```
nrb
```

Parameter

nrb	Number of RBs Numbers represented by the expression of (2^X) × (3^Y) × (5^Z), (X, Y, Z ≥ 0, integer)	
Range	0 to 48	When channel bandwidth is 10 MHz
	0 to 98	When channel bandwidth is 20 MHz
Resolution	1	
Default	48	
Suffix code	None	

Details

This command is enabled only when RB Allocation is set to AUTO.

Example of Use

To query the number of RBs:

```
DETECT_ULRMC_RB?
>6
```

DLCHAN

Downlink Channel

Function

Sets or queries the Downlink Channel.

Command

```
DLCHAN dlchan
```

Query

```
DLCHAN?
```

Response

```
dlchan
```

Parameter

dlchan	Downlink Channel
Range	0 to 262143
Resolution	1
Default	54890
Suffix code	None

Details

When the Downlink Channel is updated, the related Uplink Channel, Downlink Frequency, Uplink Frequency, and Operation Band are changed accordingly.
For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-2 “Relationship between Uplink Channel Number and Downlink Channel Number” and Table 2.1.6-3 “E-UTRA Channel Numbers (N_{DL}, N_{UL}) and TX-RX Frequency Separation (Freq. Sep)”.

Example of Use

To set the Downlink Channel to 54890:

```
DLCHAN 54890
DLCHAN?
> 54890
```

DLFREQ

Downlink Frequency

Function

Sets or queries the downlink frequency.

Command

```
DLFREQ dlfreq
```

Query

```
DLFREQ?
```

Response

```
dlfreq
```

Parameter

dlfreq		Downlink frequency
	Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
	Resolution	1 Hz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
	Default	5890 000 000 Hz
	Response unit	Hz

Details

This sets the Rx frequency for the mobile station.

Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

Example of Use

To set the downlink frequency to 5890 MHz:

```
DLFREQ 5890MHZ
DLFREQ?
>5890000000
```

EVM?

EVM

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
EVM? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of EVM measurement results:

```
EVM? AVG
> 1.50
```

EVM_H?

EVM (High)

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
EVM_H? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of EVM measurement results:

```
EVM_H? AVG
> 1.50
```

EVM_L?

EVM (Low)

Function

Queries the EVM (Error Vector Magnitude) measurement results.

Query

```
EVM_L? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of EVM measurement results:

```
EVM_L? AVG
> 1.50
```

ILVL

Input Level

Function

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

Command

```
ILVL lvl
```

Query

```
ILVL?
```

Response

```
lvl
```

Parameter

lvl		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)
	Resolution	0.1 dB
	Suffix Code	DBM (uses dBm when omitted)
	Default	–1.0 dBm
	Response 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, the MU887000A Port 1/Port 2 setting range is –60.0 to +40.0 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*.

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) 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
```

INBANDEPASS?

In-Band Emissions Judgement

Function

Queries the judgement on the in-band emission measurement results.

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 results:

```
INBANDEPASS?
> PASS
```

INBANDE_GEN?

In-Band Emissions - General

Function

Queries in-band emissions (General) measurement results.

Query

```
INBANDE_GEN? [mode]
```

Response

`ibe`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,ibe(1),ibe(2),…,ibe(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of in-band emissions (General) measurement results:

```
INBANDE_GEN? AVG
> 0.04
```

INBANDE_GENUL?

In-Band Emissions limit - General

Function

Queries the limit of the in-band emission measurement (General).

Query

```
INBANDE_GENUL?
```

Response

```
level
```

Parameter

level	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of the in-band emission measurement (General).

```
INBANDE_GENUL?
> 2.0
```

INBANDE_IMG?

In-Band Emissions - IQ Image

Function

Queries in-band emissions (IQ Image) measurement results.

Query

```
INBANDE_IMG? [mode]
```

Response

`ibe`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,ibe(1),ibe(2),…,ibe(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of in-band emissions (IQ Image) measurement results:

```
INBANDE_IMG? AVG
> 0.04
```

INBANDE_IMGUL?

In-Band Emissions limit - IQ Image

Function

Queries the limit of in-band emission measurement (IQ Image).

Query

```
INBANDE_IMGUL?
```

Response

```
level
```

Parameter

level	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of in-band emission measurement (IQ Image).

```
INBANDE_IMGUL?
> 1.5
```

INBANDE_LEAK?

In-Band Emissions - Carrier Leakage

Function

Queries the In-band emissions (Carrier Leakage) measurement results.

Query

```
INBANDE_LEAK? [mode]
```

Response

`ibe`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,ibe(1),ibe(2),…,ibe(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of in-band emissions (Carrier Leakage) measurement results:

```
INBANDE_LEAK? AVG
> 0.04
```

INBANDE_LEAKUL?

In-Band Emissions limit - Carrier Leakage

Function

Queries the limit of in-band emission measurement (Carrier Leakage).

Query

```
INBANDE_LEAKUL?
```

Response

```
level
```

Parameter

level	Limit
Resolution	0.1 dB
Unit	dBc

Example of Use

To query the limit of in-band emission measurement (Carrier Leakage).

```
INBANDE_LEAKUL?
> 1.5
```

INBANDE_MARG?

In-Band Emissions Margin

Function

Queries the worst margin in the entire bandwidth for 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?
> 1.05
```

MAGERR?

Magnitude Error

Function

Queries the Magnitude Error measurement results.

Query

```
MAGERR? [mode]
```

Response

`magnitude`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 results:

```
MAGERR? AVG
> 1.05
```

MEASOFFSET

Measurement Offset

Function

Sets and queries the offset value of the analysis start time in symbols during power trigger.

Command

```
EASOFFSET time
```

Query

```
MEASOFFSET?
```

Response

```
time
```

Parameters

time		Measurement Offset (Number of Symbol)
	Range	0 to 6.0
	Resolution	0.1
	Default	0.0
	Suffix code	None

Details

This setting is enabled when Trigger Source is set to VIDEO.

Example of Use

To set the Measurement Offset to 5.0:

```
MEASOFFSET 5.0
MEASOFFSET?
> 5.0
```

MOD_SET

Modulation Analysis On/Off and Meas. Count

Function

Enables Modulation Analysis Measurement and sets measurement count, and queries settings.

Command

```
MOD_SET on_off[,count]
```

Query

```
MOD_SET?
```

Response

```
on_off,count
```

Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
count	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To enable Modulation Analysis measurement and set measurement count to 100:

```
MOD_SET ON,100
MOD_SET?
> ON,100
```

OBWFREQ?

OBW Frequency

Function

Queries the upper, lower and center frequency of Occupied Bandwidth measurement.

Query

```
OBWFREQ? pos
```

Response

```
freq
```

Parameters

pos	Offset type of OBW
UPPER	Upper frequency
LOWER	Lower frequency
CENTER	Center frequency
freq	Offset frequency for the offset type (pos)
Resolution	1 kHz
Unit	MHz

Example of Use

To query the upper frequency of Occupied Bandwidth measurement result:

```
OBWFREQ? UPPER
> 5890.920
```

OBW?

OBW

Function

Queries the Occupied Bandwidth (OBW) measurement result.

Query

```
OBW?
```

Response

```
bw
```

Parameter

bw		Occupied Bandwidth
	Resolution	1 kHz
	Unit	MHz

Example of Use

To query the OBW measurement result:

```
OBW?
> 3.840
```

OBW_SET

Occupied Bandwidth On/Off and Meas. Count

Function

Enables Occupied Bandwidth measurement and sets measurement count, or queries settings.

Command

```
OBW_SET on_off[,count]
```

Query

```
OBW_SET?
```

Response

```
on_off,count
```

Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	OFF
count	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To turn Occupied Bandwidth measurement on and set the measurement count to 50:

```
OBW_SET ON,50
OBW_SET?
> ON,50
```

OLVL

Output Level (Cell Total)

Function

Sets or queries the output level.

Command

```
OLVL lvl
```

Query

```
OLVL?
```

Response

```
lvl
```

Parameter

lvl 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	400 MHz < frequency ≤ 6000 MHz
	–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
Response 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,
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:

```
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*.

PEVM?

Peak EVM

Function

Queries the EVM (Error Vector Magnitude) Peak measurement results.

Query

```
PEVM? [mode]
```

Response

`pevm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 EVM Peak measurement results:

```
PEVM? AVG
> 1.75
```

PHASEERR?

Phase Error

Function

Queries the Phase Error measurement results.

Query

```
PHASEERR? [mode]
```

Response

`phase`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 degree
Unit	degree

Example of Use

To query the average of Phase Error measurement results:

```
PHASEERR? AVG
> 1.55
```

POWER?

Tx Power

Function

Queries the Tx power measurement results.

Query

```
POWER? [mode]
```

Response

`pwr`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode= TTL
`s,pwr(1),pwr(2),…,pwr(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
pwr	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
pwr(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dBm
s	Measurement count

Example of Use

To query the average of Tx Power measurement results:

```
POWER? AVG
> -20.00
```

PSCCH_CARRF?

PSCCH Carrier Frequency

Function

Queries the PSCCH Carrier Frequency measurement result.

Query

```
PSCCH_CARRF? [mode]
```

Response

```
freq
```

Parameters

mode	Storage mode
AVG	Average
Omitted	Average
freq	Carrier frequency
Resolution	1 Hz
Unit	Hz

Example of Use

To query the result of PSCCH Carrier Frequency measurement:

```
PSCCH_CARRF?
> 5890000000
```

PSCCH_CFERR?

PSCCH Carrier Frequency Error

Function

Queries the PSCCH Frequency Error measurement results.

Query

```
PSCCH_CFERR? [mode]
```

Response

```
cfreq_ppm,cfreq_Hz                                    mode = AVG, MAX, MIN, DVT, Omitted
avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz          mode = TTL
```

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Worst
cfreq_ppm	Measurement result in ppm in specified Storage mode
cfreq_Hz	Measurement results in Hz in specified Storage mode
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)
Resolution	0.01 ppm
Resolution	0.1 Hz
Unit	ppm
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the average of PSCCH Frequency Error measurement results:

```
PSCCH_CFERR? AVG
> 0.03
```

PSCCH_CFERR_WORST?

PSCCH Carrier Frequency Error (Worst)

Function

Queries the worst value of PSCCH Frequency Error measurement results.

Query

```
PSCCH_CFERR_WORST?
```

Response

```
cferr_ppm,cferr_Hz
```

Parameters

cferr_ppm	Worst value in Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
cferr_Hz	Worst value in Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of PSCCH Frequency Error measurement results:

```
PSCCH_CFERR_WORST?
> 0.03,60.0
```

PSCCH_EVM?

PSCCH EVM

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
PSCCH_EVM? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
PSCCH_EVM? AVG
> 1.50
```

PSCCH_EVM_H?

PSCCH EVM (High)

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
PSCCH_EVM_H? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
PSCCH_EVM_H? AVG
> 1.50
```

PSCCH_EVM_L?

PSCCH EVM (Low)

Function

Queries the PSCCH EVM (Error Vector Magnitude) measurement results.

Query

```
PSCCH_EVM_L? [mode]
```

Response

`evm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,evm(1),evm(2),…,evm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
evm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
evm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the average of PSCCH EVM measurement results:

```
PSCCH_EVM_L? AVG
> 1.50
```

PSCCH_MAGERR?

PSCCH Magnitude Error

Function

Queries the PSCCH Magnitude Error measurement results.

Query

```
PSCCH_MAGERR? [mode]
```

Response

`magnitude`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 PSCCH Magnitude Error measurement results:

```
PSCCH_MAGERR? AVG
> 1.05
```

PSCCH_PEVM?

PSCCH Peak EVM

Function

Queries the PSCCH EVM (Error Vector Magnitude) Peak measurement results.

Query

```
PSCCH_PEVM? [mode]
```

Response

`pevm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 PSCCH EVM Peak measurement results:

```
PSCCH_PEVM? AVG
> 1.75
```

PSCCH_PHASEERR?

PSCCH Phase Error

Function

Queries the PSCCH Phase Error measurement results.

Query

```
PSCCH_PHASEERR? [mode]
```

Response

`phase`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

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 degree
Unit	degree

Example of Use

To query the average of PSCCH Phase Error measurement results:

```
PSCCH_PHASEERR? AVG
> 1.55
```

PSCCH_RSEVM?

PSCCH Reference Signal EVM

Function

Queries the PSCCH Reference Signal EVM measurement results.

Query

```
PSCCH_RSEVM? [mode]
```

Response

`rsevm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,rsevm(1),rsevm(2),…,rsevm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
rsevm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
rsevm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the PSCCH Reference Signal EVM measurement results:

```
PSCCH_RSEVM?
> 1.51
```

PSCCH_WORST_CARRFERR?

PSCCH Carrier Frequency Error (Worst)

Function

Queries the worst value of PSCCH Frequency Error measurement results.

Query

```
PSCCH_WORST_CARRFERR? unit
```

Response

```
cferr
```

Parameters

unit	Response unit	
PPM	ppm	
HZ	Hz	
cferr	Worst value in Frequency Error measurement results	
Resolution	0.01 ppm	(unit = PPM)
Resolution	0.1 Hz	(unit = HZ)
Unit	ppm	(unit = PPM)
Unit	Hz	(unit = HZ)

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of PSCCH Frequency Error measurement results in ppm:

```
PSCCH_WORST_CARRFERR? PPM
> 0.03
```

PWR_SET

Power Measurement On/Off and Meas. Count

Function

Enables Tx power measurement and sets or queries measurement count.

Command

```
PWR_SET on_off[,count]
```

Query

```
PWR_SET?
```

Response

```
on_off,count
```

Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
count	Measurement count
Range	1 to 100
Resolution	1
Default	1
Suffix code	None

Example of Use

To turn Transmit Power measurement ON and set the measurement count to 100:

```
PWR_SET ON,100
PWR_SET?
> ON,100
```

RB_ALLOC

RB Allocation

Function

Sets or queries whether the number of RBs (Resource Blocks) and the starting RB number allocated to PSSCH for the uplink signal are automatically detected or manually set.

Command

```
RB_ALLOC mode
```

Query

```
RB_ALLOC?
```

Response

```
mode
```

Parameters

mode	Automatic detection / Manual setting
AUTO	Automatic detection
SET	Manual setting
Default	SET

Details

When SET is selected, measurement is performed according to the settings for UL RMC Number of RB and UL RMC Starting RB.

Example of Use

To set the RB Allocation to AUTO:

```
RB_ALLOC AUTO
RB_ALLOC?
>AUTO
```

RSEVM?

Reference Signal EVM

Function

Queries the Reference Signal EVM measurement results.

Query

```
RSEVM? [mode]
```

Response

`rsevm`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,rsevm(1),rsevm(2),…,rsevm(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Average
rsevm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
rsevm(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 %
Unit	%
s	Measurement count

Example of Use

To query the Reference Signal EVM measurement results:

```
RSEVM?
> 1.51
```

RXFREQ

Downlink Frequency

Function

Sets or queries the downlink frequency. This is the same function as DLFREQ.

Command

```
RXFREQ dlfreq
```

Query

```
RXFREQ?
```

Response

```
dlfreq
```

Parameter

dlfreq	Downlink frequency
Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	5890 000 000 Hz
Response unit	Hz

Details

This sets the Rx frequency for the mobile station.

Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

Example of Use

To set the downlink frequency to 5890 MHz:

```
RXFREQ 5890MHZ
RXFREQ?
>5890000000
```

SEM?

SEM Judgement

Function

Queries the judgement result of Spectrum Emission Mask measurement.
Fail when any part of spectrum exceeds limit, otherwise Pass.

Query

```
SEM?
```

Response

```
judgement
```

Parameter

judgement	Judgement result
PASS	Pass
FAIL	Fail
–	Not measured

Example of Use

To query the judgement result whether the spectrum is within the limit:

```
SEM?
> PASS
```

SEMLVL_DET_LOWER?

SEM Peak Value (Detail) (Lower)

Function

Queries the peak levels with offset frequency at each of lower side 9 ranges of Spectrum Emission Mask measurement.

Query

```
SEMLVL_DET_LOWER?
```

Response

```
f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4,f_M5,l_M5,f_M6,l_M6,f_M7,l_M7,f_M8,l_M8,f_M9,l_M9
```

Parameters

l_M1 to l_M9	Peak level at each of lower side range of Range 1 to Range 9	
	Resolution	0.01 dB
	Unit	dBm
f_M1 to f_M9	Offset frequency of peak level at each of lower side range of Range 1 to Range 9	
	Resolution	1 kHz
	Unit	MHz

Details

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for details.

Example of Use

To query the peak levels with offset frequency at each of lower side of 9 ranges of Spectrum Emission Mask measurement:

```
SEMLVL_DET_LOWER?
>
-0.500,3.00,-1.500,3.00,-2.600,3.00,-3.500,3.00,-5.500,3.00,-8.000,3.00,-12.500,3.00,-17.500,3.00,-22.500,3.00
```

SEMLVL_DET_UPPER?

SEM Peak Value (Detail) (Upper)

Function

Queries the peak levels with offset frequency at each of upper side 9 ranges of Spectrum Emission Mask measurement.

Query

```
SEMLVL_DET_UPPER?
```

Response

```
f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4,f_5,l_5,f_6,l_6,f_7,l_7,f_8,l_8,f_9,l_9
```

Parameters

l_1 to l_9		Peak level in each of upper Range 1 to Range 9
	Resolution	0.01 dB
	Unit	dBm
f_1 to f_9		Offset frequency of peak level in each of upper Range 1 to Range 9
	Resolution	1 kHz
	Unit	MHz

Details

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for details.

Example of Use

To query the peak levels with offset frequency at each of upper side of 9 ranges of Spectrum Emission Mask measurement:

```
SEMLVL_DET_UPPER?
>
0.500,3.00,1.500,3.00,2.600,3.00,3.500,3.00,5.500,3.00,8.000,3.00,12.500,
3.00,17.500,3.00,22.500,3.00
```

SEMLVL_LOWER?

SEM Peak Value (Lower)

Function

Queries the peak levels with offset frequency at each of lower side ranges of Spectrum Emission Mask measurement.

Query

```
SEMLVL_LOWER?
```

Response

```
f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4
```

Parameters

l_M1 to l_M4	Peak level in each of lower Range 1 to Range 4
Resolution	0.01 dB
Unit	dBm
f_M1 to f_M4	Offset frequency of peak level in each of lower Range 1 to Range 4
Resolution	1 kHz
Unit	MHz

Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the peak levels with offset frequency at each of lower side ranges of Spectrum Emission Mask measurement:

```
SEMLVL_LOWER?
> -3.000,-20.00,-5.000,-30.00,-8.000,-40.00,-9.500,-50.00
```

SEMLVL_UPPER?

SEM Peak Value (Upper)

Function

Queries the peak levels with offset frequency at each of upper side ranges of Spectrum Emission Mask measurement.

Query

```
SEMLVL_UPPER?
```

Response

```
f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4
```

Parameters

l_1 to l_4		Peak level in each of upper Range 1 to Range 4
	Resolution	0.01 dB
	Unit	dBm
f_1 to f_4		Offset frequency of peak level in each of upper Range 1 to Range 4
	Resolution	1 kHz
	Unit	MHz

Details

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the peak levels with offset frequency at each of upper side ranges of Spectrum Emission Mask measurement:

```
SEMLVL_UPPER?
> 3.000,-20.00,5.000,-30.00,8.000,-40.00,9.500,-50.00
```

SEMMARGIN_DET_LOWER?

SEM Template Margin (Detail) (Lower)

Function

Queries the level margins at each of lower side of 9 ranges in Spectrum Emission Mask measurement.

Query

```
SEMMARGIN_DET_LOWER?
```

Response

```
f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4,f_M5,l_M5,f_M6,l_M6,f_M7,l_M7,f_M
8,l_M8,f_M9,l_M9
```

Parameters

l_M1 to l_M9	Level margin in each of lower Range 1 to Range 9
Resolution	0.01 dB
Unit	dB
f_M1 to f_M9	Offset frequency where level margin in each of lower Range 1 to Range 9 measured
Resolution	1 kHz
Unit	MHz

Details

The level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results”.

Example of Use

To query the level margins with frequency where margin measured at each of lower side of 9 ranges of Spectrum Emission Mask measurement:

```
SEMMARGIN_DET_LOWER?
>
-0.500,3.00,-1.500,3.00,-2.600,3.00,-3.500,3.00,-5.500,3.00,-8.000,3.00,-
12.500,3.00,-17.500,3.00,-22.500,3.00
```

SEMMARGIN_DET_UPPER?

SEM Template Margin (Detail) (Upper)

Function

Queries the level margins at each of upper side of 9 ranges in Spectrum Emission Mask measurement.

Query

```
SEMMARGIN_DET_UPPER?
```

Response

```
f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4,f_5,l_5,f_6,l_6,f_7,l_7,f_8,l_8,f_9,l_9
```

Parameters

l_1 to l_9		Level margin in each of upper side range of Range 1 to Range 9
	Resolution	0.01 dB
	Unit	dB
f_1 to f_9		Offset frequency where level margin measured in each of upper side range of Range 1 to Range 9
	Resolution	1 kHz
	Unit	MHz

Details

The level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

The number of target ranges varies with the combination of channel bandwidth and network signalled value for additionalSpectrumEmission. Refer to Table 2.4-3 “Frequency Ranges for Measurement Results”.

Example of Use

To query the level margins with frequency where margin measured at each of upper side of 9 ranges of Spectrum Emission Mask measurement:

```
SEMMARGIN_DET_UPPER?
>
0.500,3.00,1.500,3.00,2.600,3.00,3.500,3.00,5.500,3.00,8.000,3.00,12.500,
3.00,17.500,3.00,22.500,3.00
```

SEMMARGIN_LOWER?

SEM Template Margin (Lower)

Function

Queries the level margins at each of lower side ranges in Spectrum Emission Mask measurement.

Query

```
SEMMARGIN_LOWER?
```

Response

```
f_M1,l_M1,f_M2,l_M2,f_M3,l_M3,f_M4,l_M4
```

Parameters

l_M1 to l_M4		Level margin in each of lower Range 1 to Range 4
	Resolution	0.01 dB
	Unit	dB
f_M1 to f_M4		Offset frequency where level margin in each of lower Range 1 to Range 4 measured
	Resolution	1 kHz
	Unit	MHz

Details

Level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the level margins with frequency where margin measured at each of lower side ranges of Spectrum Emission Mask measurement:

```
SEMMARGIN_LOWER?
> -3.000,3.00,-5.000,3.00,-8.000,3.00,-9.500,3.00
```

SEMMARGIN_UPPER?

SEM Template Margin (Upper)

Function

Queries the level margins at each of upper side range in Spectrum Emission Mask measurement.

Query

```
SEMMARGIN_UPPER?
```

Response

```
f_1,l_1,f_2,l_2,f_3,l_3,f_4,l_4
```

Parameters

l_1 to l_4		Level margin in each of upper Range 1 to Range 4
	Resolution	0.01 dB
	Unit	dB
f_1 to f_4		Offset frequency where level margin in each of upper Range 1 to Range 4 measured
	Resolution	1 kHz
	Unit	MHz

Details

Level margin is calculated as (limit value – measured value).
If the measured value exceeds the limit value, the level margin becomes negative.

Refer to Table 2.4-1 “Frequency Ranges of Range 1 to Range 4” for the frequency range for the measurement.

Example of Use

To query the level margins with frequency where margin measured at each of upper side ranges of Spectrum Emission Mask measurement:

```
SEMMARGIN_UPPER?
> 3.000,3.00,5.000,3.00,8.000,3.00,9.500,3.00
```

SEM_SET

Spectrum Emission Mask On/Off and Meas. Count

Function

Enables the Spectrum Emission Mask (SEM) Measurement and sets or queries the measurement count.

Command

```
SEM_SET on_off[,count]
```

Query

```
SEM_SET?
```

Response

```
on_off,count
```

Parameters

on_off		Enables/disables the measurement.
	ON	Enables the measurement.
	OFF	Disables the measurement.
	Default	OFF
count		Measurement count
	Range	1 to 100
	Resolution	1
	Default	1
	Suffix code	None

Example of Use

To enable the SEM measurement and set the measurement count to 100:

```
SEM_SET ON,100
SEM_SET?
> ON,100
```

SIB2_NS

additionalSpectrumEmission

Function

Sets or queries the additionalSpectrumEmission.
This setting determines the Spectrum Emission Mask frequency range.

Command

```
SIB2_NS sib2_ns
```

Query

```
SIB2_NS?
```

Response

```
sib2_ns
```

Parameter

sib2_ns	additionalSpectrumEmission
NS_01	NS_01
NS_33	NS_33
NS_34	NS_34
Default	NS_01

Example of Use

To set the additionalSpectrumEmission to NS_33:

```
SIB2_NS NS_33
SIB2_NS?
> NS_33
```

SPECFLAT_RP?

Spectrum Flatness - RP Total

Function

Queries all results of ripple measurements of Spectrum Flatness.

Query

```
SPECFLAT_RP? [mode]
```

Response

```
sflatness(RP1),sflatness(RP2),sflatness(RP12),sflatness(RP21)
                                                    mode = AVG, MAX, MIN, DVT
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 = TTL
s,sflatness(RP1)(1),sflatness(RP2)(1),sflatness(RP12)(1),sflatness(RP21)(1),…,s
flatness(RP1)(s),sflatness(RP2)(s),sflatness(RP12)(s),sflatness(RP21)(s)
                                                    mode = IND
```

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
sflatness(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

Queries the average results of all ripple measurements of Spectrum Flatness.

```
SPECFLAT_RP? AVG
> 0.04,0.03,0.06,0.05
```

SPECFLAT1_M?

Spectrum Flatness - ≥ 3 MHz (R1–)

Function

Queries the minimum values in Spectrum Flatness measurement results in Range 1.

Query

```
SPECFLAT1_M? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Minimum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of minimum value in Spectrum Flatness measurement results in Range 1:

```
SPECFLAT1_M? AVG
> 0.04
```

SPECFLAT1_P?

Spectrum Flatness - ≥ 3 MHz (R1+)

Function

Queries the maximum values in Spectrum Flatness measurement results in Range 1.

Query

```
SPECFLAT1_P? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of maximum value in Spectrum Flatness measurement results in Range 1:

```
SPECFLAT1_P? AVG
> 0.04
```

SPECFLAT2_M?

Spectrum Flatness - < 3 MHz (R2–)

Function

Queries the minimum values in Spectrum Flatness measurement results in Range 2.

Query

```
SPECFLAT2_M? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Minimum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of the minimum value in Spectrum Flatness measurement results in Range 2:

```
SPECFLAT2_M? AVG
> 0.04
```

SPECFLAT2_P?

Spectrum Flatness - < 3 MHz (R2+)

Function

Queries the maximum value in Spectrum Flatness measurement results in Range 2.

s

Query

```
SPECFLAT2_P? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of the maximum value in Spectrum Flatness measurement results in Range 2:

```
SPECFLAT2_P? AVG
> 0.04
```

SPECFLATITEM?

Spectrum Flatness Measured Item

Function

Queries whether each spectrum flatness measurement items is measured or not.

Query

```
SPECFLATITEM?
```

Response

```
flag
```

Parameter

flag		Measured/Not measured flag (0 to 3)
		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.

```
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 of Spectrum Flatness measurement result:

```
SPECFLATPPPASS?
> PASS
```

SPECFLAT_RP1?

Spectrum Flatness - ≥ 3 MHz (RP1)

Function

Queries the ripple values in Spectrum Flatness measurement results in Range 1.

Query

```
SPECFLAT_RP1? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,sflatness(1),…,sflatness(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
sflatness(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of ripple value in Spectrum Flatness measurement results in Range 1:

```
SPECFLAT_RP1? AVG
> 0.04
```

SPECFLAT_RP12?

Spectrum Flatness - RP12

Function

Queries the difference between maximum value in Range 1 and minimum value in Range 2 of Spectrum Flatness measurement results.

Query

```
SPECFLAT_RP12? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,sflatness(1),…,sflatness(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
sflatness(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of difference between maximum value in Range 1 and minimum value in Range 2:

```
SPECFLAT_RP12? AVG
> 0.04
```

SPECFLAT_RP2?

Spectrum Flatness - < 3 MHz (RP2)

Function

Queries the ripple values in Spectrum Flatness measurement results in Range 2.

Query

```
SPECFLAT_RP2? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,sflatness(1),…,sflatness(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
sflatness(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of ripple value in Spectrum Flatness measurement results in Range 2:

```
SPECFLAT_RP2? AVG
> 0.04
```

SPECFLAT_RP21?

Spectrum Flatness - RP21

Function

Queries the difference between maximum value in Range 2 and minimum value in Range 1 of Spectrum Flatness measurement results.

Query

```
SPECFLAT_RP21? [mode]
```

Response

`sflatness`	mode = AVG, MAX, MIN, DVT
`avg,max,min`	mode = TTL
`s,sflatness(1),…,sflatness(s)`	mode = IND

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average・Maximum・Minimum
IND	Individual measurement result
DVT	Standard deviation
Omitted	Maximum
sflatness	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
sflatness(n)	Nth measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

Example of Use

To query the average of difference between maximum value in Range 2 and minimum value in Range 1:

```
SPECFLAT_RP21? AVG
> 0.04
```

TRGDLY

Trigger Delay

Function

Sets or queries the Trigger Delay.

Command

```
TRGDLY delay
```

Query

```
TRGDLY?
```

Response

```
delay
```

Parameters

delay	Trigger Delay
Range	0 to 10.000 ms
Resolution	0.001 ms
Default	0.000 ms
Suffix code	S, MS, US, NS (uses ms when omitted)
Response unit	ms

Details

This parameter is valid when Trigger Source is set to other than Freerun.

Examples 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 lvl
```

Query

```
TRGLVL?
```

Response

```
lvl
```

Parameter

lvl		Trigger Level
	Range	–40 to 0 dB
	Resolution	1 dB
	Default	–30 dB
	Suffix code	dB

Details

This parameter is valid 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 that the signal falls below the trigger level during power trigger.

Command

```
TRGMGAP time
```

Query

```
TRGMGAP?
```

Response

time

Parameters

time	Minimum Trigger Gap
Range	0 to 10.0 ms
Resolution	0.1 ms
Default	0.0 ms
Suffix code	NS, US, MS, S (uses ms when omitted)
Response unit	ms

Details

This parameter is valid when Trigger Source is set to VIDEO.

Examples of Use

To set the Minimum Trigger Gap to 5 ms:

```
TRGMGAP 5MS
TRGMGAP?
> 5.0
```

TRGSRC

Trigger Source

Function

Sets or queries the Trigger Source.

Command

```
TRGSRC source
```

Query

```
TRGSRC?
```

Response

```
source
```

Parameters

source	Trigger Source
VIDEO	Power
FREE	Free run
Default	VIDEO

Examples of Use

To set the trigger source to Power:

```
TRGSRC VIDEO
TRGSRC?
> VIDEO
```

TRGTOUT

Trigger Timeout

Function

Sets or queries the trigger timeout.

Command

```
TRGTOUT time
```

Query

```
TRGTOUT?
```

Response

```
time
```

Parameter

time	Trigger Timeout
Range	1 to 60 s
Resolution	1 s
Default	10 s
Suffix code	S, MS, US, NS (uses s when omitted)
Response unit	s

Example of Use

To set the Trigger timeout time to 5 s:

```
TRGTOUT 5
TRGTOUT?
> 5
```

TXFREQ

Uplink Frequency

Function

Sets or queries the uplink frequency. This command has the same function as ULFREQ.

Command

```
TXFREQ ulfreq
```

Query

```
TXFREQ?
```

Response

```
ulfreq
```

Parameter

ulfreq	Uplink frequency
Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	5890 000 000 Hz
Response unit	Hz

Details

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

Example of Use

To set the Uplink frequency to 5890 MHz:

```
TXFREQ 5890MHZ
TXFREQ?
>5890000000
```

ULCHAN

Uplink Channel

Function

Sets or queries the Uplink Channel.

Command

```
ULCHAN ulchan
```

Query

```
ULCHAN?
```

Response

```
ulchan
```

Parameter

ulchan	Uplink Channel
Range	0 to 262143
Resolution	1
Default	54890
Suffix code	None

Details

When the Uplink Channel is updated, the related Downlink Channel, Uplink Frequency, Downlink Frequency and Operation Band are changed accordingly.
For the relationship between the parameter and frequency settings of channels refer to Table 2.1.6-2 “Relationship between Uplink Channel Number and Downlink Channel Number” and to Table 2.1.6-3 “E-UTRA Channel Numbers (N_{DL}, N_{UL}) and TX-RX Frequency Separation (Freq. Sep)”.

Example of Use

To set the Uplink Channel to 54890:

```
ULCHAN 54890
ULCHAN?
>54890
```

ULFREQ

Uplink Frequency

Function

Sets or queries the Uplink frequency.

Command

```
ULFREQ ulfreq
```

Query

```
ULFREQ?
```

Response

```
ulfreq
```

Parameter

ulfreq	Uplink frequency
Range	400 000 000 to 3800 000 000 Hz (MU887000A/01A) 400 000 000 to 6000 000 000 Hz (With MU887000A/01A-001) 400 000 000 to 6000 000 000 Hz (MU887002A)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	5890 000 000 Hz
Response unit	Hz

Details

This sets the Tx frequency for the mobile station.

Updating this Uplink frequency setting does not affect the Uplink Channel setting.

Example of Use

To set the Uplink frequency to 5890 MHz:

```
ULFREQ 5890MHZ
ULFREQ?
>5890000000
```

ULIMCS

UL RMC MCS Index

Function

Sets the MCS Index for the uplink signal.

Command

```
ULIMCS mcs
```

Parameter

mcs	MCS Index for the uplink signal
Range	0 to 28
Resolution	1
Default	–
Suffix code	None

Details

When the UL RMC MCS Index is updated, the UL RMC Modulation setting is changed accordingly.
Refer to Table 2.1.6-1.

Example of Use

To set the MCS Index for the uplink signal to 28:

```
ULIMCS 28
```

ULRB_START

UL RMC Starting RB

Function

Sets or queries the starting RB number for the uplink signal.

Command

```
ULRB_START start
```

Query

```
ULRB_START?
```

Response

```
start
```

Parameter

start		starting RB number
	Range	2 to (RBmax – RBn) RBmax = 50 When channel bandwidth is 10 MHz RBmax = 100 When channel bandwidth is 20 MHz RBn is set using the ULRMC_RB command.
	Resolution	1
	Default	2
	Suffix code	None

Details

The UL RMC starting RB number for the uplink signal is reset to 2 when the Channel Bandwidth or UL RMC Number of RB is updated.

Example of Use

To set the starting RB number to 6:

```
ULRB_START 6
ULRB_START?
> 6
```

ULRMC_MOD

UL RMC Modulation

Function

Sets or queries the PSSCH modulation scheme for the uplink signal. When the UL RMC MCS Index is set, this parameter is changed accordingly.

Command

```
ULRMC_MOD mod
```

Query

```
ULRMC_MOD?
```

Response

```
mod
```

Parameter

mod	Modulation scheme
QPSK	QPSK modulation
16QAM	16QAM modulation
AUTO	Automatic identification
Default	QPSK

Example of Use

To set the modulation scheme for the uplink signal to 16QAM:

```
ULRMC_MOD 16QAM
ULRMC_MOD?
> 16QAM
```

ULRMC_RB

UL RMC Number of RB

Function

Sets or queries the number of RBs (Resource Blocks) assigned to PSSCH for the uplink signal.

Command

```
ULRMC_RB nrb
```

Query

```
ULRMC_RB?
```

Response

```
nrb
```

Parameter

nrb	Number of RBs Numbers represented by the expression of (2^X) × (3^Y) × (5^Z), (X, Y, Z ≥ 0, integer)	
Range	0 to 48	When channel bandwidth is 10 MHz
	0 to 98	When channel bandwidth is 20 MHz
Resolution	1	
Default	48	
Suffix code	None	

Details

When the UL RMC Number of RB is updated, the UL RMC Starting RB is set to minimum.
When the UL RMC Number of RB is set to 0, Modulation Analysis is not performed.

Example of Use

To set the number of RBs to 6.

```
ULRMC_RB 6
ULRMC_RB?
> 6
```

WAVEFMEAS?

Waveform

Function

Queries the spectrum waveform data of each measurement result.

Query

```
WAVEFMEAS? format,position,length[,symbol]
```

Response

```
data(1),data(2),…,data(length)
```

Parameter

format	Format
1	Occupied Bandwidth
2	Spectrum Emission Mask (SEM)
3	Constellation (I)
4	Constellation (Q)
5	EVM (Average)
6	EVM (Maximum)
7	Phase Error (Average)
8	Phase Error (Maximum)
9	Magnitude Error (Average)
10	Magnitude Error (Maximum)
11	In-band Emissions (dB) (Average)
12	In-band Emissions (dB) (Maximum)
13	In-band Emissions (dBc) (Average)
14	In-band Emissions (dBc) (Maximum)
15	Spectrum Flatness (Average)
16	Spectrum Flatness (Maximum)
17	Spectrum Flatness (Minimum)
18	PSCCH Constellation (I)
19	PSCCH Constellation (Q)
20	PSCCH EVM (Average)
21	PSCCH EVM (Maximum)
22	PSCCH Phase Error (Average)
23	PSCCH Phase Error (Maximum)
24	PSCCH Magnitude Error (Average)
25	PSCCH Magnitude Error (Maximum)

position Start point of waveform data

Resolution 1

Range

Format	Channel Bandwidth	
	10 MHz	20 MHz
1	0 to 298	0 to 596
2	0 to 596	0 to 1042
3 to 10, 15 to 25	0 to 599	0 to 1199
11 to 14	0 to 49	0 to 99

length Number of read data

Resolution 1

Range

Format	Channel Bandwidth	
	10 MHz	20 MHz
1	1 to 299	1 to 597
2	1 to 597	1 to 1043
3 to 10, 15 to 25	1 to 600	1 to 1200
11 to 14	1 to 50	1 to 100

symbol Position of SC-FDMA symbol

Resolution 1

Range When format is 3 to 10

0 to 6

data(n) Waveform data

format	Resolution	Unit
2	0.01 dB	dBm
3, 4, 18, 19	0.0001	None
5, 6, 9, 10, 20, 21, 24, 25	0.01 %	%
7, 8, 22, 23	0.01 degree	degree
1, 11, 12, 15, 16, 17	0.01 dB	dB
13, 14	0.01 dB	dBc

Details

Average in the above formats is equivalent to the average waveform of a spectrum analyzer.
Maximum in the above formats is equivalent to the peak-hold waveform of a spectrum analyzer.

Example of Use

To query the EVM (Average) of 768 spectrum waveform data from 257 of each measurement result:

```
WAVEFMEAS? 5,256,768,1
> 2.00,2.01,2.00,…,2.10
```

WORST_CARRFERR?

Carrier Frequency Error (Worst)

Function

Queries the worst value of Frequency Error measurement results.

Query

```
WORST_CARRFERR? unit
```

Response

```
cferr
```

Parameters

unit	Response unit	
PPM	ppm	
HZ	Hz	
cferr	Worst value in Frequency Error measurement results	
Resolution	0.01 ppm	(unit = PPM)
Resolution	0.1 Hz	(unit = HZ)
Unit	ppm	(unit = PPM)
Unit	Hz	(unit = HZ)

Details

The worst value should be either the maximum or minimum value, whichever has the larger absolute value.

Example of Use

To query the worst value of Frequency Error measurement results in PPM:

```
WORST_CARRFERR? PPM
> 0.03
```

Chapter 6 Performance Test

This chapter explains how to setup the measuring instruments required for the MX887068A LTE-V2X TX measurement performance tests as well as the test procedures.

6.1 Outline 6-2
6.2 Instruments for Testing Performance 6-3
6.3 Calibration (MX887068A/MX887068A-001) 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 (MX887068A) 6-11
6.4.1 Tx Power Measurement Accuracy (CW) 6-12
6.4.2 Frequency/Modulation 6-14
6.4.3 In-band Emissions 6-16
6.4.4 Adjacent Channel Leakage Power Ratio (ACLR) 6-18
6.4.5 Sample Format for Test Result Sheets 6-20
6.5 Performance Tests (MX887068A-001) 6-26
6.5.1 Frequency/Modulation 6-27
6.5.2 Sample Format for Test Result Sheets 6-29
6.6 Servicing 6-30

6.1 Outline

The performance tests are performed to assure that the TRX Test Module performance does not deteriorate. Test the performance of the TRX Test Module 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.

- Tx Power measurement accuracy (CW)
- Frequency/modulation measurement — Carrier frequency accuracy, Residual EVM
- In-Band Emission measurement
- 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 TRX Test Module 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 TRX Test Module performance and the specifications for each instrument.

Table 6.2-1 Measuring Instruments for Performance Tests

Test Item	Required Specifications*	Recommendation
Tx Power Measurements ● Measurement Accuracy (CW)	Signal Generator ● Frequency Range: 5000 to 6000 MHz ● Frequency Resolution: 1 Hz ● Output Level Range Unmodulated: –110 to +17 dBm Resolution: 0.01 dB	Vector Signal Generator (MG3710E) 1stRF 100kHz to 6GHz (MG3710E-036)
	Signal Analyzer ● Frequency Range: 5000 to 6000 MHz ● Frequency Resolution: 1 Hz ● Level Range: –130 to +30 dBm ● Level Accuracy: ±0.05 dB ● External Reference Input: (10 MHz)	Signal Analyzer (MS2690A or MS2830A) 6GHz Signal Analyzer (MS2830A-041) Preamplifier (MS2690A-008 or MS2830A-008)
	Power Meter ● Frequency Range: 5000 to 6000 MHz ● Level Accuracy: ±0.02 dB ● Level Resolution: 0.01 dB	Power Meter (ML2437A)
	Power Sensor ● Frequency Range: 5000 to 6000 MHz ● Level Range: –40 to +20 dBm ● Input Connector: N type	Power Sensor (MA2442D)

*: The performance covers the test item measurement range.

Table 6.2-1 Measuring Instruments for Performance Tests (Cont'd)

Test Item	Required Specifications*	Recommendation
Frequency/Modulation Measurements ● Carrier Frequency Accuracy ● Residual EVM Adjacent Channel Leakage Power Ratio In-Band Emissions	Signal generator supporting output of LTE-V2X modulation signals Same as above	Same as above
	Power Meter Same as above	Same as above
	Power Sensor ● Frequency Range: 5000 to 6000 MHz ● Level Range: –30 to +20 dBm ● 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+) 6-dB Attenuator (BW-N6W5+)

6.3 Calibration (MX887068A/MX887068A-001)

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: MG3710E
- 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

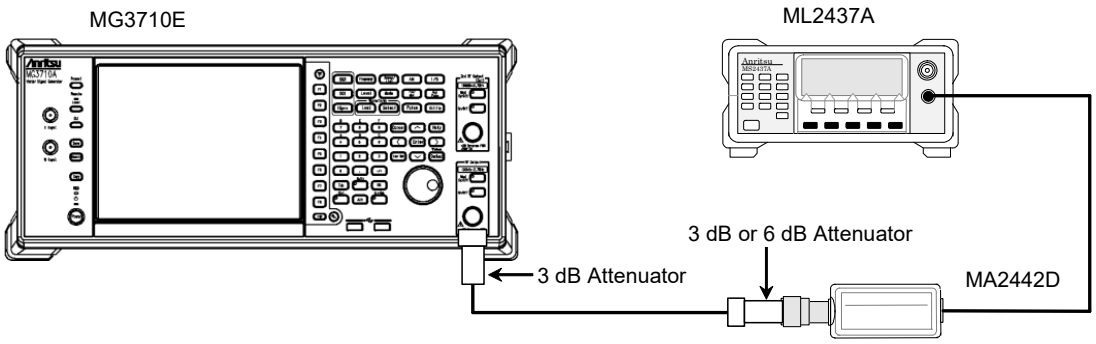


Figure 6.3.1-1 SG Calibration (CW)

(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: 5855 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: MG3710E
- 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

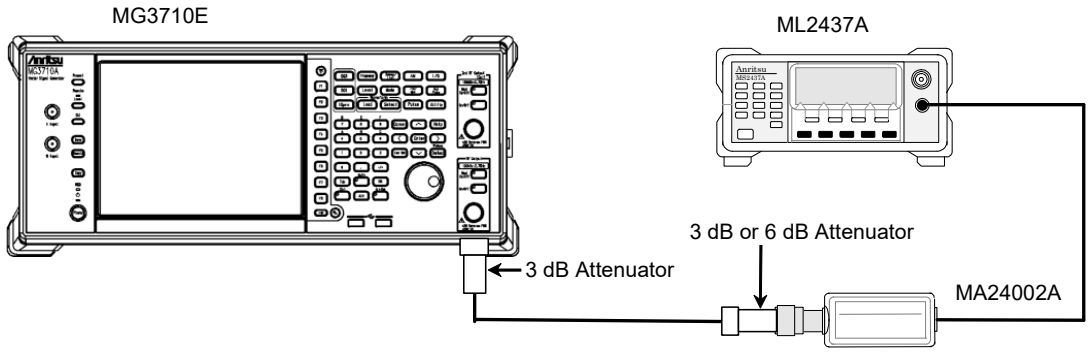


Figure 6.3.2-1 SG Calibration (MOD)

(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 6.4.2 "Frequency/Modulation".
   Output frequency: 5855 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: MG3710E
- Signal Analyzer: MS269xA or MS2830A
- Attenuator:

For MU887000A/01A	3 dB:	AT-103	2 sets
For MU887002A	3 dB:	BW-N3W5+	
	6 dB:	BW-N6W5+	

(2) Setup

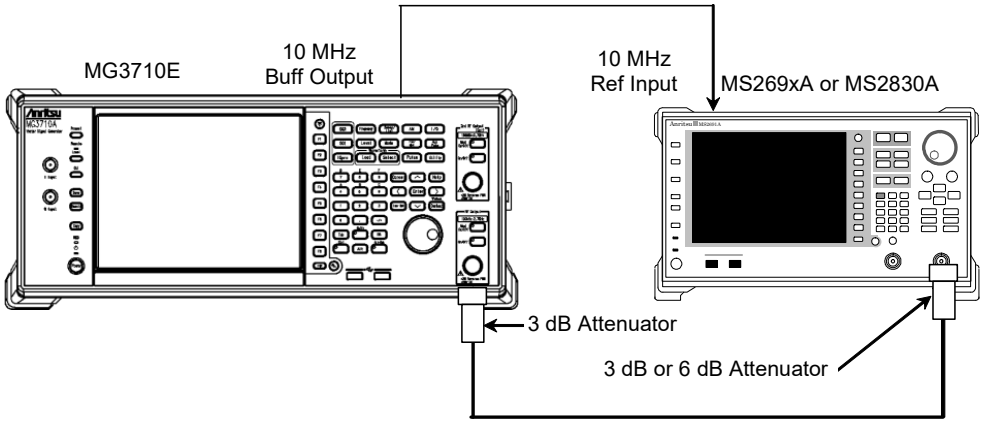


Figure 6.3.3-1 Linearity Calibration

(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: 5855 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

	MS269xA or MS2830A						
	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. The test is performed only when MU887000A/01A-001 is installed, or MU887002A.

Table 6.3.4-1 Measurement Point and Frequency

Meas. Point	Frequency (MHz)
1	5855
2	5925

6.4 Performance Tests (MX887068A)

Common test items

The following list shows the common settings for each measurement at the TRX Test Module.

Application Select:	Cellular
Standard Select:	LTEV2X
Channel Bandwidth:	20 MHz
UL RMC Modulation:	QPSK
UL RMC Number of RB:	96
UL RMC Starting RB:	2

6.4.1 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
(5855 MHz ≤ Frequency ≤ 5925 MHz)

Measurement Accuracy	Input Level	Temperature
±0.7 dB	–20 dBm ≤, ≤ +35 dBm	20 to 30°C
±1.1 dB	–50 dBm ≤, < –20 dBm	20 to 30°C

MU887002A TRX 1/2 Test Port 1 to 12
(5855 MHz ≤ Frequency ≤ 5925 MHz)

Measurement Accuracy	Input Level	Temperature
±0.9 dB	–20 dBm ≤, ≤ +35 dBm	20 to 30°C
±1.1 dB	–50 dBm ≤, < –20 dBm	20 to 30°C

MU887000A Test Port 3/4
(5855 MHz < Frequency ≤ 5925 MHz)

Measurement Accuracy	Input Level	Temperature
±0.7 dB	–30 dBm ≤, ≤ +25 dBm	20 to 30°C
±1.1 dB	–50 dBm ≤, < –30 dBm	20 to 30°C

(2) Measuring instruments

- Vector signal generator: MG3710E
- Attenuator:
  For MU887000A/01A 3 dB: AT-103 2 sets
  For MU887002A 3 dB: BW-N3W5+
  6 dB: BW-N6W5+

(3) Setup

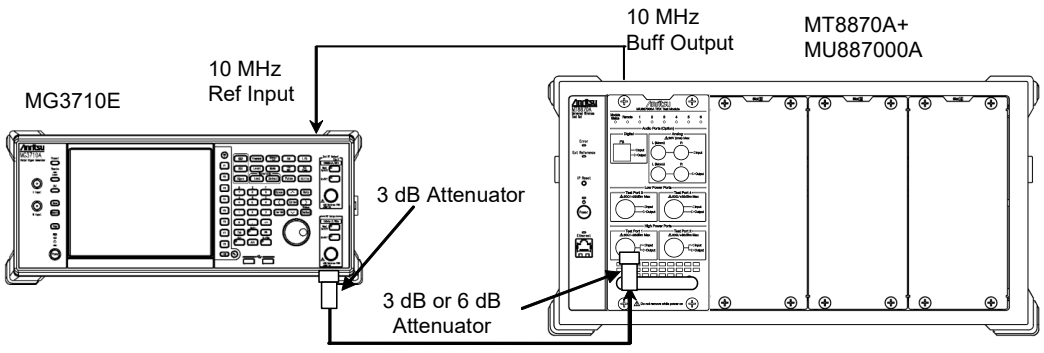


Figure 6.4.1-1 Setup for Measuring Amplitude Measurement Accuracy

(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

1. Setup the instruments as shown in Figure 6.4.1-1.
2. Set the MU887000A as follows:

Connect port:	Test Port1
Output level ON/OFF:	OFF
Input level:	–10 dBm
Uplink frequency:	5855 MHz
Trigger Source:	Freerun
Turn Off All measurement:	OFF
Tx Power measurement:	ON, 1 time

3. Set the Vector signal generator (SG) as follows:

Modulation:	OFF
Output frequency:	5855 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 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 to successively, and repeat steps 2 to 5 over.

6.4.2 Frequency/Modulation

This test is related to the following modulation analyses.

- Carrier frequency accuracy
- Residual EVM

(1) Test specifications

	Measurement Accuracy
Carrier frequency accuracy	± (Set frequency × Reference oscillator accuracy + 36 Hz)
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: –30 dBm ≤, ≤ +35 dBm
MU887000A Test Port 3/4
Input Level range: –30 dBm ≤, ≤ +25 dBm

(2) Measuring instruments

- Vector signal generator: MG3710E
- Attenuator:
  For MU887000A/01A 3 dB: AT-103 2 sets
  For MU887002A 3 dB: BW-N3W5+
  6 dB: BW-N6W5+

(3) Setup

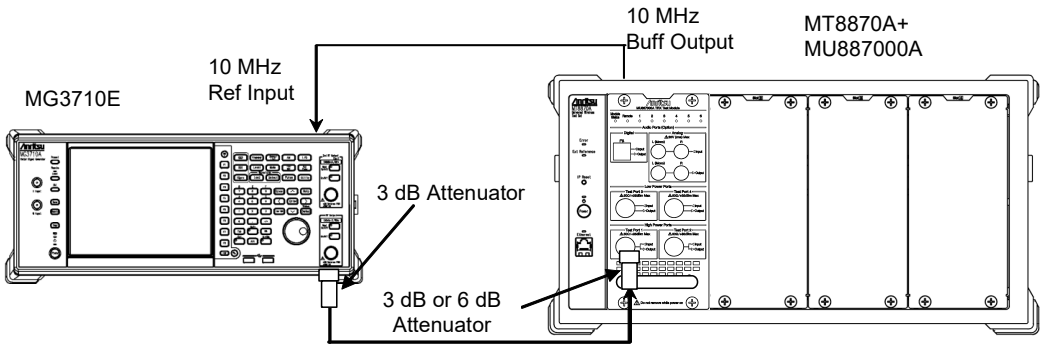


Figure 6.4.2-1 Setup for Measuring Frequency/Modulation

(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

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:	–30 dBm
Uplink frequency:	5855 MHz
Turn Off All measurement:	OFF
Modulation Analysis measurement:	ON, 20 times

3. Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Waveform pattern analyzable in Step 2.
Output frequency:	5855 MHz
Output level:	–30 dBm (This output level reflects the calibration value for item 6.3.2.)

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 Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 5 over.

6.4.3 In-band Emissions

This test is related to in-band emissions.

(1) Test specifications

(5855 MHz ≤ Frequency ≤ 5925 MHz)

In-Band Emissions	≤ –40 dBc

Input level: ≥ –10 dBm

Allocated RB ≤ 18

(2) Measuring instruments

- Vector signal generator: MG3710E
- Attenuator:

For MU887000A/01A	3 dB:	AT-103	2 sets
For MU887002A	3 dB:	BW-N3W5+	
	6 dB:	BW-N6W5+	

(3) Setup

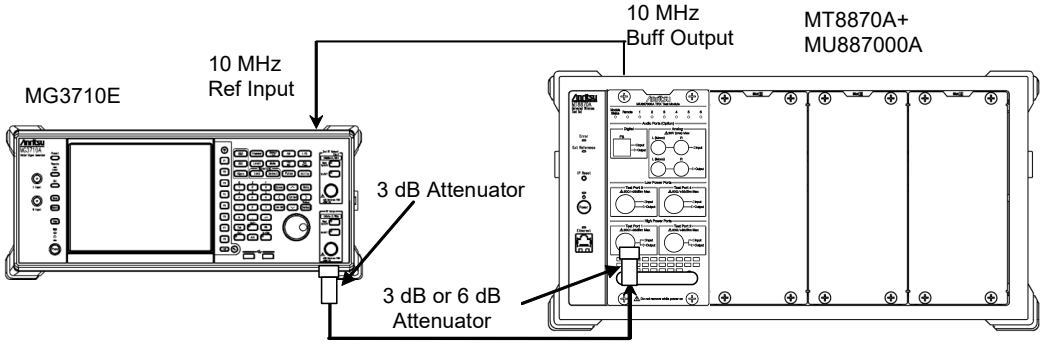


Figure 6.4.3-1 In-Band Emissions Measurement Setup

(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 6.4.3-1.
2. Set the MU887000A as follows:

Connect port:	Test Port 1
Output level ON/OFF:	OFF
Input level:	–10 dBm
Uplink frequency:	5855 MHz
UL RMC Number of RB:	18
Turn Off All measurement:	OFF
Modulation Analysis measurement:	ON, 20 times

3. Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Waveform pattern analyzable in Step 2
Output frequency:	5855 MHz
Output level:	–10 dBm (This output level reflects the calibration value for item 6.3.2.)

4. Measure the in-band emissions and read the following value:

   In-band emissions (General) 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. Change the Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 5 over.

6.4.4 Adjacent Channel Leakage Power Ratio (ACLR)

This test is related to Adjacent Channel Leakage Power Ratio measurements.

(1) Test specifications

(5855 MHz ≤ Frequency ≤ 5925 MHz)

Adjacent Channel Leakage Power Ratio	Measurement Point
≥ 42 dB	E-UTRA ACLR1

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
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: MG3710E
- Attenuator:
  For MU887000A/01A 3 dB: AT-103 2 sets
  For MU887002A 3 dB: BW-N3W5+
  6 dB: BW-N6W5+

(3) Setup

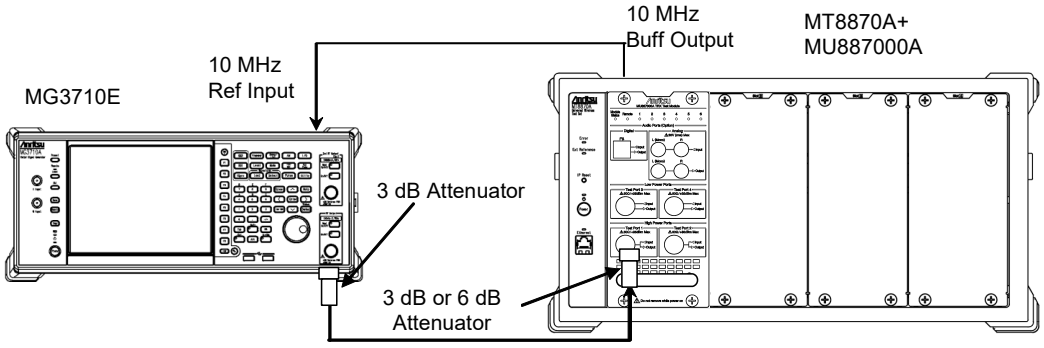


Figure 6.4.4-1 Setup for Measuring Adjacent Channel Leakage Power Ratio

(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

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: –14 dBm
   Uplink frequency: 5855 MHz
   Turn Off All measurement: OFF
   ACLR measurement: ON, 20 times

3. Set the Vector signal generator (SG) as follows:

   Modulation: ON
   Modulation wave: Waveform pattern analyzable in Step 2
   Output frequency: 5855 MHz
   Output level: –10 dBm
   (This output level reflects the calibration value for item 6.3.2.)
   For MU887002A: –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: Maximum 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 Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 5 over.

6.4.5 Sample Format for Test Result Sheets

Use the following test result sheets when testing the MX887068A 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)

MG3710E Unmodulated Wave

Frequency (MHz)	SG Setting (dBm)		
	0 dBm	–10 dBm	–20 dBm
5855			
5925			

SG Calibration (MOD)

SG Calibration Value (MOD)

MG3710E Modulation Wave

Frequency (MHz)	SG Setting (dBm)
	–10 dBm
5855	
5925	

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)
5855	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
5925	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	

Tx Power Measurement Accuracy (CW)

Tx Power Measurement Accuracy

MU887000A Port 1/2, MU887001A Port 1 to 4

Input Level: –10 dBm (Item 6.3.1 Calibration Value)

Frequency (MHz)	MX887068A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy –10 – (Pow)	Hi Limit	Measurement uncertainty
5855		–0.7		+0.7	±0.28
5925					

Tx Power Measurement Accuracy

MU887002A TRX 1/2 Port 1/2

Input Level: –10 dBm (Item 6.3.1 Calibration Value)

Frequency (MHz)	MX887068A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy –10 – (Pow)	Hi Limit	Measurement uncertainty
5855		–0.9		+0.9	±0.28
5925					

Tx Power Measurement Accuracy (CW) (Cont'd)

Tx Power Measurement Accuracy

MU887000A Port 1/2, MU887001A Port 1 to 4, MU887002A TRX 1/2 Port 1/2

Input Level: –50 dBm (Item 6.3.3 Calibration Value)

Frequency (MHz)	Item 6.3.3 –50 dBm Calibration Value (C) (dB)	MX887068A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy –20 + (C) – (Pow)	Hi Limit	Measurement uncertainty
5855			–1.1		+1.1	±0.28
5925						

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)	MX887068A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy –10 – (Pow)	Hi Limit	Measurement uncertainty
5855		–0.7		+0.7	±0.28
5925					

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)	MX887068A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy –20 + (C) – (Pow)	Hi Limit	Measurement uncertainty
5855			–1.1		+1.1	±0.28
5925						

Frequency/Modulation Measurement

Residual EVM / Carrier Frequency Accuracy

Input Level: –10 dBm / –30 dBm

Frequency (MHz)	Residual EVM (%)			Carrier Frequency Accuracy (Hz)		
	Measured Value	Spec.	Measurement uncertainty	Measured Value	Spec.	Measurement uncertainty
5855		≤ 2.5	±0.1		±36.0	±2.0
5925						

In-Band Emission Measurement

In-Band Emission

Frequency (MHz)	Input Level: –10 dBm	
	Measured Value (dB)	Spec.
5855		≤ –40 dBc
5925		

Adjacent Channel Leakage Power Measurement (ACLR)

Adjacent Channel Leakage Power (Cont'd)

Input Level: –10 dBm / –14 dBm

Frequency (MHz)	Adjacent Channel Leakage Power Ratio (dB)	
	Band	
	E-UTRA (–1)	E-UTRA (+1)
5855		
5925		
Spec. (dB)	≥ 42 dB	≥ 42 dB
Measurement uncertainty	1 dB	

6.5 Performance Tests (MX887068A-001)

Common test items

The following list shows the common settings for each measurement at the TRX Test Module.

Application Select:	Cellular
Standard Select:	LTEV2X
Channel Bandwidth:	20 MHz
UL RMC Modulation:	QPSK
UL RMC Number of RB:	96
UL RMC Starting RB:	2

6.5.1 Frequency/Modulation

This test is related to the following modulation analyses.

- Carrier frequency accuracy
- Residual EVM

(1) Test specifications

	Measurement Accuracy
Carrier frequency accuracy	± (Set frequency × Reference oscillator accuracy + 36 Hz)
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: –30 dBm ≤, ≤ +35 dBm
MU887000A Test Port 3/4
Input Level range: –30 dBm ≤, ≤ +25 dBm

(2) Measuring instruments

- Vector signal generator: MG3710E
- Attenuator:
  For MU887000A/01A 3 dB: AT-103 2 sets
  For MU887002A 3 dB: BW-N3W5+
  6 dB: BW-N6W5+

(3) Setup

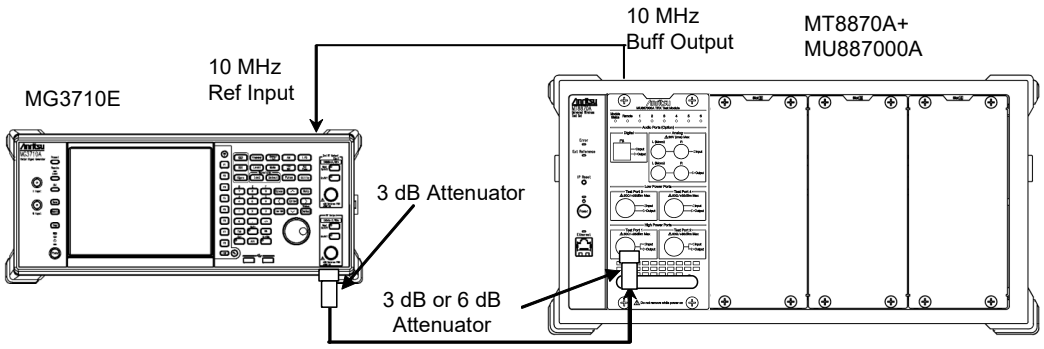


Figure 6.5.1-1 Setup for Measuring Frequency/Modulation

(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

1 Setup the instruments as shown in Figure 6.5.1-1.

2. Set the MU887000A as follows:

Connect port:	Test Port 1
Output level ON/OFF:	OFF
Input level:	–30 dBm
Uplink frequency:	5855 MHz
Turn Off All measurement:	OFF
Modulation Analysis measurement:	ON, 20 times

3. Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Waveform pattern analyzable in Step 2.
Output frequency:	5855 MHz
Output level:	–30 dBm (This output level reflects the calibration value for item 6.3.2.)

4. Measure the frequency error and EVM.

PSCCH Carrier Frequency Error Result:	Worst value
PSCCH 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 Connect port setting for the connection with the MU887000A successively, and repeat steps 2 to 5 over.

6.5.2 Sample Format for Test Result Sheets

Use the following test result sheets when testing the MX887068A-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 _____

_____

_____

Frequency/Modulation Measurement

Residual EVM / Carrier Frequency Accuracy

Input Level: –10 dBm / –30 dBm

Frequency (MHz)	Residual EVM (%)			Carrier Frequency Accuracy (Hz)		
	Measured Value	Spec.	Measurement uncertainty	Measured Value	Spec.	Measurement uncertainty
5855		≤ 2.5	±0.1		±36.0	±2.0
5925						

6.6 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 MX887068A LTE-V2X TX Measurement. Refer to section 1.2 “Composition” for details of the product configuration.

A.1 MX887068A A-2
A.2 MX887068A-001 ..... A-4

A.1 MX887068A

This section explains the specifications of MX887068A LTE-V2X Uplink.

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.
The calibration is the self calibration function in the measurement instrument.

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.1-1 MX887068A Specifications

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Common Items
Frequency

Measuring Object</td><td>5855 MHz ≤ frequency ≤ 5925 MHz (with MU887000A/01A-001)
5855 MHz ≤ frequency ≤ 5925 MHz (MU887002A)
PSSCH</td></tr>
<tr><td>RF Power
Input Level Range</td><td>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</td></tr>
<tr><td>Measurement Accuracy</td><td>MU887000A Port 1, Port 2:
MU887001A Port 1 to 4:
5855 MHz ≤ frequency ≤ 5925 MHz (After calibration, 20 to 30 °C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–20 to +35 dBm</td><td>±0.7 dB</td></tr>
<tr><td>–50 to –20 dBm</td><td>±1.1 dB</td></tr>
</table>
MU887002A TRX 1/2 Port 1 to 12:
5855 MHz ≤ frequency ≤ 5925 MHz (After calibration, 20 to 30 °C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–20 to +35 dBm</td><td>±0.7 dB (Typ.)
±0.9 dB</td></tr>
<tr><td>–50 to –20 dBm</td><td>±1.1 dB</td></tr>
</table>
MU887000A Port 3, Port 4:
5855 MHz ≤ frequency ≤ 5925 MHz (After calibration, 20 to 30 °C)
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–30 to +25 dBm</td><td>±0.7 dB</td></tr>
<tr><td>–50 to –30 dBm</td><td>±1.1 dB</td></tr>
</table></td></tr>
</table>

Table A.1-1 MX887068A Specifications (Cont'd)

Item	Specification
Frequency/Modulation Measurement	
Input Level Range	MU887000A Port 1, Port 2: –30.0 to +35.0 dBm Port 3, Port 4: –30.0 to +25.0 dBm MU887001A Port 1 to 4: –30.0 to +35.0 dBm MU887002A TRX 1/2 Port 1 to 12: –30.0 to +35.0 dBm
Carrier Frequency Accuracy	± (Set frequency × Reference oscillator accuracy + 36 Hz) 5855 MHz ≤ frequency ≤ 5925 MHz, 20 to 30 °C
Modulation accuracy	Residual Vector Error: ≤ 2.5% (20 averaging times) 5855 MHz ≤ frequency ≤ 5925 MHz, 20 to 30 °C
In-Band Emissions	≤ –40 dBc (Input Level ≥ –10 dBm and Allocated RBs ≤18) 5855 MHz ≤ frequency ≤ 5925 MHz, 20 to 30 °C
Occupied Bandwidth	
Input Level Range	MU887000A Port 1, Port 2: –10.0 to +35.0 dBm Port 3, Port 4: –10.0 to +25.0 dBm MU887001A Port 1 to 4: –10.0 to +35.0 dBm MU887002A TRX 1/2 Port 1 to 12: –10.0 to +35.0 dBm
Adjacent Channel Leakage Power Ratio	
Input Level Range	MU887000A Port 1, Port 2: –10.0 to +35.0 dBm Port 3, Port 4: –10.0 to +25.0 dBm MU887001A Port 1 to 4: –10.0 to +35.0 dBm MU887002A TRX 1/2 Port 1 to 12: –14.0 to +35.0 dBm
Measurement Range	5855 MHz ≤ frequency ≤ 5925 MHz, 20 to 30 °C ≥ 42 dB (E-UTRA ACLR1)
Spectrum Emission Mask (SEM)	
Input Level Range	MU887000A Port 1, Port 2: –10.0 to +35.0 dBm Port 3, Port 4: –10.0 to +25.0 dBm MU887001A Port 1 to 4: –10.0 to +35.0 dBm MU887002A TRX 1/2 Port 1 to 12: –10.0 to +35.0 dBm

A.2 MX887068A-001

This section explains the specifications of MX887068A-001 LTE-V2X PSCCH 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.
The calibration is the self calibration function in the measurement instrument.

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 MX887068A-001 Specifications

Item	Specification
Common Items	
Frequency	According to the following MX887068A specifications. Common Items Frequency
Measuring Object	PSCCH
Frequency/Modulation Measurement	
Input Level Range	According to the following MX887068A specifications. Frequency/Modulation Measurement Input Level Range
Carrier Frequency Accuracy	According to the following MX887068A specifications. Frequency/Modulation Measurement Carrier Frequency Accuracy
Modulation accuracy	According to the following MX887068A specifications. Frequency/Modulation Measurement Modulation accuracy

Index

References are page numbers.

A

Abbreviations 1-4
Adjacent Channel Leakage Power Ratio.....2-21

C

Cable loss correction..... 2-3
Carrier leakage.....2-26
Channel Bandwidth 2-5
Channel numbers 2-6

D

Data Composition of Sequence Measurement Condition..... 3-3

E

Error Vector Magnitude 2-24
EVM.....2-24

F

Frequency 2-3
Frequency error.....2-23

I

In-band Emissions for Non-Allocated RB.....2-27

L

Level 2-3

M

Magnitude error 2-24
Margin 2-18
measurement condition table 3-14
Modulation analysis 2-22

N

Native
- Common 5-3
- Common Parameter..... 5-3, 5-5
- Fundamental Measurement Parameter 5-7
- LTE-V2X Setting..... 5-6
- Measurement 5-3
- Result..... 5-8
- System..... 5-4

O

Occupied Bandwidth 2-15

P

Peak level 2-18
performance tests 6-2
Phase error 2-24

Q

Questionable Register 2-13

R

Reference signal 2-25
Resource Block..... 2-6

S

Sample program 2-36
Sample Program..... 3-29
SCPI
- Common 4-3
- Common Parameter..... 4-5
- Common Parameters 4-4
- Fundamental Measurement Parameter 4-7
- LTE-V2X Setting..... 4-6
- Measurement 4-3
- Operation Status Register 4-3
- Questionable Register..... 4-3
- Result..... 4-8
- System..... 4-4

sequence table setting items 3-6
Software End-User License Agreement (EULA) v
Specifications.....A-1
Spectrum Emission Mask..... 2-17
Spectrum Flatness..... 2-29
start and stop segments 3-21
status of segments 3-22
Status Register 2-12, 2-13

T

Transmit Power 2-14

W

Waveform data.....2-34
Waveform file..... 2-4