

# **MX887065A**

## **Category M FDD Uplink TX Measurement Operation Manual**

**First 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 this document before using the equipment.
- Keep this manual with the equipment.

**ANRITSU CORPORATION**

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To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

## Symbols used in manual



### **DANGER**

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



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### **CAUTION**

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

## Safety Symbols Used on Equipment and in Manual

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



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This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



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



These indicate that the marked part should be recycled.

MX887065A

Category M FDD Uplink TX Measurement  
Operation Manual

22 December 2017(First Edition)

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- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
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- Network connections  
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## CE marking



### 1. Product Model

Software: MX887065A Category M FDD Uplink TX  
Measurement

### 2. Applied Directive and Standards

When MX887065A Category M FDD Uplink TX Measurement is installed in the MT8870A, the applied directive and standards of this software conform to those of the MT8870A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX887065A can be used with.



# RCM Conformity Marking

Anritsu affixes the RCM mark on the following product(s) in accordance with the regulation to indicate that they conform to the EMC framework of Australia/New Zealand.

## RCM marking



### 1. Product Model

Software: MX887065A Category M FDD Uplink TX  
Measurement

### 2. Applied Directive and Standards

When MX887065A Category M FDD Uplink TX Measurement is installed in the MT8870A, the applied directive and standards of this software conform to those of the MT8870A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX887065A can be used with.




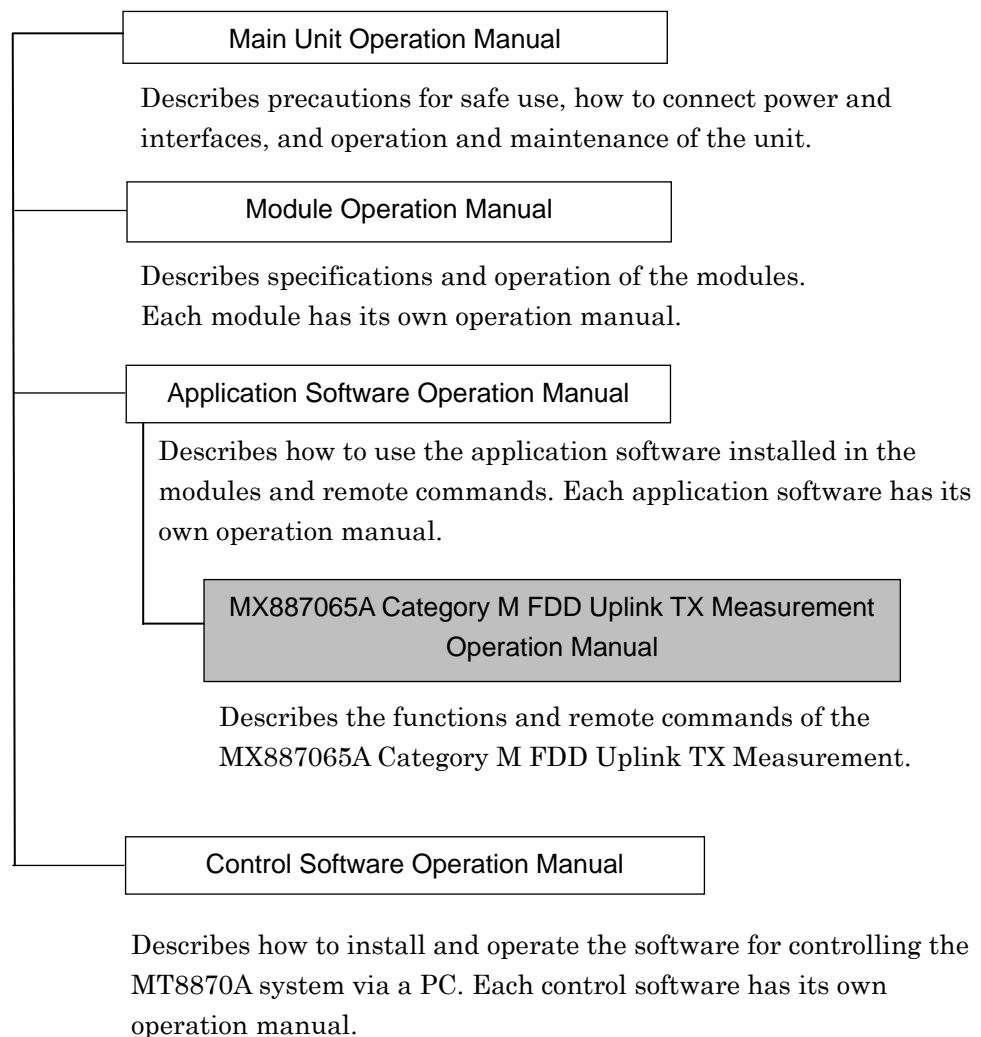
# About This Manual

This manual mainly describes the use, panels, and specifications of the MX887065A Category M FDD Uplink TX Measurement.

Products related to the MT8870A Universal Wireless Test Set include:

- MT8870A Universal Wireless Test Set (main unit)
- Modules installed in the MT8870A
- Application software installed in the modules
- Control software installed in a PC controller

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.



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# Chapter 1 Outline

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This chapter outlines the MX887065A Category M FDD Uplink TX Measurement. Refer to Appendix A Specifications for the software functions and performance.

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## **1.1 Outline**

The MX887065A Category M FDD Uplink TX Measurement (hereafter MX887065A) adds the Category M FDD wireless measurement function to the MU887000A TRX Test Module.

The MX887065A supports setting of an arbitrary waveform pattern for sending as the Category M FDD downlink signal. Regardless of the uplink signal information, the modulated waveform pattern loaded from memory is sent as the downlink signal (Non-signalling method).

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

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

When conducting the RX measurement by the MX887065A, execute throughput measurement by the mobile station.



## 1.2 Composition

The composition of the MX887065A is shown in Table 1.2-1.

**Table 1.2-1 MX887065A Composition**

Item	Model/Code	Name	Qty	Remarks
Software		Storage media (DVD, etc.)	1	
	MX887065A	Category M FDD Uplink TX Measurement		License file included on storage media (DVD, etc.)
	W3936AE	MX887065A Category M FDD Uplink TX Measurement Operation Manual		English, on storage media (DVD, etc.)

## 1.3 License Registration

Before the MX887065A 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 Ratio
CATM	Category M
CQI	Channel Quality Indicator
DL	Downlink
E-UMTS	Evolved UMTS Terrestrial Radio Access
EVM	Error Vector Magnitude
FDD	Frequency Division Duplex
LTE	Long Term Evolution
NS	Network Signalling value
OBW	Occupied Bandwidth
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
RB	Resource Block
RMC	Reference Measurement Channel
SEM	Spectrum Emission Mask
SIB	System Information Block
TPC	Total Power Control
TS	Technical Specification
UL	Uplink
UMTS	Universal Mobile Telecommunication System

## Chapter 2 Fundamental Measurement

This chapter describes the fundamental functions and commands of the MX887065A. For details of the commands, refer to Chapter 4 “SCPI Command Reference” and Chapter 5 “Native Command Reference”.

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## 2.1 Common Operations

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

### 2.1.1 Selecting application

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

```
SYSSEL  
:INSTrument[:SElect]
```

Switch the MX887065A measurement standard using the following command. Set the parameter to CATM 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 MU887000A ports to be used. The following command sets both the port for outputting the downlink signal and the port for receiving the uplink signals.

Set Port1 to Port4 at the parameter

```
PORT  
:ROUTe:PORT:CONNection
```

When setting the sequence table in sequence measurement, the sequence commands set only the output port to Port 1 to Port 4.

The above-mentioned command sets the receiving port.

### 2.1.3 Frequency and level

#### Frequency

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

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

- 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 MU887000A using the following commands.

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

#### Cable loss correction

The loss of coaxial cables can be corrected for the output, input, and measured levels.

Refer to Chapter 3 Basic Operation in the *MU887000A TRX Test Module Operation Manual* for an explanation of the commands and loss correction data.

### 2.1.4 Setting transmission signal

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

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

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

- Output On/Off  
LVL  
:CONFigure:CELLular:GENerator:RFSettings:STATe
- Modulation On/Off  
MOD  
:CONFigure:CELLular:GENerator:BBMode
- Waveform File Select  
PACKAGE  
:CONFigure:CELLular:GENerator:ARB:PACKage:SElect
- Waveform Pattern Select  
DLPAT  
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SEL  
ect  
DLPAT\_SYNC  
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SEL  
ect: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 a Category M waveform pattern, specify a file in the MV887065A Category M FDD Downlink 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 MV887065A Category M FDD Downlink Waveform files.

### 2.1.6 Setting Category M signals

Set the following items to configure the Category M signal.

#### Frame Structure

The frame structure of the Category M signal was defined for FDD and TDD. Only FDD is available for MX887065A.

#### Duplex Mode

Only Half Duplex is available for MX887065A.

#### Channel Bandwidth

An Category M system has a variable transmission bandwidth called the channel bandwidth. The specified channel bandwidth values are:

1.4, 3, 5, 10, 15, 20 MHz

Set the channel bandwidth of the measurement target signal.

#### Channel configuration

Select the target physical channel from the following:

PUSCH      Physical Uplink Shared Channel

PUCCH      Physical Uplink Control Channel

#### Channel Coding

Sets the channel configuration. To perform TX test based on the measurement standards, set to RMC (Reference Measurement Channel based on TS36.521-1). Only RMC can be set on the MX887065A.

Reference measurement signal modulation

The Reference Measurement Channel (RMC) signal for measuring the wireless performance of Category M mobile station is specified in TS 36.521-1 Annex A.

Uplink reference measurement signal is defined for each modulation scheme, and the QPSK or 16QAM modulation scheme is specified as the measurement target signal.

UL\_RMC MCS Index

Sets MCS of Uplink. When MCS Index is set, modulation scheme is changed automatically.

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

MCS Index $I_{MCS}$	Modulation scheme
0 to 10	QPSK
11 to 15	16QAM

RMC Start RB Number

RMC Number of RBs

The Category M system has subcarrier signals at 15-kHz intervals and a set of 12 subcarriers is called a Resource Block (RB).

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

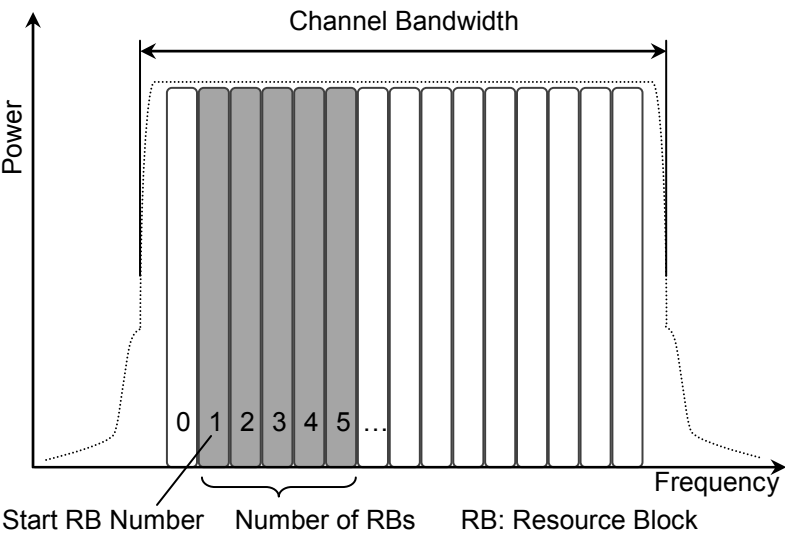


Figure 2.1.6-1 Target Resource Blocks



**Channel Quality Indicator RB Number**

Set the RB number for the mobile station to transmit the Downlink signal Channel Quality Indicator (CQI). The CQI is transmitted in the PUSCH, so the RB number determines the PUCCH position.

**Uplink and Downlink Channels**

The frequency of the signals sent and received by the MU887000A is set by the channel numbers as specified in TS 36.101 5.7.3 Carrier frequency and EARFCN.

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

Changing Downlink Channel Number setting changes the Uplink Channel Number, Downlink Frequency, Uplink Frequency, and Frame Structure settings.

However, the Uplink Frequency and channel number 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**

Downlink Channel Number ( $N_{DL}$ )	Uplink Channel Number ( $N_{UL}$ )
dl_ch	ul_ch
0 to 4949	ul_ch = dl_ch + 18000
5010 to 5379	ul_ch = dl_ch + 18000
5730 to 7399	ul_ch = dl_ch + 18000
7500 to 9659	ul_ch = dl_ch + 18000
9770 to 9919	ul_ch = dl_ch + 17890
36000 to 46789	ul_ch = dl_ch
65536 to 67135	ul_ch = dl_ch + 65536

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 ( $N_{Offs-DL}$ ), Uplink lower limit frequency ( $F_{UL\_low}$ ), Uplink offset number ( $N_{Offs-UL}$ )

When Downlink Channel Number is changed, the MX887065A executes the following processes:

1. Determines values of following parameters based on Downlink Channel Number ( $N_{DL}$ ) and Table 2.1.6-3  
Downlink lower limit frequency ( $F_{DL\_low}$ ),  
Downlink offset number ( $N_{Offs-DL}$ )
2. Calculates Downlink frequency ( $F_{DL}$ ) from following equation using the above values:  
$$F_{DL} = F_{DL\_low} + 0.1(N_{DL} - N_{Offs-DL})$$
3. Sets Downlink frequency at MU887000A
4. Determines Uplink Channel Number ( $N_{UL}$ ) based on Downlink Channel Number ( $N_{DL}$ ) and Table 2.1.6-2
5. Determines values of following parameters based Uplink Channel Number ( $N_{UL}$ ) and Table 2.1.6-3  
Uplink lower limit frequency ( $F_{UL\_low}$ ),  
Uplink offset number ( $N_{Offs-UL}$ )
6. Calculates Uplink Frequency ( $F_{UL}$ ) from following equation using the above values:  
$$F_{UL} = F_{UL\_low} + 0.1(N_{UL} - N_{Offs-UL})$$
7. Sets Uplink frequency ( $F_{UL}$ ) at MU887000A

When Uplink Channel is changed, the MX887065A executes the following processing:

1. Determines values of following parameters based on Uplink Channel Number ( $N_{UL}$ ) and Table 2.1.6-3.  
Uplink lower limit frequency ( $F_{UL\_low}$ ),  
Uplink offset number ( $N_{Offs-UL}$ )
2. Calculates Uplink frequency ( $F_{UL}$ ) from following equation using the above values:  
$$F_{UL} = F_{UL\_low} + 0.1(N_{UL} - N_{Offs-UL})$$
3. Sets Uplink frequency at MU887000A
4. Determines Downlink Channel Number ( $N_{DL}$ ) based on Uplink Channel Number ( $N_{UL}$ ) and Table 2.1.6-2
5. Determines values of following parameters based on Downlink Channel Number ( $N_{DL}$ ) and Table 2.1.6-3:  
Downlink lower limit frequency ( $F_{DL\_low}$ ),  
Downlink offset number ( $N_{Offs-DL}$ )
6. Calculates Downlink frequency ( $F_{DL}$ ) from following equation using the above values:  
$$F_{DL} = F_{DL\_low} + 0.1(N_{DL} - N_{Offs-DL})$$
7. Sets Downlink frequency at MU887000A

**Table 2.1.6-3 E-UTRA Channel Numbers and Default Mobile Station TX-RX Frequency Separation**  
(Reprinted from Table 5.7.3-1 and Table 5.7.4-1 of 3GPP TS36.101)

Band	Freq Separation (MHz)	Downlink			Uplink		
		F <sub>DL_low</sub> (MHz)	N <sub>Offs-DL</sub>	Range of N <sub>DL</sub>	F <sub>UL_low</sub> (MHz)	N <sub>Offs-UL</sub>	Range of N <sub>UL</sub>
1	190	2110	0	0 to 599	1920	18000	18000 to 18599
2	80	1930	600	600 to 1199	1850	18600	18600 to 19199
3	95	1805	1200	1200 to 1949	1710	19200	19200 to 19949
4	400	2110	1950	1950 to 2399	1710	19950	19950 to 20399
5	45	869	2400	2400 to 2649	824	20400	20400 to 20649
6	45	875	2650	2650 to 2749	830	20650	20650 to 20749
7	120	2620	2750	2750 to 3449	2500	20750	20750 to 21449
8	45	925	3450	3450 to 3799	880	21450	21450 to 21799
9	95	1844.9	3800	3800 to 4149	1749.9	21800	21800 to 22149
10	400	2110	4150	4150 to 4749	1710	22150	22150 to 22749
11	48	1475.9	4750	4750 to 4949	1427.9	22750	22750 to 22949
12	30	729	5010	5010 to 5179	699	23010	23010 to 23179
13	−31	746	5180	5180 to 5279	777	23180	23180 to 23279
14	−30	758	5280	5280 to 5379	788	23280	23280 to 23379
...	-----	-----	-----	-----	-----	-----	-----
17	30	734	5730	5730 to 5849	704	23730	23730 to 23849
18	45	860	5850	5850 to 5999	815	23850	23850 to 23999
19	45	875	6000	6000 to 6149	830	24000	24000 to 24149
20	−41	791	6150	6150 to 6449	832	24150	24150 to 24449
21	48	1495.9	6450	6450 to 6599	1447.9	24450	24450 to 24599
22	48	3510	6600	6600 to 7399	3410	24600	24600 to 25399
23	100	2180	7500	7500 to 7699	2000	25500	25500 to 25699
24	180	1525	7700	7700 to 8039	1626.5	25700	25700 to 26039
25	−101.5	1930	8040	8040 to 8689	1850	26040	26040 to 26689
26	45	859	8690	8690 to 9039	814	26690	26690 to 27039
27	45	852	9040	9040 to 9209	807	27040	27040 to 27209
28	55	758	9210	9210 to 9659	703	27210	27210 to 27659
29	N/A	717	9660	9660 to 9769	N/A	N/A	N/A
30	45	2350	9770	9770 to 9869	2305	27660	27660 to 27759
31	10	462.5	9870	9870 to 9919	452.5	27760	27760 to 27809
32	N/A	1452	9920	9920 to 10359	N/A	N/A	N/A

**Table 2.1.6-3 E-UTRA Channel Numbers and Default UE TX-RX Frequency Separation**  
(Reprinted from Table 5.7.3-1 and Table 5.7.4-1 of 3GPP TS36.101) (Cont'd)

Band	Freq Separation (MHz)	Downlink			Uplink		
		F <sub>DL_low</sub> (MHz)	N <sub>Offs-DL</sub>	Range of N <sub>DL</sub>	F <sub>UL_low</sub> (MHz)	N <sub>Offs-UL</sub>	Range of N <sub>UL</sub>
33	0	1900	36000	36000 to 36199	1900	36000	36000 to 36199
34	0	2010	36200	36200 to 36349	2010	36200	36200 to 36349
35	0	1850	36350	36350 to 36949	1850	36350	36350 to 36949
36	0	1930	36950	36950 to 37549	1930	36950	36950 to 37549
37	0	1910	37550	37550 to 37749	1910	37550	37550 to 37749
38	0	2570	37750	37750 to 38249	2570	37750	37750 to 38249
39	0	1880	38250	38250 to 38649	1880	38250	38250 to 38649
40	0	2300	38650	38650 to 39649	2300	38650	38650 to 39649
41	0	2496	39650	39650 to 41589	2496	39650	39650 to 41589
42	0	3400	41590	41590 to 43589	3400	41590	41590 to 43589
43	0	3600	43590	43590 to 45589	3600	43590	43590 to 45589
44	0	703	45590	45590 to 46589	703	45590	45590 to 46589
45	0	1447	46590	46590 to 46789	1447	46590	46590 to 46789
...	-----	-----	-----	-----	-----	-----	-----
65	190	2110	65536	65536 to 66435	1920	131072	131072 to 131971
66	400	2110	66436	66436 to 67335	1710	131972	131972 to 132671
67	N/A	738	67336	67336 to 67535	N/A	N/A	N/A
...	-----	-----	-----	-----	-----	-----	-----
252* <sup>1</sup>	N/A	5150	255144	255144 to 256143	N/A	N/A	N/A
255* <sup>1</sup>	N/A	5725	260894	260894 to 262143	N/A	N/A	N/A

### Group Hopping

Turns On or Off Group Hopping

### Cell ID

Sets the Cell ID

Use the following commands to set the Category M signals

- **Frame Structure**  
FRAMETYPE  
:CONFigure:CELLular:LTE:FSTRucture
- **Duplex Mode**  
DUPLExMODE  
:CONFigure:CELLular:CATM:DUPLEx
- **Channel Coding**  
CHCODING  
:CONFigure:CELLular:CATM:CHCoding

- **RMC Configuration**  
CHCONFIG  
:CONFigure:CELLular:CATM:CTYPE
- **nRB-CQI**  
NRBCQI  
:CONFigure:CELLular:CATM:RBCQi
- **Channel Bandwidth**  
BANDWIDTH  
:CONFigure:CELLular:CATM:CBANdwidth
- **UL RMC Narrowband Index**  
ULRMC\_NARROW  
:CONFigure:CELLular:CATM:NARRowband
- **UL RMC Number of RB**  
ULRMC\_RB  
:CONFigure:CELLular:CATM:RBAllocation:NRB
- **UL RMC Starting RB**  
ULRB\_START  
:CONFigure:CELLular:CATM:RBAllocation:ORB
- **UL RMC MCS Index**  
ULIMCS  
:CONFigure:CELLular:CATM:MCS
- **UL RMC Modulation**  
ULRMC\_MOD  
:CONFigure:CELLular:CATM:MODulation:MSCHEME
- **Group Hopping On/Off**  
GROUPHOP  
:CONFigure:CELLular:CATM:GHOPping
- **Cell ID**  
CELLID  
:CONFigure:CELLular:CATM:CID
- **Cyclic Shift**  
CSHIFT  
:CONFigure:CELLular:CATM:CSHift
- **Delta SS**  
DELTASS  
:CONFigure:CELLular:CATM:DSS

### 2.1.7 Setting measurement

Set the following measurement items.

- **Trigger Source**  
TRGSRC  
:TRIGger:CELLular:CATM:FUNDamental:SOURce
- **Trigger Level**  
TRGLVL  
:TRIGger:CELLular:CATM:FUNDamental:LEVel
- **Trigger Delay**  
TRGDLY  
:TRIGger:CELLular:CATM:FUNDamental:DElay
- **Trigger Timeout**  
TRGTOUT  
:TRIGger:CELLular:CATM:FUNDamental:TOUT

Use the following command when not measuring.

- **Setting all measurement items to off**  
ALLMEASITEMS\_OFF  
:CONFigure:CELLular:CATM:FUNDamental:AMITems:OFF

## 2.1.8 Starting/stopping measurement

### Starting measurement

To start measurement, send the following command.

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

```
SNGLS
:INITiate:CELLular:MEASurement:SINGLE

SWP
```

### Stopping measurement

To stop measurement, send the following command.

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

### Checking measurement status

Query the measurement status and errors using the following commands.

```
TXMSTAT
MSTAT
:FETCh:CELLular:MEASurement:STATe
```

**Table 2.1.8-1 Query Response**

Response	Description
0	Measurement completed normally
2	Level exceeded The MU887000A 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 MX887065A 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**

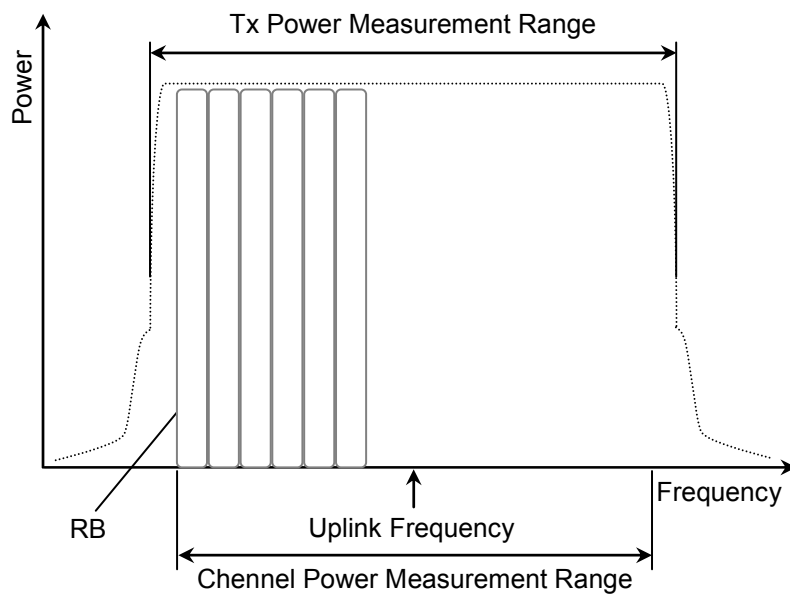
Bit	Description
16 to 3	Not used and always set to 0.
2	Changed to 1 at measurement timeout
1	Changed to 1 when measurement result under level
0	Changed to 1 when measurement result over level

## 2.2 Transmit Power

The Tx Power measurement measures the power in the bandwidth specified in Table 5.4.2-1 of 3GPP TS36.521-1.

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

Channel Bandwidth	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Tx Power	1.4	3	5	10	15	20
Channel Power	1.08	2.7	4.5	9.0	13.5	18



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

Set the following parameter to measure the Tx Power.

Measurement enable and measurement count

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

```
PWR_SET
:CONFigure:CELLular:CATM:FUNDamental:POWER:SET
```

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

- **Tx Power**  
POWER  
:FETCh:CELLular:CATM:FUNDamental:POWer:TXPower
- **Channel Power**  
CHPWR  
:FETCh:CELLular:CATM:FUNDamental:POWer:CHPower

## 2.3 Occupied Bandwidth

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

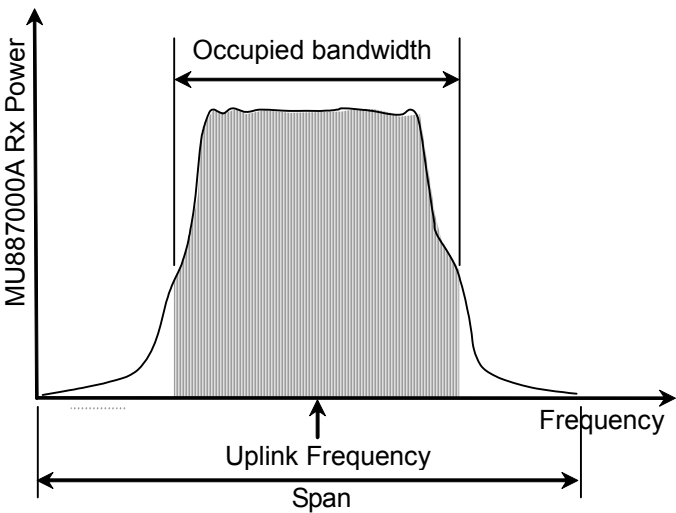


Figure 2.3-1 Occupied Bandwidth

The Occupied Bandwidth measurement settings are:

Span

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

Table 2.3-1 Occupied Bandwidth Measurement Frequency Range

Channel Bandwidth	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Span (MHz)	3.697	7.671	12.729	25.374	38.019	50.663

Occupied Bandwidth power ratio

The power ratio (occupied ratio) for determining the Occupied Bandwidth is 99.9%.

Measurement enable and measurement count

Enable Occupied Bandwidth measurement and specify the measurement count.

The Occupied Bandwidth is measured for 1 subframe (1 ms, Excluding Guard period) at each measurement count.

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

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

- **OBW Result**

OBW

:FETCh:CELLular:CATM:FUNDamental:OBW

- **OBW Frequency Result**

OBWFREQ

:FETCh:CELLular:CATM: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 6.6.2.1EA Spectrum Emission Mask for UE category M1.

When using the MX887065A, 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.

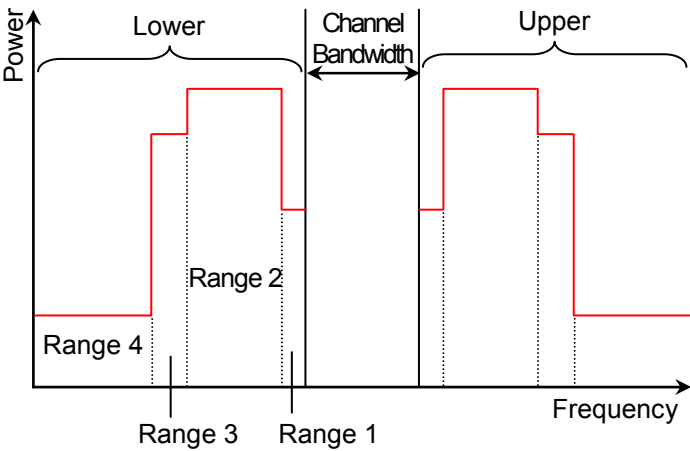


Figure 2.4-1 Mask Range of Spectrum Emission Mask

Table 2.4-1 Frequency Ranges of Range 1 to 4

		Frequency Ranges			
additionalSpectrumEmission	Channel Bandwidth (MHz)	Range 1	Range 2	Range 3	Range 4
NS_01 NS_02 NS_03 NS_04 NS_05	1.4	0 to 1 MHz	1 to 2.5 MHz	2.5 to 2.8 MHz	-----
	3.0	0 to 1 MHz	1 to 5 MHz	5 to 6 MHz	-----
	5	0 to 1 MHz	1 to 5 MHz	5 to 6 MHz	6 to 10 MHz
	10	0 to 1 MHz	1 to 5 MHz	5 to 10 MHz	10 to 15 MHz
	15	0 to 1 MHz	1 to 5 MHz	5 to 15 MHz	15 to 20 MHz
	20	0 to 1 MHz	1 to 5 MHz	5 to 20 MHz	20 to 25 MHz
Measurement bandwidth		30 kHz	1 MHz	1 MHz	1 MHz
NS_06 NS_07	1.4	0 to 0.1 MHz	0.1 to 1 MHz	1 to 2.5 MHz	2.5 to 2.8 MHz
	3.0	0 to 0.1 MHz	0.1 to 1 MHz	1 to 5 MHz	5 to 6 MHz
	5	0 to 0.1 MHz	0.1 to 1 MHz	1 to 6 MHz	6 to 10 MHz
	10	0 to 0.1 MHz	0.1 to 1 MHz	1 to 10 MHz	10 to 15 MHz
Measurement bandwidth		30 kHz	100 kHz	1 MHz	1 MHz

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, Excluding Guard period) at each measurement count.

AdditionalSpectrumEmission

Set the Network Signal Value for Additional Spectrum Emission. Then the frequency ranges change to the values shown in Table 2.4-1, and the limits change to the values shown in Table 2.4-2, depending on the setting.

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

additional SpectrumEmission	Range	Spectrum emission limit (dBm)/ Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
NS_03	1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5
	2	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
	3	-23.5	-23.5	-11.5	-11.5	-11.5	-11.5
	4	---	---	-23.5	-23.5	-23.5	-23.5
additional SpectrumEmission	Range	Spectrum emission limit (dBm)/ Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
NS_04	1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5
	2	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
	3	-23.5	-23.5	-23.5	-23.5	-23.5	-23.5
	4	---	---	-23.5	-23.5	-23.5	-23.5
additional SpectrumEmission	Range	Spectrum emission limit (dBm)/ Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
NS_06 NS_07	1	-11.5	-11.5	-13.5	-16.5	-18.5	-19.5
	2	-11.5	-11.5	-11.5	-11.5	-8.5	-8.5
	3	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
	4	-23.5	-23.5	-23.5	-23.5	-23.5	-23.5
additional SpectrumEmission	Range	Spectrum emission limit (dBm)/ Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Other than above	1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5
	2	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5
	3	-23.5	-23.5	-11.5	-11.5	-11.5	-11.5
	4	---	---	-23.5	-23.5	-23.5	-23.5



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.

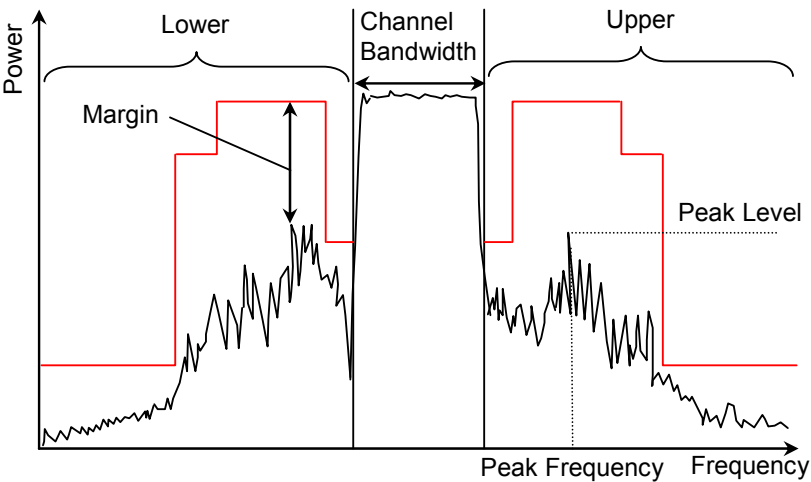


Figure 2.4-2 Spectrum Emission Mask Measurement Result

Table 2.4-3 Frequency Ranges for Measurement Results

NS\_06, NS\_07

Bandwidth (MHz)	Frequency Difference from Channel Bandwidth $\Delta f_{\text{OoB}}$ (MHz)							
	0-0.1	0.1-1	1-2.5	2.5-2.8	2.8-5	5-6	6-10	10-15
1.4	✓	✓	✓	✓				
3.0	✓	✓	✓	✓	✓	✓		
5	✓	✓	✓	✓	✓	✓	✓	
10	✓	✓	✓	✓	✓	✓	✓	✓
Measurement Bandwidth	30 kHz	100 kHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz
Frequency Range	1, -1	2, -2	3, -3	4, -4	5, -5	6, -6	7, -7	8, -8

Other than above

	Frequency Difference from Channel Bandwidth $\Delta f_{\text{OoB}}$ (MHz)								
Bandwidth (MHz)	0-1	1-2.5	2.5-2.8	2.8-5	5-6	6-10	10-15	15-20	20-25
1.4	✓	✓	✓						
3.0	✓	✓	✓	✓	✓				
5	✓	✓	✓	✓	✓	✓			
10	✓	✓	✓	✓	✓	✓	✓		
15	✓	✓	✓	✓	✓	✓	✓	✓	
20	✓	✓	✓	✓	✓	✓	✓	✓	✓
Measurement Bandwidth	30 kHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz
Frequency 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 ON/OFF and Measurement Count  
SEM\_SET  
:CONFigure:CELLular:CATM:FUNDamental:SEMask:SET
- AdditionalSpectrumEmission  
SIB2\_NS  
:CONFigure:CELLular:CATM:FUNDamental:SEMask:ASEmission

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

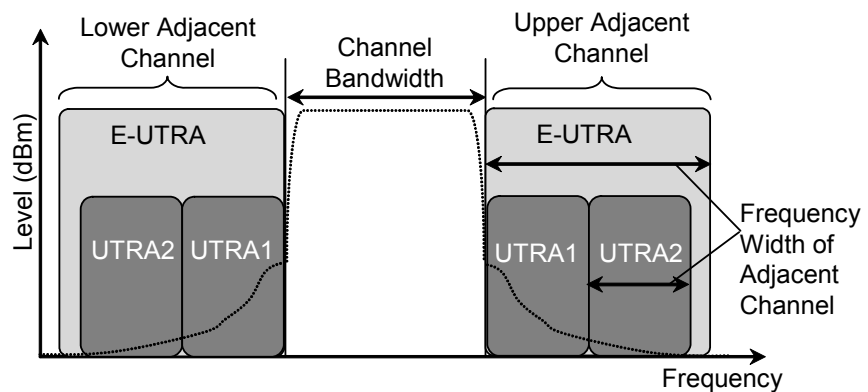
- Evaluation Result  
SEMPASS  
:FETCh:CELLular:CATM:FUNDamental:SEMask:JUDGement
- Peak Level and Frequency  
WORST\_SEM\_LV  
:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel  
TTL\_WORST\_SEM\_LV  
:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:TTL
- Margin and Frequency  
WORST\_SEM  
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGIN  
TTL\_WORST\_SEM  
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGIN:TTL

- Peak Level and Frequency (Detail)  
WORST\_SEM\_DET\_LV  
:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail  
TTL\_WORST\_SEM\_DET\_LV  
:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail:T  
TL
- Margin and Frequency (Detail)  
WORST\_SEM\_DET  
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail  
TTL\_WORST\_SEM\_DET  
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail:  
TTL

## 2.5 Adjacent Channel Leakage Power Ratio

Adjacent Channel Leakage Power Ratio (ACLR) is the ratio of in-band power to the power leaking to adjacent channels.

The E-UTRA (LTE) and UTRA (W-CDMA) bands are specified for adjacent channels. The power leaking to the two adjacent channels is measured for UTRA.



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

The ACLR measurement parameters are:

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

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

Channel Bandwidth	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
UTRA	3.84	3.84	3.84	3.84	3.84	3.84
E-UTRA	1.08	2.7	4.5	9.0	13.5	18

Measurement enable and measurement count

Enable ACLR measurement and specify the measurement count.

The Adjacent Channel Leakage Power Ratio is measured for 1 subframe (1 ms, Excluding Guard period) at each measurement count.

ACLR\_SET

:CONFigure:CELLular:CATM:FUNDamental:ACLR:SET

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

ACLR

:FETCh:CELLular:CATM:FUNDamental:ACLR

## 2.6 Modulation Analysis

Modulation analysis measures:

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

Use the following command to enable modulation analysis measurement and specify the measurement count.

Modulation analysis of 1 slot (0.5 ms, Excluding Guard period) is performed at each measurement count.

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

### **2.6.1 Frequency Error**

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

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

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

- **Carrier Frequency**  
CARRF  
:FETCh:CELLular:CATM:FUNDamental:MODulation:CFrequency
- **Frequency Error**  
CFERR  
:FETCh:CELLular:CATM:FUNDamental:MODulation:FERRor
- **Worst Value of Frequency Error**  
CFERR\_WORST  
:FETCh:CELLular:CATM:FUNDamental:MODulation:FERRor:WORSt

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

## 2.6.2 EVM

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

The difference in phase between the vector of the measured signal and the reference vector is called the phase error while the difference in magnitude is called the magnitude error.

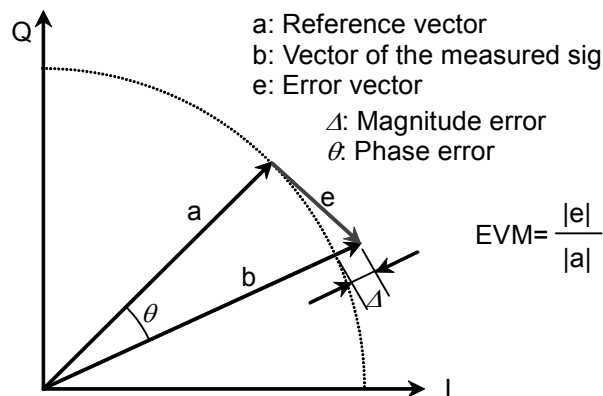


Figure 2.6.2-1 Definition of EVM

Query the EVM measurement result using the following commands:

- **EVM**  
EVM  
:FETCh:CELLular:CATM:FUNDamental:MODulation:EVM
- **Peak EVM**  
PVECTERR  
:FETCh:CELLular:CATM:FUNDamental:MODulation:PEVM
- **EVM of the Reference Signal**  
RSEVM  
:FETCh:CELLular:CATM:FUNDamental:MODulation:RSEVM
- **Phase Error**  
PHASEERR  
:FETCh:CELLular:CATM:FUNDamental:MODulation:PHERror
- **Magnitude Error**  
MAGTDERR  
:FETCh:CELLular:CATM:FUNDamental:MODulation:MERRor

The reference signal is defined in TS 36.211 5.5.2 “Demodulation Reference Signal”.

The target symbol for EVM measurement differs with RMC Configuration as described in Section 2.1.6 “Setting Category M signals”. (PUSCH and PUCCH measurements are available, but PRACH measurement is not.)

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

PUCCH: All Symbols are the target for EVM and peak EVM measurements. EVM of the reference signal cannot be measured.

### 2.6.3 Carrier leakage

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

- Carrier Leakage Result

CARRLEAK

:FETCh:CELLular:CATM:FUNDamental:MODulation:CARLeakage

### 2.6.4 Rho

Waveform quality ( $\rho$ : Rho) shows the correlation between an ideal noiseless waveform and the measured signal. It is 1 when both signals match each other.

The approximate relationship between Rho and EVM is:

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

Query the Rho measurement results using the following command:

RHO

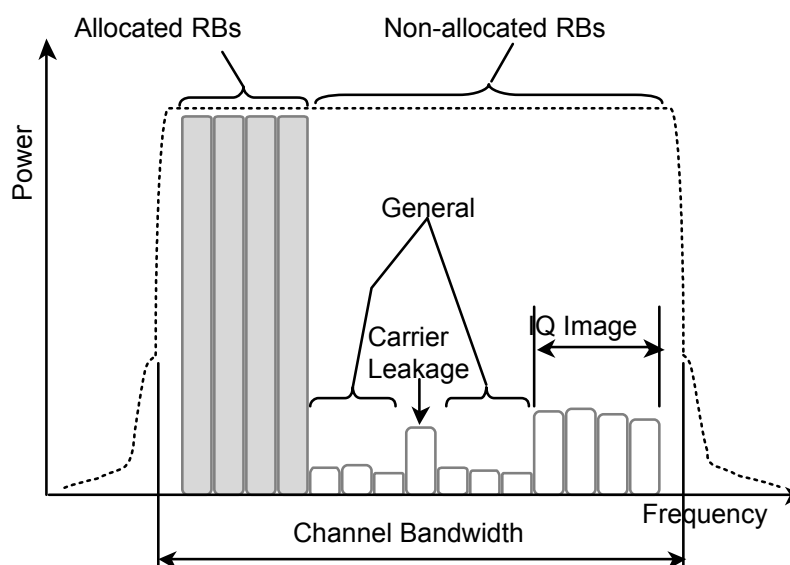
:FETCh:CELLular:CATM:FUNDamental:MODulation:RHO



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

The In-band Emission for Non-Allocated RB is the ratio between the signal power of the allocated RBs and the signal power in the non-allocated RBs.

TS 36.521-1 6.5.2.3EA “In-band Emission for non-allocated RB for UE category M1” specifies three measurement ranges: Carrier Leakage, General, and IQ Image.



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

Set the allocated RB using Narrowbands Index, UL RMC Number of RB, and UL RMC Starting RB as described in Section 2.1.6 “Setting Category M signals”.

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

- Carrier Leakage  
`INBANDE_LEAK`  
`:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions`  
`:CARLeakage`
- General  
`INBANDE_GEN`  
`:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions`  
`:GENeral`
- IQ Image  
`INBANDE_IMG`  
`:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions`  
`:IQIMage`

- In-Band Emissions limit - General

INBANDE\_GENUL

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:LIMit:GENeral

- In-Band Emissions limit - IQ Image

INBANDE\_IMG

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:LIMit:IQIMage

- In-Band Emissions limit - Carrier Leakage

INBANDE\_LEAKUL

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:LIMit:CARLeakage

- In-Band Emissions margin

INBANDE\_MARG

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:MARGin

- In-Band Emissions Measured Item

INBANDEITEM

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:ITEM

- In-Band Emissions Judgement

INBANDEPASS

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions  
:JUDGement

2.6.6 IQ Imbalance

Query the IQ Imbalance measurement result using the following command:

- IQ Imblance (%) Result  
IQIMB\_PER  
:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalanc  
e:PERCent
- IQ Imblance (dB) Result  
IQIMB\_DB  
:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalanc  
e:DB

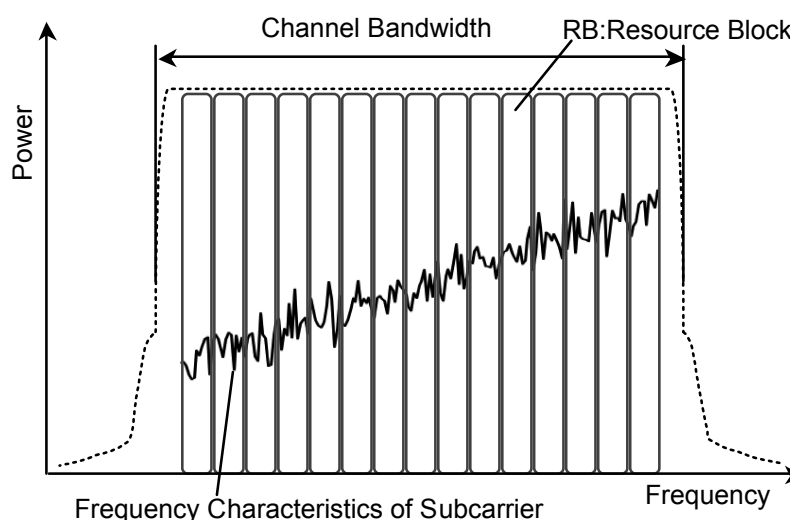
IQ Imbalance measurement is performed only under the following conditions.

Table 2.6.6-1 IQ Imbalance measurement conditions

Item	RMC Configuration	IBEM_CLFR	Channel Bandwidth	UL RMC Number of RB
Setting	PUSCH	NBC	All	6
		CFR	1.4 MHz	6

## 2.6.7 Spectrum Flatness

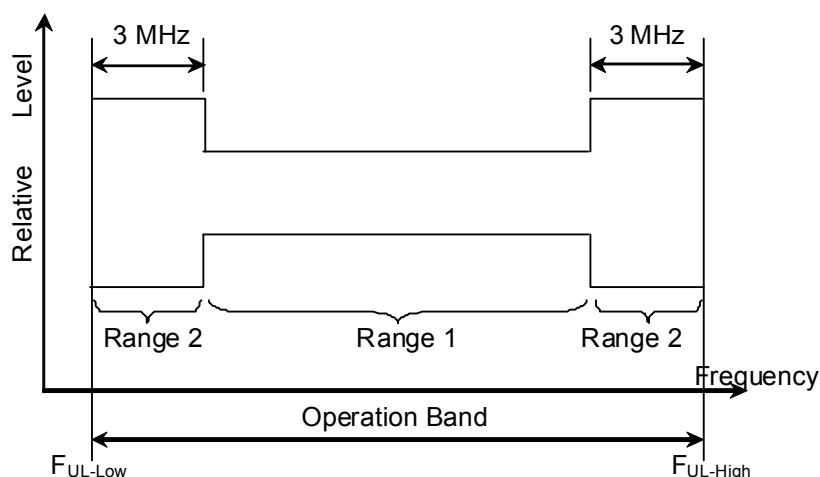
Spectrum Flatness measurement measures the maximum and minimum values of the relative level of the subcarriers.



**Figure 2.6.7-1 Measurement Range of Spectrum Flatness**

TS 36.521-1 6.5.2.4EA EVM equalizer spectrum flatness for UE category M1 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 2.6.7-2 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.

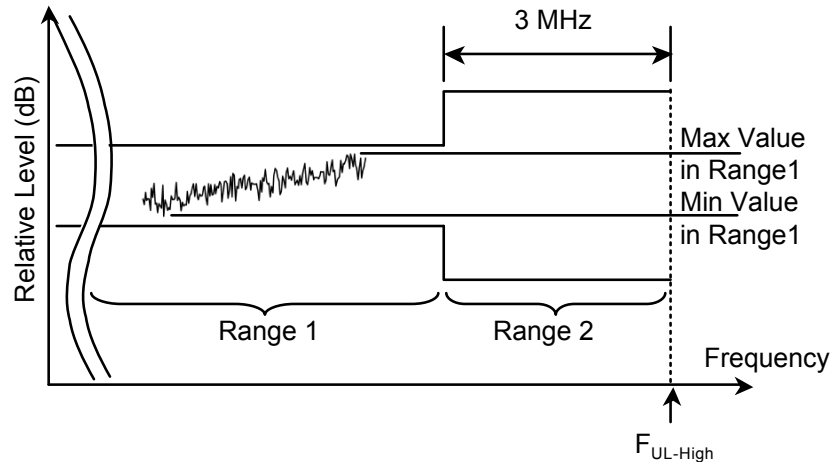


Figure 2.6.7-3 Channel Bandwidth in Range 1

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

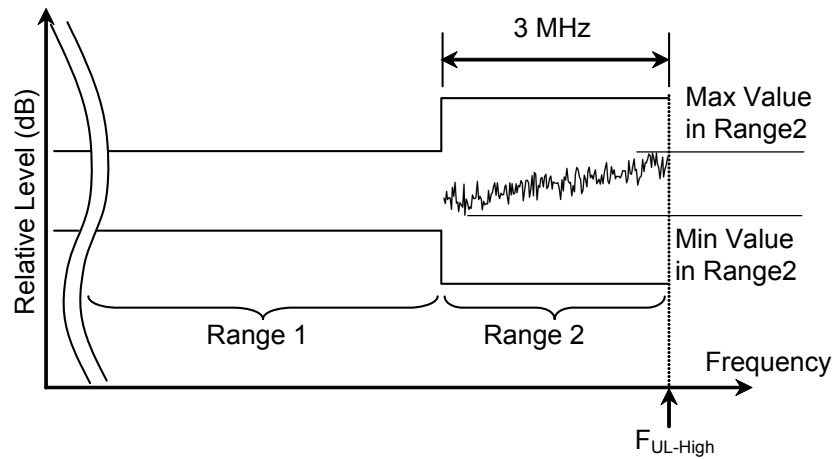


Figure 2.6.7-4 Channel Bandwidth in Range 2

When the measurement range crosses both Range 1 and Range 2, the following values are measured:

Maximum value, Minimum value,  
and Ripple (maximum value – minimum value) of Range 1

Maximum value, Minimum value,  
and Ripple (maximum value – minimum value) of Range 2

Difference between maximum value of Range 2  
and minimum value of Range 1

Difference between maximum value of Range 1  
and minimum value of Range 2

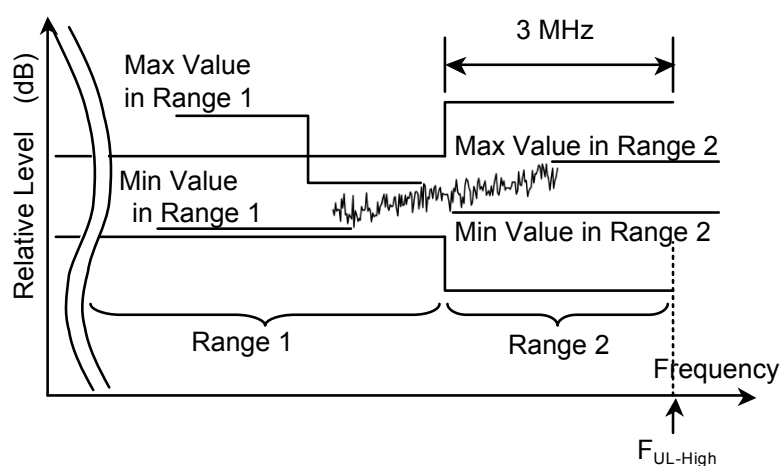
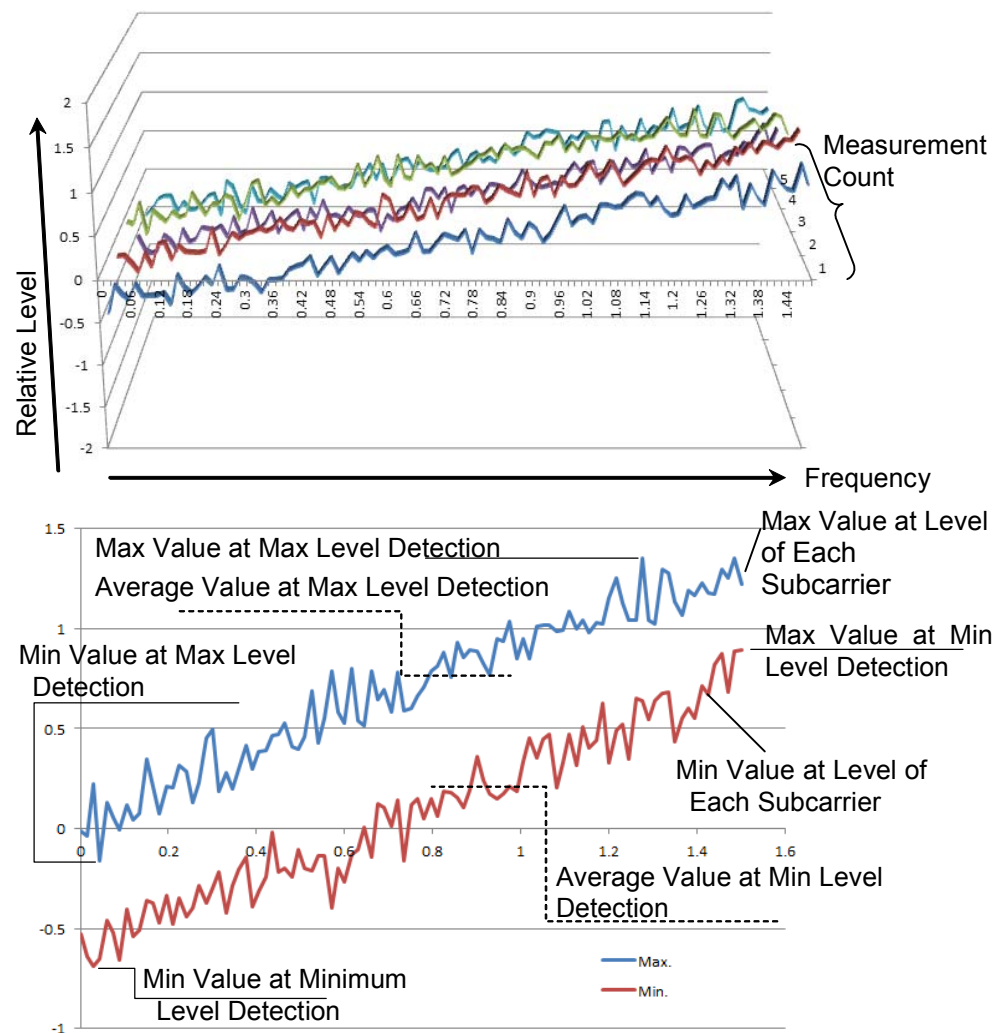


Figure 2.6.7-5 Channel Bandwidth Crossing Range 1 and Range 2

The MX887065A 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 2.6.7-6 Types of Spectrum Flatness Measurement Results**

- Operation band

The threshold line for spectrum flatness is determined by setting the operation band.

BAND

:CONFigure:CELLular:CATM:FUNDamental:BAND

Query the spectrum flatness measurement results using the following commands:

- Range 1 Maximum Value

SPECFLAT1\_P

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness

:R1P

- **Range 1 Minimum Value**  
SPECFLAT1\_M  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:R1M
- **Range 1 Worst Value**  
SPECFLAT1  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:R1
- **Range 1 Ripple**  
SPECFLAT\_RP1  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:RP1
- **Range 2 Maximum Value**  
SPECFLAT2\_P  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:R2P
- **Range 2 Minimum Value**  
SPECFLAT2\_M  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:R2M
- **Range 2 Worst Value**  
SPECFLAT2  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:R2
- **Range 2 Ripple**  
SPECFLAT\_RP2  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:RP2
- **Range 2 Maximum Value – Range 1 Minimum Value**  
SPECFLAT\_RP21  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:RP21
- **Range 1 Maximum Value – Range 2 Minimum Value**  
SPECFLAT\_RP12  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:RP12
- **Spectrum Flatness Measured Item**  
SPECFLATITEM  
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness  
:ITEM
- **Spectrum Flatness Judgement**  
SPECFLATPPPASS  
:FETCh:CELLular:CATM: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:CATM:FUNDamental:TRACe

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

**Table 2.7-1 Waveform Data Type and Data Interval**

Measurement Item	Query Parameter	Data Interval
Occupied Bandwidth	1	5.625 kHz
Spectrum Emission Mask	2	5.625 kHz
Constellation (I)	3	Subcarrier (15 kHz)
Constellation (Q)	4	
EVM (Average)	5	Subcarrier (15 kHz)
EVM (Maximum)	6	
Phase Error (Average)	7	Subcarrier (15 kHz)
Phase Error (Maximum)	8	
Magnitude Error (Average)	9	Subcarrier (15 kHz)
Magnitude Error (Maximum)	10	
In-band Emissions dB (Average)	11	Resource Block (180 kHz)
dB (Maximum)	12	
dBc (Average)	13	
dBc (Maximum)	14	
Spectrum Flatness (Average)	15	Subcarrier (15 kHz)
(Maximum)	16	
(Minimum)	17	

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)					
	1.4	3	5	10	15	20
Occupied Bandwidth	655	1359	2255	4495	6735	8975
Spectrum Emission Mask	1135	2255	3695	5487	7247	9039
Constellation	72	180	300	600	900	1200
EVM	72	180	300	600	900	1200
Phase Error	72	180	300	600	900	1200
Magnitude Error	72	180	300	600	900	1200
In-band Emissions	6	15	25	50	75	100
Spectrum Flatness	72	180	300	600	900	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 MX887065A.
2. Set the following measurement conditions.
 

Test Port	Port 1
Input Level	−10 dBm
Uplink Frequency	1940 MHz
Frame Configuration	FDD
Duplex Mode	Half Duplex
Channel Bandwidth	1.4 MHz
Channel Configuration	PUSCH
RMC Modulation scheme	QPSK
Narrowband Index	0
Starting RB Number	0
Number of RB	6
Tx Power Measurement	OFF
Occupied Bandwidth Measurement	OFF
Spectrum Emission Mask Measurement	ON, 100 times
Adjacent Channel Leakage Power Ratio Measurement	OFF
Modulation Analysis	OFF
3. Start measurement.
4. Read the measurement status.
5. Query measurement results after measurement is completed.

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

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

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

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

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

; Set Input Range to "-10 dBm".
sendln 'ILVL -10'
call check_error_code

; Set center frequency to "1940 MHz".
sendln 'ULFREQ 1940MHZ'
call check_error_code

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

; Set Duplex Mode to "Half Duplex".
sendln 'DUPLEXMODE HALF'
call check_error_code
```

```
; Set Channel Bandwidth to "1.4MHz".
sendln 'BANDWIDTH 1.4MHZ'
call check_error_code

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

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

; Set Narrowband Index to "0".
sendln 'ULRMC_NARROW 0'
call check_error_code

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

; Set Count of RB to "6".
sendln 'ULRMC_RB 6'
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 'SEMPASS?'
call check_error_code

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

; Query Margin in each range
sendln 'TTL_WORST_SEM?'
call check_error_code

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

messagebox 'Macro end successfully' 'Finish'

End

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

:check_error_code
; query error
sendln 'SYSERR?'
```

```
waitln 'No error'

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

; in case of no error

return

:check_response

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

return

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

## 2.8.2 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 MX887065A.
2. Set the following measurement conditions.

Test Port	Port 2
Input Level	−20 dBm
Uplink Frequency	1940 MHz
Frame Structure	FDD
Duplex Mode	Half Duplex
Channel Bandwidth	5 MHz
Channel Configuration	PUSCH
RMC Modulation scheme	QPSK
Narrowband Index	0
Starting RB Number	0
Number of RB	1
Tx Power	OFF
Occupied Bandwidth Measurement	OFF
Spectrum Emission Mask Measurement	OFF
Adjacent Channel Leakage Power Ratio Measurement	OFF
Modulation Analysis	ON, 200 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	
IQ Imbalance	
Waveform Quality	
In-band Emissions	General, IQ Image, Carrier Leakage
Spectrum Flatness	Maximum, Minimum, Ripple, Worst value of Range 1 Maximum, Minimum, Ripple, Worst value of Range 2 Difference between maximum value of Range 2 and minimum value of Range 1 Difference between maximum value of Range 1 and minimum value of Range 2

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

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

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

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

; Set test port to "Port2".
sendln ':ROUT:PORT:CONN:DIR PORT2,PORT2'
call check_error_code

; Set channel to "9750".
sendln ':CONF:CELL:MEAS:RFS:ULCH 9750'
call check_error_code

; Set Input Level to "-20 dBm".
sendln ':CONF:CELL:MEAS:RFS:LEV -20'

; Set Frame Structure to "FDD".
sendln ':CONF:CELL:CATM:FSTR FDD'
call check_error_code

; Set Duplex Mode to "Half Duplex".
sendln ':CONF:CELL:CATM:DUPL HALF'
call check_error_code
```

```
; Set Channel Bandwidth to "5MHz".
sendln ':CONF:CELL:CATM:CBAN 5MHZ'
call check_error_code

; Set RMC Configuration to "PUSCH".
sendln ':CONF:CELL:CATM:CTYP PUSCH'
call check_error_code

; Set RMC Modulation to "QPSK".
sendln ':CONF:CELL:CATM:MOD:MSCH QPSK'
call check_error_code

; Set Narrowband Index to "0".
sendln ':CONF:CELL:CATM:NARR 0'
call check_error_code

; Set Starting RB Number to "3.75kHz".
sendln ':CONF:CELL:CATM:RBAL:ORB 0'
call check_error_code

; Set Count of RB to "1".
sendln ':CONF:CELL:CATM:RBAL:NRB 1'
call check_error_code

; Set Measurement of Transmit Power to "OFF".
sendln ':CONF:CELL:CATM:FUND:POW:SET OFF'
call check_error_code

; Set Measurement of Occupied Bandwidth to "OFF".
sendln ':CONF:CELL:CATM:FUND:OBW:SET OFF'
call check_error_code

; Set Measurement of Spectrum Emission Mask to "OFF".
sendln ':CONF:CELL:CATM:FUND:SEM:SET OFF'
call check_error_code

; Set Measurement of Adjacent Channel Leakage power Ratio to "OFF".
sendln ':CONF:CELL:CATM:FUND:ACLR:SET OFF'
call check_error_code

; Set Measurement of Modulation Analysis to "ON","200 times".
sendln ':CONF:CELL:CATM:FUND:MOD:SET ON,200'
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:CATM:FUND:MOD:CFR? AVG'
call check_error_code

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

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

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

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

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

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

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

; Query IQ Imbalance
sendln ':FETC:CELL:CATM:FUND:MOD:IQIM:DB? TTL'
call check_error_code

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

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

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

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

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

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

; Query Spectrum Flatness - Range 1 Worst
sendln ':FETC:CELL:CATM:FUND:MOD:ESFL:R1?'
call check_error_code
```

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

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

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

; Query Spectrum Flatness - Range 2 Worst
sendln ':FETC:CELL:CATM:FUND:MOD:ESFL:R2?'
call check_error_code

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

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

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

messagebox 'Macro end successfully' 'Finish'

End

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

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

```

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

; in case of no error

return

:check_response

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

return

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

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 ..... 4-20
  - 4.2.1 Common commands ..... 4-21
  - 4.2.2 Fundamental measurement commands ..... 4-35

## 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.
{ }	Choose one of the groups in braces. A B({C D}) indicates a choice of A, B(C), or A, B(D).

### 4.1.1 Common commands

#### Operation Status Register

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

#### Questionable Register

Function	Command	Query	Response
Measurement Questionable Status Register Query	-----	:STATus:QUESTionable:MEASure[:EVENT]?	<mqsrr>

#### Common

Function	Command	Query	Response
Standard Select	:CONFigure:CELLular:MEASurement:STANdard <std>	:CONFigure:CELLular:MEASurement:STANdard?	<std>
Set Connect Port Direction	:ROUTe:PORT:CONNect:DIRec tion <input>,<output>	:ROUTe:PORT:CONNect:DIRec tion?	<input>,<output>

#### Measurement

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

## Common Parameters

Function	Command	Query	Response
Output Level On/Off	:CONFigure:CELLular:GENerator:RFSettings:STATE <on_off>	:CONFigure:CELLular:GENerator:RFSettings:STATE?	<on_off>
Output Signal Modulation	:CONFigure:CELLular:GENerator:BBMode <on_off>	:CONFigure:CELLular:GENerator:BBMode?	<on_off>
Waveform File Select	:CONFigure:CELLular:GENerator:ARB:PACKage:SElect <pac>	:CONFigure:CELLular:GENerator:ARB:PACKage:SElect?	<pac>
Waveform Pattern Select	:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect <pat>	:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect?	<pat>
Waveform Pattern Select (SYNC)	:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC <pat>	:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC?	<pat>

## System

Function	Command	Query	Response
Application Select	:INSTrument[:SElect] <app>	:INSTrument[:SElect]?	<app>
Language Selection of Remote Command	:SYSTem:LANGUage <mode>	:SYSTem:LANGUage?	<mode>

## 4.1.2 Fundamental measurement commands

### Common Parameters

Function	Command	Query	Response
Channel Bandwidth	:CONFigure:CELLular:CATM:CBANdwidth <bandwidth>	:CONFigure:CELLular:CATM:CBANdwidth?	<bandwidth>
Uplink Channel	:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel <ul_ch>	:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel?	<ul_ch>
Uplink Frequency	:CONFigure:CELLular:MEASurement:RFSettings:FREQuency <ul_freq>	:CONFigure:CELLular:MEASurement:RFSettings:FREQuency?	<ul_freq>
Downlink Channel	:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel <dl_ch>	:CONFigure:CELLular:MEASurement:RFSettings:DLCHannel?	<dl_ch>
Downlink Frequency	:CONFigure:CELLular:GENerator:RFSettings:FREQuency <dl_freq>	:CONFigure:CELLular:GENerator:RFSettings:FREQuency?	<dl_freq>
Operation Band	:CONFigure:CELLular:CATM:FUNDamental:BAND <band>	:CONFigure:CELLular:CATM:FUNDamental:BAND?	<band>
Input Level	:CONFigure:CELLular:MEASurement:RFSettings:LEVel <level>	:CONFigure:CELLular:MEASurement:RFSettings:LEVel?	<level>
Output Level (Total)	:CONFigure:CELLular:GENerator:RFSettings:LEVel <level>	:CONFigure:CELLular:GENerator:RFSettings:LEVel?	<level>
Output Level (Total 1.4 MHz)	:CONFigure:CELLular:GENerator:RFSettings:LEVel:NARRowband <level>	:CONFigure:CELLular:GENerator:RFSettings:LEVel:NARRowband?	<level>

## Category M Setting

Function	Command	Query	Response
Frame Structure	:CONFigure:CELLular:CATM: FSTRucture <mode>	:CONFigure:CELLular:CATM: FSTRucture?	<mode>
Duplex Mode	:CONFigure:CELLular:CATM: DUPLex <mode>	:CONFigure:CELLular:CATM: DUPLex?	<mode>
Channel Coding	:CONFigure:CELLular:CATM: CHCoding <object>	:CONFigure:CELLular:CATM: CHCoding?	<object>
RMC Configuration	:CONFigure:CELLular:CATM: CTYPE <val>	:CONFigure:CELLular:CATM: CTYPE?	<val>
nRB-CQI	:CONFigure:CELLular:CATM: RBCQi <value>	:CONFigure:CELLular:CATM: RBCQi?	<value>
UL RMC Narrowband Index	:CONFigure:CELLular:CATM: NARRowband <index>	:CONFigure:CELLular:CATM: NARRowband?	<index>
UL RMC Number of RB	:CONFigure:CELLular:CATM: RBAllocation:NRB <ul_rmc_rb>	:CONFigure:CELLular:CATM: RBAllocation:NRB?	<ul_rmc_rb>
UL RMC Starting RB	:CONFigure:CELLular:CATM: RBAllocation:ORB <ulrb>	:CONFigure:CELLular:CATM: RBAllocation:ORB?	<ulrb>
UL RMC MCS Index	:CONFigure:CELLular:CATM: MCS <ulimcs>	----	----
UL RMC Modulation	:CONFigure:CELLular:CATM: MODulation:MSCHeme <ul_rmc_mod>	:CONFigure:CELLular:CATM: MODulation:MSCHeme?	<ul_rmc_mod>

## Category M Setting (Cont'd)

Function	Command	Query	Response
Group Hopping	:CONFigure:CELLular:CATM:GHOPping <on_off>	:CONFigure:CELLular:CATM:GHOPping?	<on_off>
Cell ID	:CONFigure:CELLular:CATM:CID <id>	:CONFigure:CELLular:CATM:CID?	<id>
Cyclic Shift	:CONFigure:CELLular:CATM:CSHift <val>	:CONFigure:CELLular:CATM:CSHift?	<val>
Delta SS	:CONFigure:CELLular:CATM:DSS <val>	:CONFigure:CELLular:CATM:DSS?	<val>
RB Search	:CONFigure:CELLular:CATM:FUNDamental:RBSearch <on_off>	:CONFigure:CELLular:CATM:FUNDamental:RBSearch?	<on_off>
In-band Emissions/ EVM Carrier Leakage Frequency	:CONFigure:CELLular:CATM:FUNDamental:IEMissions:CLFRequency <clf>	:CONFigure:CELLular:CATM:FUNDamental:IEMissions:CLFRequency?	<clf>
Trigger Source	:TRIGger:CELLular:CATM:FUNDamental:SOURce <source>	:TRIGger:CELLular:CATM:FUNDamental:SOURce?	<source>
Trigger Level	:TRIGger:CELLular:CATM:FUNDamental:LEVel <level>	:TRIGger:CELLular:CATM:FUNDamental:LEVel?	<level>
Trigger Delay	:TRIGger:CELLular:CATM:FUNDamental:DELay <delay>	:TRIGger:CELLular:CATM:FUNDamental:DELay?	<delay>
Trigger Timeout	:TRIGger:CELLular:CATM:FUNDamental:TOUT <time>	:TRIGger:CELLular:CATM:FUNDamental:TOUT?	<time>

## Fundamental Measurement Parameter

Function	Command	Query	Response
Power Measurement On/Off and Meas. Count	:CONFigure:CELLular:CATM:FUNDamental:POWer:SET <on_off>[,<avg_count>]	:CONFigure:CELLular:CATM:FUNDamental:POWer:SET?	<on_off>,<avg_count>
OBW On/Off and Meas. Count	:CONFigure:CELLular:CATM:FUNDamental:OBW:SET <on_off>[,<avg_count>]	:CONFigure:CELLular:CATM:FUNDamental:OBW:SET?	<on_off>,<avg_count>
SEM On/Off and Meas. Count	:CONFigure:CELLular:CATM:FUNDamental:SEMask:SET <on_off>[,<avg_count>]	:CONFigure:CELLular:CATM:FUNDamental:SEMask:SET?	<on_off>,<avg_count>
ACLR On/Off and Meas. Count	:CONFigure:CELLular:CATM:FUNDamental:ACLR:SET <on_off>[,<avg_count>]	:CONFigure:CELLular:CATM:FUNDamental:ACLR:SET?	<on_off>,<avg_count>
Modulation Analysis On/Off and Meas. Count	:CONFigure:CELLular:CATM:FUNDamental:MODulation:SET <on_off>[,<avg_count>]	:CONFigure:CELLular:CATM:FUNDamental:MODulation:SET?	<on_off>,<avg_count>
All Measurement Items Off	:CONFigure:CELLular:CATM:FUNDamental:AMITems:OFF	----	----
additionalSpectrumEmission	:CONFigure:CELLular:CATM:FUNDamental:SEMask:ASEMis sion <sib2_ns>	:CONFigure:CELLular:CATM:FUNDamental:SEMask:ASEMis sion?	<sib2_ns>



## Result (Power Measurement, Occupied Bandwidth)

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

## Result (Spectrum Emission Mask)

Function	Command	Query	Response
SEM Judgement	----	:FETCh:CELLular:CATM:FUND amental:SEMask:JUDGement?	<judgement>
SEM Worst Value	----	:FETCh:CELLular:CATM:FUND amental:SEMask:LEVel? <range>	<level>,<freq>
SEM Worst Value (All range)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:LEVel:TTL?	<level (-1)>,<freq (-1)>,...,<level (-4)>,<freq (-4)>, <level (1)>,<freq (1)>,...,<level (4)>,<freq (4)>
SEM Template Margin	----	:FETCh:CELLular:CATM:FUND amental:SEMask:MARGin? <range>	<margin>,<freq>
SEM Template Margin (All range)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:MARGin:TTL ?	<margin (-1)>,<freq (-1)>,...,<margin (-4)>,<freq (-4)>, <margin (1)>,<freq (1)>,...,<margin (4)>,<freq (4)>
SEM Worst Value (Detail)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:LEVel:DETa il? <range>	<level>,<freq>
SEM Worst Value (Detail) (All range)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:LEVel:DETa il:TTL?	<level (-1)>,<freq (-1)>,...,<level (-9)>,<freq (-9)>, <level (1)>,<freq (1)>,...,<level (9)>,<freq (9)>
SEM Template Margin (Detail)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:MARGin:DET ail? <range>	<margin>,<freq>
SEM Template Margin (Detail) (All range)	----	:FETCh:CELLular:CATM:FUND amental:SEMask:MARGin:DET ail:TTL?	<margin (-1)>,<freq (-1)>,...,<margin (-9)>,<freq (-9)>, <margin (1)>,<freq (1)>,...,<margin (9)>,<freq (9)>

## Result (Adjacent Channel Power)

Function	Command	Query	Response
ACLR Result	----	:FETCh:CELLular:CATM:FUND amental:ACLR? <mode>	<aclr(E-UTRA_LOW)>,<aclr(E-UTRA_UP)>, <aclr(UTRA_LOW2)>,<aclr(UTRA_LOW1)>, <aclr(UTRA_UP1)>,<aclr(UTRA_UP2)> <mode>=AVG,MAX,MIN  <avg(E-UTRA_LOW)>,<avg(E-UTRA_UP)>, <avg(UTRA_LOW2)>,<avg(UTRA_LOW1)>, <avg(UTRA_UP1)>,<avg(UTRA_UP2)>, <max(E-UTRA_LOW)>,<max(E-UTRA_UP)>, <max(UTRA_LOW2)>,<max(UTRA_LOW1)>, <max(UTRA_UP1)>,<max(UTRA_UP2)>, <min(E-UTRA_LOW)>,<min(E-UTRA_UP)>, <min(UTRA_LOW2)>,<min(UTRA_LOW1)>, <min(UTRA_UP1)>,<min(UTRA_UP2)> <mode>=TTL

### Result (Modulation Analysis)

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

## Result (Modulation Analysis) (Cont'd)

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

## Result (In-band emissions for non allocated RB)

Function	Command	Query	Response
In-Band Emissions Measured Item	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:ITEM?	<flag>
In-Band Emissions Judgement	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:JUDGement?	<judgement>
In-Band Emissions (General) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:GENeral? [<mode>]	<ibe> <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<ibe(1)>,...,<ibe[s]> <mode>=IND MAX when <mode> is omitted.
In-Band Emissions limit (General)	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:LIMit:GENeral?	<level>
In-Band Emissions (IQ Image) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:IQIMage? [<mode>]	<ibe> <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<ibe(1)>,...,<ibe[s]> <mode>=IND MAX when <mode> is omitted.
In-Band Emissions limit (IQ Image)	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:LIMit:IQIMage?	<level>

## Result (In-band emissions for non allocated RB (Cont'd), IQ Imbalance)

Function	Command	Query	Response
In-Band Emissions (Carrier Leakage) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:CARLeakage? [<mode>]	<ibe> <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<ibe(1)>,...,<ibe[s]> <mode>=IND MAX when <mode> is omitted.
In-Band Emissions limit (Carrier Leakage)	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:LIMit:CARLeakage?	<level>
In-Band Emissions Margin	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:MARGin?	<margin>
IQ Imbalance (%) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:PERCent? [<mode>]	<percent> <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL AVG when <mode> is omitted.
IQ Imbalance (dB) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:DB? [<mode>]	<level> <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL AVG when <mode> is omitted.

## Result (Spectrum flatness)

Function	Command	Query	Response
Spectrum Flatness Measured Item	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:ITEM?	<flag>
Spectrum Flatness Judgement	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:JUDGement?	<judgement>
Spectrum Flatness ( $\geq 3$ MHz (RP1)) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP1? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<sflatness(1)>,...,<sflatness(s)> <mode>=IND MAX when <mode> is omitted.
Spectrum Flatness (RP12) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP12? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<sflatness(1)>,...,<sflatness(s)> <mode>=IND MAX when <mode> is omitted.
Spectrum Flatness (<3 MHz (RP2)) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP2? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<sflatness(1)>,...,<sflatness(s)> <mode>=IND MAX when <mode> is omitted.
Spectrum Flatness (RP21) Result	----	:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP21? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL <s>,<sflatness(1)>,...,<sflatness(s)> <mode>=IND MAX when <mode> is omitted.



## Result (Spectrum flatness) (Cont'd)

Function	Command	Query	Response
Spectrum Flatness ( $\geq 3$ MHz) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R1?	<worst>
Spectrum Flatness ( $\geq 3$ MHz (R1 -)) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R1M? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL MIN when <mode> is omitted.
Spectrum Flatness ( $\geq 3$ MHz (R1 +)) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R1P? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL MAX when <mode> is omitted.
Spectrum Flatness (<3 MHz) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R2?	<worst>
Spectrum Flatness (<3 MHz (R2 -)) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R2M? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL MIN when <mode> is omitted.
Spectrum Flatness (<3 MHz (R2 +)) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFlat ness:R2P? [<mode>]	<sflatness>           <mode>=AVG,MAX,MIN,DVT <avg>,<max>,<min> <mode>=TTL MAX when <mode> is omitted.

## Result (Spectrum flatness) (Cont'd)

Function	Command	Query	Response
Spectrum Flatness (RP Total) Result	----	:FETCh:CELLular:CATM:FUND amental:MODulation:ESFLat ness:RP? [<mode>]	<sflat (RP1)>,<sflat (RP2)>,<sflat (RP12)>, <sflat (RP21)>      <mode>=AVG,MAX,MIN,DVT <avg (RP1)>,<avg (RP2)>,<avg (RP12)>,<avg (R P21)>, <max (RP1)>,<max (RP2)>,<max (RP12)>,<max (R P21)>, <min (RP1)>,<min (RP2)>,<min (RP12)>,<min (R P21)>  <mode>=TTL <s>,<sflat (RP1) (1)>,<sflat (RP2) (1)>,<sfl at (RP12) (1)>,<sflat (RP21) (1)>,...,<sflat (RP1) (s)>,<sflat (RP2) (s)>,<sflat (RP12) (s )>,<sflat (RP21) (s)>  <mode>=IND MAX when <mode> is omitted.

## Result (Waveform)

Function	Command	Query	Response
Waveform	----	:FETCh:CELLular:CATM:FUND amental:TRACe? <format>,<position>,<leng th>[,<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 the current measurement.

Command

`:ABORt:CELLular:MEASurement`

Example of Use

To stop the current measurement:

`:ABOR:CELL:MEAS`

## :CONFigure:CELLular:GENerator:ARB:PACKage:SElect

### Waveform File Select

#### Function

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

#### Command

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

#### Query

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

#### Response

```
<pac>
```

#### Parameter

<pac>	Waveform file
-------	---------------

#### Details

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

#### Example of Use

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

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

#### Related command

Use the following command to load the waveform file into waveform memory.

```
SOUR:GPRF:GEN:ARB:FILE:LOAD
```

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

```
:SOURce:GPRF:GENerator:ARB:FILE:LOAD
```

The following command can be used to query the names of waveform files that have been loaded into waveform memory.

```
SOUR:GPRF:GEN:ARB:WAV:NAME?
```

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

```
:SOURce:GPRF:GENerator:ARB:WAVEform:NAME?
```

Use the following commands to select a waveform pattern to use from the waveform patterns included in the waveform file configured using the command described in this section.

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect
```

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC
```

```
:CONFigure:CELLular:SEQUence:RFSettings:TRX
```

**:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect**

## Waveform Pattern Select

## Function

Selects a waveform pattern to use from patterns included in waveform file.

When the command received, the signal is immediately switched regardless of the frame cycle of signal, so the frame cycle is not continued.

This command is also used to query the currently selected waveform pattern.

## Command

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect <pat>
```

## Query

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect?
```

## Response

```
<pat>
```

## Parameter

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

## Details

Select the waveform pattern for RF output signal in waveform file.

The pattern number is the same as the group number. Refer to Chapter 3, “Waveform File Details” in the *Waveform Files for Cellular Application Operation Manual*.

## Example of Use

To output the waveform pattern to 1:

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

## Related command

Waveform file for arbitrary waveform signal selection or query

```
:CONFigure:CELLular:GENerator:ARB:PACKage:SElect
```

## Remarks

The group number depends on the selected waveform file.

For details of the waveform pattern, refer to Chapter 3, “Waveform File Details” in the *Waveform Files for Cellular Application Operation Manual*.

## :CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC

Waveform Pattern Select (SYNC)

### Function

Selects a waveform pattern to use from patterns included in waveform file.

When the command received, the signal is switched according to the frame cycle of signal so that the frame cycle is continued.

This command is also used to query the currently selected waveform pattern.

### Command

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC <pat>
```

### Query

```
:CONFigure:CELLular:GENerator:ARB:WAVEform:PATtern:SElect:SYNC?
```

### Response

```
<pat>
```

### Parameter

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

### Details

Select the waveform pattern for RF output signal in waveform file.

The pattern number is the same as the group number. Refer to Chapter 3, “Waveform File Details” in the *Waveform Files for Cellular Application Operation Manual*.

### Example of Use

To output the waveform pattern to 1:

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

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

```
> PAT1
```

### Related command

Waveform file for arbitrary waveform signal selection or query

```
:CONFigure:CELLular:GENerator:ARB:PACKage:SElect
```

### Remarks

The group number depends on the selected waveform file.

For details of the waveform pattern, refer to Chapter 3, “Waveform File Details” in the *Waveform Files for Cellular Application Operation Manual*.



## :CONFigure:CELLular:GENerator:BBMode

Output Signal Modulation

### Function

Sets or queries MU887000A RF signal output modulation.

### Command

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

### Query

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

### Response

```
<on_off>
```

### Parameter

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

### Example of Use

```
To turn on the modulation.  
: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 at MU887000A connector.

### 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 turn on the RF signal transmitted from the MU887000A connector:

```
: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)
NBIOT	NB-IoT	(requires MX887067A)
CATM	Category M	(requires MX887065A)
SEQUENCE	Sequence measurement	(requires MX887010A)
SEQ	Sequence measurement	(requires MX887010A)
Default	COMMON	

Example of Use

```
To switch the measurement standard to SEQUENCE:
:CONF:CELL:MEAS:STAN SEQUENCE
:CONF:CELL:MEAS:STAN?
> SEQUENCE
```

Remarks

This parameter must be set to CATM 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>

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.

Example of Use

To query current measurement status:

:FETC:CELL:MEAS:STAT?

> 0

## :INITiate:CELLular:MEASurement:SINGle

### Measurement Start

#### Function

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

#### Command

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

#### Details

Sending this command executes one measurement execution.

Sending this command during measurement, aborts measurement once and restarts it.

ESR2 must be polled or sync processing via \*WAI is required to determine the timing of measurement completion.

#### Example of Use

To start measurement:

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

#### Related command

##### ESR2

For the details of the event status register, refer to Chapter 3 “Fundamental Operation” in the *MU887000A TRX Test Module Operation Manual*.

## :INSTrument[:SElect]

Application Select

Function

Sets or queries the type of application software executing on MU887000A.

Command

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

Query

```
:INSTrument[:SElect]?
```

Response

```
<app>
```

Parameter

<app>	Type of application software
CELLULAR	Cellular Application
SRW	SRW Application

Details

Set the parameter to CELLULAR and send the command before using the MX887065A.

Example of Use

To set the application software to CELLULAR:

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

Remarks

When using the MX887065A, set the application to CELLULAR using the SYSSEL command, and then set the standard to CATM using the STDSEL command.

:ROUTe:PORT:CONNection:DIRection

Set Connect Port Direction

Function  
Sets or queries connectors for inputting and outputting RF signals.

Command  
:ROUTe:PORT:CONNection:DIRection <input>,<output>

Query  
:ROUTe:PORT:CONNection:DIRection?

Response  
<input>,<output>

Parameters	
<input>	Test Port No.
PORT1	Test Port1
PORT2	Test Port2
PORT3	Test Port3
PORT4	Test Port4
Default	PORT1
<output>	Test Port No.
PORT1	Test Port1
PORT2	Test Port2
PORT3	Test Port3
PORT4	Test Port4
Default	PORT1

Details  
Both Test Port1 and Test Port2 can be set to input and output simultaneously.  
Test Port3 and Test Port4 can be set to either input or output at one time.  
Only Port1 and Port2 are used by the MX887065A.

Example of Use  
To set the RF signal input and output connectors to Test Port1 and Test Port2, respectively:  
:ROUT:PORT:CONN:DIR PORT1, PORT2  
:ROUT:PORT:CONN:DIR?  
> PORT1, PORT2

## :SYSTem:LANGuage

Language Selection of Remote Command

### Function

Switches the language mode of remote control commands.

### Command

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

### Query

```
:SYSTem:LANGuage?
```

### Response

```
<mode>
```

### Parameter

<mode>	Language mode
NAT	Native
SCPI	SCPI
Default	NAT

### Example of Use

To switch the language mode of remote control commands to Native.

```
:SYST:LANG NAT
```

```
:SYST:LANG?
```

```
>NAT
```



**: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**

&lt;mosr&gt;

**Parameter**

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

**Details**

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

**Example of Use**

To query content of measurement status event register:

:STAT:OPER:MEAS?

&gt; 1

## :STATus:QUESTionable:MEASure[:EVENT]?

Measurement Questionable Status Register Query

### Function

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

### Query

:STATus:QUESTionable:MEASure[:EVENT]?

### Response

<mqsr>

### Parameter

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

### Details

The sum of the values for bits of the occurring event from the values 2<sup>0</sup> = 1, 2<sup>1</sup> = 2 to 2<sup>15</sup> = 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
```

4.2.2 Fundamental measurement commands

:CONFigure:CELLular:CATM:CBANdwidth

Channel Bandwidth

Function

Sets or queries the Channel Bandwidth.

Command

:CONFigure:CELLular:CATM:CBANdwidth <bandwidth>

Query

:CONFigure:CELLular:CATM:CBANdwidth?

Response

<bandwidth>

Parameter

<bandwidth>	Bandwidth
1.4MHZ	1.4 MHz
3MHZ	3 MHz
5MHZ	5 MHz
10MHZ	10 MHz
15MHZ	15 MHz
20MHZ	20 MHz
Default	1.4MHZ

Example of Use

To set the channel bandwidth to 1.4 MHz:  
:CONF:CELL:CATM:CBAN 1.4MHZ  
:CONF:CELL:CATM:CBAN?  
> 1.4MHZ

Remarks

When the channel bandwidth is updated, Narrowband Index, Number of RB, Starting RB, and Output Level (Total) are changed accordingly.  
Narrowband Index is reset to 0, Number of RB is reset to 6, Starting RB is reset to 0.

## :CONFigure:CELLular:CATM:CHCoding

### Channel Coding

#### Function

Sets or queries the channel coding.

#### Command

:CONFigure:CELLular:CATM:CHCoding <object>

#### Query

:CONFigure:CELLular:CATM:CHCoding?

#### Response

<object>

#### Parameter

<object>	Target for channel coding
RMC	Reference Measurement Channel
Default	RMC

#### Examples of Use

To set the channel coding to RMC:

```
:CONF:CELL:CATM:CHC RMC
```

```
:CONF:CELL:CATM:CHC?
```

```
> RMC
```

:CONFigure:CELLular:CATM:CID

Cell ID

Function

Sets or queries the Cell ID.

Command

:CONFigure:CELLular:CATM:CID <id>

Query

:CONFigure:CELLular:CATM:CID?

Response

<id>

Parameter

<id>	Cell ID
Range	0 to 503
Resolution	1
Default	0
Suffix code	None

Example of Use

To set the Cell ID to 0:  
:CONF:CELL:CATM:CID 0  
:CONF:CELL:CATM:CID?  
> 0

## :CONFigure:CELLular:CATM:CSHift

Cyclic Shift

### Function

Sets or queries the Cyclic Shift.

### Command

```
:CONFigure:CELLular:CATM:CSHift <val>
```

### Query

```
:CONFigure:CELLular:CATM:CSHift?
```

### Response

```
<val>
```

### Parameter

<val>	Enables/disables Cyclic Shift
ON	Enables Cyclic Shift
OFF	Disables Cyclic Shift
AUTO	Sets the Cyclic Shift to Auto.
Default	ON

### Example of Use

To enable the Cyclic Shift:

```
:CONF:CELL:CATM:CSH ON
:CONF:CELL:CATM:CSH?
> ON
```

## :CONFigure:CELLular:CATM:CTYPe

RMC Configuration

Function

Sets or queries the channel configuration of uplink signal when Channel Coding is RMC.

Command

:CONFigure:CELLular:CATM:CTYPe <val>

Query

:CONFigure:CELLular:CATM:CTYPe?

Response

<val>

Parameter

<val>	RMC channel configuration
PUSCH	PUSCH
PUCCH	PUCCH
Default	PUSCH

Example of Use

To set the channel configuration of uplink signal to PUSCH:

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

## :CONFigure:CELLular:CATM:DSS

Delta SS

### Function

Sets or queries the Delta SS.

### Command

```
:CONFigure:CELLular:CATM:DSS <val>
```

### Query

```
:CONFigure:CELLular:CATM:DSS?
```

### Response

```
<val>
```

### Parameter

<val>	Delta SS
Range	0 to 29
Resolution	1
Default	0
Suffix code	None

### Example of Use

To set the Delta SS to 0:

```
:CONF:CELL:CATM:DSS 0
:CONF:CELL:CATM:DSS?
> 0
```



# `:CONFigure:CELLular:CATM:DUPLex`

Duplex Mode

Function

Sets or queries the Duplex Mode.

Command

`:CONFigure:CELLular:CATM:DUPLex <mode>`

Query

`:CONFigure:CELLular:CATM:DUPLex?`

Response

`<mode>`

Parameter

<code>&lt;mode&gt;</code>	Duplex Mode
HALF	Half Duplex
Default	HALF

Example of Use

To set the Duplex Mode to HALF:

```
:CONF:CELL:CATM:DUPL HALF
:CONF:CELL:CATM:DUPL?
> HALF
```

## :CONFigure:CELLular:CATM:FSTRucture

### Frame Structure

#### Function

Sets or queries the frame structure.  
This setting determines the duplex mode.

#### Command

```
:CONFigure:CELLular:CATM:FSTRucture <mode>
```

#### Query

```
:CONFigure:CELLular:CATM:FSTRucture?
```

#### Response

```
<mode>
```

#### Parameter

<mode>	Frame Structure
FDD	Frequency Division Multiplexing
Default	FDD

#### Example of Use

To set the frame structure to FDD:

```
:CONF:CELL:CATM:FSTR FDD
:CONF:CELL:CATM:FSTR?
> FDD
```

## :CONFigure:CELLular:CATM:FUNDamental:ACLR:SET

ACLR On/Off and Meas. Count

### Function

Sets or queries the ACLR measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:CATM:FUNDamental:ACLR:SET <on_off>[,<avg_count>]
```

### Query

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

### Response

```
<on_off>,<avg_count>
```

### Parameters

<on_off>	Enables/disables measurement.
ON	Enables measurement
OFF	Disables measurement
Default	ON
<avg_count>	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Examples of Use

To set the ACLR measurement to OFF:

```
:CONF:CELL:CATM:FUND:ACLR:SET OFF
:CONF:CELL:CATM:FUND:ACLR:SET?
> OFF
```

## **:CONFigure:CELLular:CATM:FUNDamental:AMITems:OFF**

All Measurement Items Off

### **Function**

Sets all fundamental measurement items to off at one time.

### **Command**

`:CONFigure:CELLular:CATM:FUNDamental:AMITems:OFF`

### **Example of Use**

To set all fundamental measurement items to off at one time:

`:CONF:CELL:CATM:FUND:AMIT:OFF`

## :CONFigure:CELLular:CATM:FUNDamental:BAND

Operation band

Function

Sets or queries the operation band.

Command

:CONFigure:CELLular:CATM:FUNDamental:BAND <band>

Query

:CONFigure:CELLular:CATM:FUNDamental:BAND?

Response

<band>

Parameter

<band>	Operation band
Range	0 to 256
Resolution	1
Default	1

Example of Use

To query the operation band:  
:CONF:CELL:CATM:FUND:BAND 1  
:CONF:CELL:CATM:FUND:BAND?  
> 1

Remarks

“0” is returned when the uplink or downlink channel number is set, but the set band is not found in Table 2.1.6-3.

When setting the operation band, change UL and DL channels as the following table.

Band	UL Channel	DL Channel	Band	UL Channel	DL Channel	Band	UL Channel	DL Channel
0	Not changed	4980	...	Not changed	Not changed	31	27785	9895
1	18300	300	17	23790	5790	32	Not changed	10140
2	18900	900	18	23925	5925	...		
3	19575	1575	19	24075	6075	65	131522	65986
4	20175	2175	20	24300	6300	66	132422	66886
5	20525	2525	21	24525	6525	67	Not changed	67436
6	20700	2700	22	25000	7000	68	132822	67686
7	21100	3100	23	25600	7600	69	Not changed	68086
8	21625	3625	24	25870	7870	70	133047	68461
9	21975	3975	25	26365	8365	71	133297	68761
10	22450	4450	26	26865	8865	...	Not changed	Not changed
11	22850	4850	27	27125	9125	252	Not changed	255644
12	23095	5095	28	27435	9435	...	Not changed	Not changed
13	23230	5230	29	Not changed	9715	255	Not changed	261494
14	23330	5330	30	27710	9820			

**:CONFigure:CELLular:CATM:FUNDamental:IEMissions:CLFRequency**

In-band Emissions/EVM Carrier Leakage Frequency

**Function**

Sets and queries the position of Carrier Leakage Frequency of the UE in the In-band Emission/EVM measurement

**Command**

```
:CONFigure:CELLular:CATM:FUNDamental:IEMissions:CLFRequency <clf>
```

**Query**

```
:CONFigure:CELLular:CATM:FUNDamental:IEMissions:CLFRequency?
```

**Response**

```
<clf>
```

**Parameter**

<clf>	Position of Carrier Leakage Frequency
CFR	Carrier Frequency
NBC	Narrow Band Center
Default	CFR

**Details**

**CFR:** The In-band Emission/EVM measurement is performed, treating the resource block located at the center frequency of Aggregated Channel Bandwidth as the carrier leakage frequency.

**NBC:** The In-band Emission/EVM measurement is performed, treating the center of assigned Narrow Band Index (6RB) as the carrier leakage frequency.

**Example of Use**

To set the position of Carrier Leakage Frequency to CFR:

```
:CONF:CELL:CATM:FUND:IEM:CLFR CFR
```

```
:CONF:CELL:CATM:FUND:IEM:CLFR?
```

```
> CFR
```

## :CONFigure:CELLular:CATM:FUNDamental:MODulation:SET

Modulation Analysis On/Off and Meas. Count

### Function

Sets or queries the Modulation Analysis On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:CATM:FUNDamental:MODulation:SET <on_off>[,<avg_count>]
```

### Query

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

### Response

```
<on_off>,<avg_count>
```

### Parameters

<on_off>	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	OFF
<avg_count>	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set the Modulation Analysis to On and measurement count to 200:

```
:CONF:CELL:CATM:FUND:MOD:SET ON,200
```

```
:CONF:CELL:CATM:FUND:MOD:SET?
```

```
> ON,200
```



## :CONFigure:CELLular:CATM:FUNDamental:OBW:SET

OBW On/Off and Meas. Count

### Function

Sets or queries the OBW (Occupied Bandwidth) measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:CATM:FUNDamental:OBW:SET <on_off>[,<avg_count>]
```

### Query

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

### Response

```
<on_off>,<avg_count>
```

### Parameters

<on_off>	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
<avg_count>	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set OBW measurement on and set the measurement count to 50:

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

## :CONFigure:CELLular:CATM:FUNDamental:POWer:SET

Power Measurement On/Off and Meas. Count

### Function

Sets or queries the Tx Power Measurement On/Off state and measurement count.

### Command

```
:CONFigure:CELLular:CATM:FUNDamental:POWer:SET <on_off>[,<avg_count>]
```

### Query

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

### Response

```
<on_off>,<avg_count>
```

### Parameters

<on_off>	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
<avg_count>	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set Tx Power measurement ON and set the measurement count to 200:

```
:CONF:CELL:CATM:FUND:POW:SET ON,200
```

```
:CONF:CELL:CATM:FUND:POW:SET?
```

```
> ON,200
```

## :CONFigure:CELLular:CATM:FUNDamental:RBSearch

### RB Search

#### Function

Sets or queries the RB Search On/Off state.

#### Command

```
:CONFigure:CELLular:CATM:FUNDamental:RBSearch <on_off>
```

#### Query

```
:CONFigure:CELLular:CATM:FUNDamental:RBSearch?
```

#### Response

```
<on_off>
```

#### Parameter

<on_off>	RB Search On/Off
ON	Enables RB Search. Detects the Resource Block automatically in 20 MHz bandwidth.
OFF	Disables RB Search. Measures the Resource Block specified by Narrowband Index.
Default	OFF

#### Example of Use

To enable the RB Search:

```
:CONF:CELL:CATM:FUND:RBS ON
:CONF:CELL:CATM:FUND:RBS?
> ON
```

## :CONFigure:CELLular:CATM:FUNDamental:SEMask:ASEMission

additionalSpectrumEmission

### Function

Sets or queries the additionalSpectrumEmission in SIB2.

This setting determines the Spectrum Emission Mask frequency range.

### Command

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

### Query

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

### Response

```
<sib2_ns>
```

### Parameter

<sib2_ns>	additionalSpectrumEmission
NS_01	NS_01
NS_02	NS_02
NS_03	NS_03
...	
NS_31	NS_31
NS_32	NS_32
Default	NS_01

### Example of Use

To set the additionalSpectrumEmission in SIB2 to NS\_02:

```
:CONF:CELL:CATM:FUND:SEM:ASEM NS_02
```

```
:CONF:CELL:CATM:FUND:SEM:ASEM?
```

```
> NS_02
```

**:CONFigure:CELLular:CATM:FUNDamental:SEMask:SET**

SEM On/Off and Meas. Count

**Function**

Sets or queries the SEM (Spectrum Emission Mask) Measurement On/Off state and measurement count.

**Command**

```
:CONFigure:CELLular:CATM:FUNDamental:SEMask:SET <on_off>[,<avg_count>]
```

**Query**

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

**Response**

```
<on_off>,<avg_count>
```

**Parameters**

<on_off>	Enables/disables the measurement.
ON	Enables the measurement.
OFF	Disables the measurement.
Default	OFF
<avg_count>	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

**Example of Use**

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

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

## :CONFigure:CELLular:CATM:GHOPping

### Group Hopping

#### Function

Sets or queries the Group Hopping On/Off state.

#### Command

```
:CONFigure:CELLular:CATM:GHOPping <on_off>
```

#### Query

```
:CONFigure:CELLular:CATM:GHOPping?
```

#### Response

```
<on_off>
```

#### Parameter

<on_off>	Enables/disables Group hopping.
ON	Enables Group hopping.
OFF	Disables Group hopping.
Default	ON

#### Example of Use

To enable Group hopping:

```
:CONF:CELL:CATM:GHOP ON
:CONF:CELL:CATM:GHOP?
> ON
```

## :CONFigure:CELLular:CATM:MCS

UL RMC MCS Index

### Function

Sets or queries the MCS Index of Uplink signal.

### Command

```
:CONFigure:CELLular:CATM:MCS <ulimcs>
```

### Parameter

<ulimcs>	UL MCS Index
Range	0 to 15
Resolution	1
Default	None
Suffix code	None

### Details

When the UL RMC MCS Index is set, Modulation scheme is set according to Table 2.1.6-1 “Relation Between MCS Index of UL RMC and Modulation”.

### Example of Use

To set the UL RMC MCS Index to 1:

```
:CONF:CELL:CATM:MCS 1
```

## :CONFigure:CELLular:CATM:MODulation:MSCHeme

### UL RMC Modulation

#### Function

Sets or queries the Modulation scheme of uplink signal.  
When the MCS Index is updated, the this parameter is changed accordingly.

#### Command

```
:CONFigure:CELLular:CATM:MODulation:MSCHeme <ul_rmc_mod>
```

#### Query

```
:CONFigure:CELLular:CATM:MODulation:MSCHeme?
```

#### Response

```
<ul_rmc_mod>
```

#### Parameter

<ul_rmc_mod>	Modulation scheme
QPSK	QPSK
16QAM	16QAM
Default	QPSK

#### Example of Use

To set the Modulation scheme to QPSK:

```
:CONF:CELL:CATM:MOD:MSCH QPSK  
:CONF:CELL:CATM:MOD:MSCH?  
> QPSK
```



:CONFigure:CELLular:CATM:NARRowband

ULRMC Narrowband Index

Function

Sets or queries the Narrowband Index.

Command

:CONFigure:CELLular:CATM:NARRowband <index>

Query

:CONFigure:CELLular:CATM:NARRowband?

Response

<index>

Parameter

<index>	Narrowband Index value	
Range	0	(Channel Bandwidth = 1.4 MHz)
	0 to 1	(Channel Bandwidth = 3 MHz)
	0 to 3	(Channel Bandwidth = 5 MHz)
	0 to 7	(Channel Bandwidth = 10 MHz)
	0 to 11	(Channel Bandwidth = 15 MHz)
	0 to 15	(Channel Bandwidth = 20 MHz)
Resolution	1	
Default	0	
Suffix code	None	

Example of Use

To set the Narrowband Index to 0:  
:CONF:CELL:CATM:NARR 0  
:CONF:CELL:CATM:NARR?  
> 0

Remarks

The Narrowband Index is reset to 0 when the channel bandwidth is updated.

## :CONFigure:CELLular:CATM:RBAllocation:NRB

UL RMC Number of RB

### Function

Sets or queries the number of assigned RBs (Resource Blocks) at Uplink RMC.

### Command

```
:CONFigure:CELLular:CATM:RBAllocation:NRB <ul_rmc_rb>
```

### Query

```
:CONFigure:CELLular:CATM:RBAllocation:NRB?
```

### Response

```
<ul_rmc_rb>
```

### Parameter

<ul_rmc_rb>	Number of RBs
Range	0 to 6
Resolution	1
Default	6
Suffix code	None

### Example of Use

To set the number of RBs to 1.

```
:CONF:CELL:CATM:RBAL:NRB 1
```

```
:CONF:CELL:CATM:RBAL:NRB?
```

```
> 1
```

### Remarks

The number of RBs is reset to 6 when the channel bandwidth is updated.

:CONFigure:CELLular:CATM:RBALlocation:ORB

UL RMC Starting RB

Function  
Sets or queries the start number for Uplink signal RB.

Command  
:CONFigure:CELLular:CATM:RBALlocation:ORB <ulrb>

Query  
:CONFigure:CELLular:CATM:RBALlocation:ORB?

Response  
<ulrb>

Parameter	
<ulrb>	RB start number
Range	0 to (6 – RBn)
	RBn is set using the ULRMC_RB command.
Resolution	1
Default	0
Suffix code	None

Example of Use  
To set the RB start number to 0:  
:CONF:CELL:CATM:RBAL:ORB 0  
:CONF:CELL:CATM:RBAL:ORB?  
> 0

Remarks  
The RB start number is reset to 0 when the channel bandwidth is updated.  
The RB start number is reset to 0 when the number of RB is updated.

## :CONFigure:CELLular:CATM:RBCQi

nRB-CQI

### Function

Sets or queries the nRB-CQI.

### Command

```
:CONFigure:CELLular:CATM:RBCQi <value>
```

### Query

```
:CONFigure:CELLular:CATM:RBCQi?
```

### Response

```
<value>
```

### Parameter

<value>	nRB-CQI
Range	0 to 8
Resolution	1
Suffix code	None
Default	0

### Details

The number of RBs to send the Uplink PUCCH signal is set.

### Example of Use

To set the nRB-CQI to 3:

```
:CONF:CELL:CATM:RBCQ 3
```

```
:CONF:CELL:CATM:RBCQ?
```

```
> 3
```

:CONFigure:CELLular:GENerator:RFSettings:FREQuency

Downlink Frequency

Function

Sets or queries the downlink frequency.

Command

:CONFigure:CELLular:GENerator:RFSettings:FREQuency <dl\_freq>

Query

:CONFigure:CELLular:GENerator:RFSettings:FREQuency?

Response

<dl\_fleq>

Parameter

<dl_fleq>	Downlink frequency
Range	400 000 000 to 3800.000 000 Hz 400 000 000 to 6000.000000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	2140 000 000 Hz
Unit	Hz

Details

The Rx frequency for the mobile station is set.  
Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

Example of Use

To set the downlink frequency to 2140 MHz:  
:CONF:CELL:GEN:RFS:FREQ 2140MHZ  
:CONF:CELL:GEN:RFS:FREQ?  
>2140000000

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

Output Level (Total)

### Function

Sets or queries the total output level of all channels.

### Command

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

### Query

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

### Response

```
<level>
```

### Parameter

<level>	Output level
Range	–130.0 to –10.0 dBm (Port 1/Port 2) –120.0 to 0.0 dBm (Port 3/Port 4)
Resolution	0.1 dB
Suffix Code	DBM (uses dBm when omitted)
Default	–66.4 dBm
Unit	dBm

### Details

The setting range varies with the output port setting.

When the Cable Loss Calibration is ON, the cable loss is subtracted from the output level setting range.

When the cable loss is 5 dB, the Port1/Port2 setting range is –135.0 to –15.0 dBm.

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

### Example of Use

To set the output level to –50.0 dBm:

```
: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*.

## Remarks

When the Output Level (Total) is updated, Output Level (Total 1.4 MHz) is changed accordingly.

$$\text{Output Level (Total 1.4 MHz)} = \text{Output Level (Total)} - 10\log_{10}(n\text{SC}/72)$$

Channel Bandwidth	nSC	$10\log_{10}(n\text{SC}/72)$ Round to one decimal place
1.4 MHz	72	0
3 MHz	180	4.0
5 MHz	300	6.2
10 MHz	600	9.2
15 MHz	900	10.9
20 MHz	1200	12.2

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

Output Level(Total 1.4MHz)

### Function

Sets or queries the output level of Narrowband total (dBm/1.4 MHz).

### Command

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

### Query

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

### Response

```
<level>
```

### Parameter

<level>	Output level
Range	Refer to the following table.
Resolution	0.1 dB/1.4 MHz
Default	-66.4 dBm
Suffix code	DBM, (uses dBm when omitted)
Unit	dBm

Channel Bandwidth	Port 1 / Port 2	Port 3 / Port 4
1.4 MHz	-130.0 to -10.0 dBm	-120.0 to 0.0 dBm
3 MHz	-134.0 to -14.0 dBm	-124.0 to -4.0 dBm
5 MHz	-136.2 to -16.2 dBm	-126.2 to -6.2 dBm
10 MHz	-139.2 to -19.2 dBm	-129.2 to -9.2 dBm
15 MHz	-140.9 to -20.9 dBm	-130.9 to -10.9 dBm
20 MHz	-142.2 to -22.2 dBm	-132.2 to -12.2 dBm

### Details

The setting range varies with the output port setting.

When the Cable Loss Calibration is ON, the cable loss is subtracted from the output level setting range.

### Example of Use

To set the output level to -50.0 dBm:

```
:CONF:CELL:GEN:RFS:LEV:NARR -50.0
:CONF:CELL:GEN:RFS:LEV:NARR?
>-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*.

## Remarks

When the Output Level (Total 1.4 MHz) is updated, Output Level (Total) is changed accordingly.  
 $\text{Output Level (Total)} = \text{Output Level (Total 1.4 MHz)} + 10\log_{10}(nSC/72)$

Channel Bandwidth	nSC	$10\log_{10}(nSC/72)$ Round to one decimal place
1.4 MHz	72	0
3 MHz	180	4.0
5 MHz	300	6.2
10 MHz	600	9.2
15 MHz	900	10.9
20 MHz	1200	12.2

When changing Channel Bandwidth, if the set value exceeds the upper limit or falls below the lower limit, the value is rounded to the limit.

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

## Downlink Channel

## Function

Sets or queries the Downlink Channel.

## Command

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

## Query

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

## Response

```
<dl_ch>
```

## Parameter

<dl_ch>	Downlink Channel
Range	0 to 262143
Resolution	1
Default	300
Suffix code	None

## Details

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

For the relationship between the channel and frequency settings refer to Table 2.1.6-2

“Relationship between Uplink Channel Number and Downlink Channel Number” and Table 2.1.6-3 “E-UTRA Channel Numbers and Default UE TX-RX Frequency Separation”.

**Example of Use**

To set the Downlink Channel to 300:

```
:CONF:CELL:MEAS:RFS:DLCH 300
```

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

```
> 300
```

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

Uplink Frequency

### Function

Sets or queries the uplink frequency.

### Command

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

### Query

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

### Response

```
<ul_freq>
```

### Parameter

<ul_freq>	Uplink frequency
Range	400 000 000 to 3800 000 000 Hz 400 000 000 to 6000 000 000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	1950 000 000 Hz
Unit	Hz

### Details

This setting corresponds to the mobile station Tx frequency setting.

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

### Example of Use

To set the Uplink frequency to 1950 MHz:

```
:CONF:CELL:MEAS:RFS:FREQ 1950MHZ
```

```
:CONF:CELL:MEAS:RFS:FREQ?
```

```
>1950000000
```

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

Input Level

### Function

Sets or queries the input level of the MU887000A connector.

### Command

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

### Query

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

### Response

```
<level>
```

### Parameter

<level>	Input level of PCC
Range	–65.0 to +35.0 dBm (Port 1/Port 2) –65.0 to +25.0 dBm (Port 3/Port 4)
Resolution	0.1 dB
Suffix Code	DBM, (uses dBm when omitted)
Default	–1.0 dBm
Unit	dBm

### Details

The setting range varies according to the External Loss setting.

When Cable Loss Correction is ON, the cable loss is added to the input level setting range.

When the cable loss is 5 dB, the Port1/Port2 setting range is –60.0 to +40.0 dBm.

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

### 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 <ul_ch>`**Query**`:CONFigure:CELLular:MEASurement:RFSettings:ULCHannel?`**Response**`<ul_ch>`**Parameter**

<code>&lt;ul_ch&gt;</code>	Uplink Channel
Range	0 to 262143
Resolution	1
Suffix code	None
Default	18300

**Details**

When the Uplink Channel is updated, the related Operation Band, Downlink Channel, Uplink Frequency, Downlink Frequency 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 and Default UE TX-RX Frequency Separation”.

**Example of Use**

To set the Uplink Channel to 18300:

```
:CONF:CELL:MEAS:RFS:ULCH 18300
```

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

```
> 18300
```

## :FETCh:CELLular:CATM:FUNDamental:ACLR?

ACLR Result

### Function

Queries the result of ACLR (Adjacent Channel Leakage Power Ratio) measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:ACLR? <mode>

### Response

When <mode> = AVG, MAX, MIN, DVT,

<aclr(E-UTRA\_LOW)>,<aclr(E-UTRA\_UP)>,<aclr(UTRA\_LOW2)>,<aclr(UTRA\_LOW1)>,  
<aclr(UTRA\_UP1)>,<aclr(UTRA\_UP2)>

When <mode> = TTL,

<avg(E-UTRA\_LOW)>,<avg(E-UTRA\_UP)>,  
<avg(UTRA\_LOW2)>,<avg(UTRA\_LOW1)>,<avg(UTRA\_UP1)>,<avg(UTRA\_UP2)>,  
<max(E-UTRA\_LOW)>,<max(E-UTRA\_UP)>,  
<max(UTRA\_LOW2)>,<max(UTRA\_LOW1)>,<max(UTRA\_UP1)>,<max(UTRA\_UP2)>,  
<min(E-UTRA\_LOW)>,<min(E-UTRA\_UP)>,  
<min(UTRA\_LOW2)>,<min(UTRA\_LOW1)>,<min(UTRA\_UP1)>,<min(UTRA\_UP2)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
<aclr(offset)>	Result of Adjacent Channel Leakage Power Ratio measurement in specified Storage mode
<avg(offset)>	ACLR measurement result (Average)
<max(offset)>	ACLR measurement result (Maximum)
<min(offset)>	ACLR measurement result (Minimum)
Resolution	0.01dB
Response unit	dB

### Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.

### Example of Use

To query the average of ACLR measurement result:

:FETC:CELL:CATM:FUND:ACLR? AVG

> -61.23,-30.06,-65.68,-62.44,-65.68,-62.44

**:FETCh:CELLular:CATM:FUNDamental:MODulation:CARLeakage?**

Carrier Leakage Result

**Function**

Queries the Carrier Leakage (Origin offset) measurement result.

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:CARLeakage? [&lt;mode&gt;]

**Response**

When &lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;cleakage&gt;

When &lt;mode&gt; = TTL,

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

**Parameters**

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

**Example of Use**

To query the average of Carrier Leakage measurement result:

```
:FETC:CELL:CATM:FUND:MOD:CARL? AVG
> 20.00
```

## :FETCh:CELLular:CATM:FUNDamental:MODulation:CFRequency?

Carrier Frequency Result

### Function

Queries the Carrier Frequency measurement result.

### Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:CFRequency? <mode>

### Response

<freq>

### Parameter

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

### Example of Use

To query the result of Carrier Frequency measurement:

```
:FETC:CELL:CATM:FUND:MOD:CFR? AVG  
> 1951000000
```



**:FETCh:CELLular:CATM:FUNDamental:MODulation:EVM?**

EVM Result

Function

Queries the EVM (Error Vector Magnitude) measurement result.

Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:EVM? [&lt;mode&gt;]

Response

When &lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;evm&gt;

When &lt;mode&gt; = TTL,

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

When &lt;mode&gt; = IND,

&lt;s&gt;, &lt;evm(1)&gt;, &lt;evm(2)&gt;, . . . , &lt;evm(s)&gt;

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)>	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
<s>	Number of valid measurement results

Example of Use

To query the average of EVM measurement result:

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

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:EVMH?

EVM Result (High)

### Function

Queries the EVM (Error Vector Magnitude) measurement result.

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT

<evm>

When <mode> = TTL,

<avg>, <max>, <min>

When <mode> = IND,

<s>, <evm (1)>, <evm (2)>, . . . , <evm (s)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)>	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
<s>	Number of valid measurement results

### Example of Use

To query the average of EVM measurement result:

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

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

**:FETCh:CELLular:CATM:FUNDamental:MODulation:EVML?**

EVM Result (Low)

**Function**

Queries the EVM (Error Vector Magnitude) measurement result.

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:EVML? [&lt;mode&gt;]

**Response**

When &lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;evm&gt;

When &lt;mode&gt; = TTL,

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

When &lt;mode&gt; = IND,

&lt;s&gt;, &lt;evm(1)&gt;, &lt;evm(2)&gt;, . . . , &lt;evm(s)&gt;

**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)>	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
<s>	Number of valid measurement results

**Example of Use**

To query the average of EVM measurement result:

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

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:ITEM?

Spectrum Flatness Measured Item

### Function

Queries whether a spectrum flatness measurement item(s) is measured or not.

### Query

:FETCh:CELLular:CATM: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	$\geq 3$ 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:CATM:FUND:MOD:ESFL:ITEM?

> 2

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

Spectrum Flatness Judgement

Function

Queries the judgement of Spectrum Flatness measurement result.

Query

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

Response

<judgement>

Parameter

<judgement>	Judgement
PASS	Pass
FAIL	Fail
–	Not measured

Example of Use

To query the judgement of Spectrum Flatness measurement result:  
:FETC:CELL:CATM:FUND:MOD:ESFL:JUDG?  
> PASS

Remarks

Queries a pass/fail judgement result only when the corresponding test parameter is selected.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R1?

Spectrum Flatness ( $\geq 3$  MHz) Result

### Function

Queries the worst value in the Spectrum Flatness measurement result in Range 1.

### Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R1?

### Response

<worst>

### Parameter

<worst>	Worst value in Range 1
Resolution	0.01 dB
Unit	dB

### Details

The worst value should be either the maximum or minimum of the Flatness measurement results in Range 1, whichever has a larger absolute value.

### Example of Use

To query the worst value in the Spectrum Flatness measurement result in Range 1:

:FETC:CELL:CATM:FUND:MOD:ESFL:R1?

> 0.04

**:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R1M?**Spectrum Flatness ( $\geq 3$  MHz (R1 –)) Result**Function**

Queries the minimum value in the Spectrum Flatness measurement result in Range 1.

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R1M? [&lt;mode&gt;]

**Response**

&lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;sflatness&gt;

&lt;mode&gt; = TTL

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

**Parameter**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Minimum
<sflatness>	Minimum value in Range 1 in specified Storage mode.
<avg>	Minimum value in Range 1 (Average)
<max>	Minimum value in Range 1 (Maximum)
<min>	Minimum value in Range 1 (Minimum)
Resolution	0.01 dB
Unit	dB

**Example of Use**

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

```
:FETCh:CELL:CATM:FUND:MOD:ESFL:R1M? AVG
> 0.04
```

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R1P?

Spectrum Flatness ( $\geq 3$  MHz (R1 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 1.

### Query

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

### Response

<mode> = AVG, MAX, MIN, DVT

<sflatness>

<mode> = TTL

<avg>, <max>, <min>

### Parameter

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Maximum value in Range 1 in specified Storage mode.
<avg>	Maximum value in Range 1 (Average)
<max>	Maximum value in Range 1 (Maximum)
<min>	Maximum value in Range 1 (Minimum)
Resolution	0.01 dB
Unit	dB

### Example of Use

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

```
:FETCh:CELL:CATM:FUND:MOD:ESFL:R1P? AVG
```

```
> 0.04
```



**:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R2?**

Spectrum Flatness (<3 MHz) Result

Function

Queries the worst value in the Spectrum Flatness measurement result in Range 2.

Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R2?

Response

<worst>

Parameter

<worst>	Worst value in Range 2
Resolution	0.01 dB
Unit	dB

Details

The worst value should be either the maximum or minimum of the Flatness measurement results in Range 2, whichever has a larger absolute value.

Example of Use

To query the worst value in the Spectrum Flatness measurement result in Range 2:

:FETC:CELL:CATM:FUND:MOD:ESFL:R2?

> 0.04

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R2M?

Spectrum Flatness (<3 MHz (R2 –)) Result

### Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 2.

### Query

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

### Response

<mode> = AVG, MAX, MIN, DVT

<sflatness>

<mode> = TTL

<avg>, <max>, <min>

### Parameter

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Minimum
<sflatness>	Minimum value in Range 2 in specified Storage mode.
<avg>	Minimum value in Range 2 (Average)
<max>	Minimum value in Range 2 (Maximum)
<min>	Minimum value in Range 2 (Minimum)
Resolution	0.01 dB
Unit	dB

### Example of Use

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

```
:FETC:CELL:CATM:FUND:MOD:ESFL:R2M? AVG
```

```
> 0.04
```

**:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R2P?**

Spectrum Flatness (&lt;3 MHz (R2 +)) Result

**Function**

Queries the maximum value in the Spectrum Flatness measurement result in Range 2.

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:R2P? [&lt;mode&gt;]

**Response**

&lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;sflatness&gt;

&lt;mode&gt; = TTL

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

**Parameter**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Maximum
<sflatness>	Maximum value in Range 2 in specified Storage mode.
<avg>	Maximum value in Range 2 (Average)
<max>	Maximum value in Range 2 (Maximum)
<min>	Maximum value in Range 2 (Minimum)
Resolution	0.01 dB
Unit	dB

**Example of Use**

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

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

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:RP?

Spectrum Flatness (RP Total) Result

### Function

Queries all ripple values in the Spectrum Flatness measurement result.

### Query

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

### Response

<mode> = AVG, MAX, MIN, DVT

```
<sflat (RP1)>,<sflat (RP2)>,<sflat (RP12)>,<sflat (RP21)>
```

<mode> = TTL

```
<avg (RP1)>,<avg (RP2)>,<avg (RP12)>,<avg (RP21)>,<
```

```
<max (RP1)>,<max (RP2)>,<max (RP12)>,<max (RP21)>,<
```

```
<min (RP1)>,<min (RP2)>,<min (RP12)>,<min (RP21)>
```

<mode> = IND

```
<s>,<sflat (RP1) (1)>,<sflat (RP2) (1)>,<sflat (RP12) (1)>,<sflat (RP21) (1)>,<
```

```
...,<sflat (RP1) (s)>,<sflat (RP2) (s)>,<sflat (RP12) (s)>,<sflat (RP21) (s)>
```

### Parameter

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

### Example of Use

To query the average of every ripple values in the Spectrum Flatness measurement result:

```
:FETC:CELL:CATM:FUND:MOD:ESFL:RP? AVG
```

```
> 0.04,0.03,0.06,0.05
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

**:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP1?**Spectrum Flatness ( $\geq 3$  MHz (RP1)) Result**Function**

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

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP1? [&lt;mode&gt;]

**Response**

&lt;mode&gt; = AVG, MAX, MIN, DVT

&lt;sflatness&gt;

&lt;mode&gt; = TTL

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

&lt;mode&gt; = IND

&lt;s&gt;, &lt;sflatness(1)&gt;, &lt;sflatness(2)&gt;, ..., &lt;sflatness(s)&gt;

**Parameter**

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

**Example of Use**

To query the average of ripple values in the Spectrum Flatness measurement result in Range 1:

```
:FETCh:CELL:CATM:FUND:MOD:ESFL:RP1? AVG
> 0.04
```

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:RP12?

Spectrum Flatness (RP12) Result

### Function

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

### Query

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

### Response

<mode> = AVG, MAX, MIN, DVT

<sflatness>

<mode> = TTL

<avg>, <max>, <min>

<mode> = IND

<s>, <sflatness(1)>, <sflatness(2)>, ..., <sflatness(s)>

### Parameter

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<sflatness>	Difference between the maximum value in Range 1 and the minimum value in Range 2 in specified Storage mode.
<avg>	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Average)
<max>	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Maximum)
<min>	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Minimum)
<sflatness(n)>	Nth difference between the maximum value in Range 1 and the minimum value in Range 2 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

**Example of Use**

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

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

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:ESFLatness:RP2?

Spectrum Flatness (<3 MHz (RP2)) Result

### Function

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

### Query

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

### Response

<mode> = AVG, MAX, MIN, DVT

<sflatness>

<mode> = TTL

<avg>, <max>, <min>

<mode> = IND

<s, <sflatness(1)>, <sflatness(2)>, ..., <sflatness(s)>

### Parameter

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<sflatness>	Ripple value in Range 2 in specified Storage mode.
<avg>	Ripple value in Range 2 (Average)
<max>	Ripple value in Range 2 (Maximum)
<min>	Ripple value in Range 2 (Minimum)
<sflatness(n)>	Nth ripple value in Range 2 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 2:

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

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.



**:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP21?**

Spectrum Flatness (RP21) Result

**Function**

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

**Query**

```
:FETCh:CELLular:CATM:FUNDamental:MODulation:ESFlatness:RP21? [<mode>]
```

**Response**

```
<mode> = AVG, MAX, MIN, DVT
```

```
<sflatness>
```

```
<mode> = TTL
```

```
<avg>, <max>, <min>
```

```
<mode> = IND
```

```
<s, <sflatness(1)>, <sflatness(2)>, ..., <sflatness(s)>
```

**Parameter**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<sflatness>	Difference between the maximum value in Range 2 and the minimum value in Range 1 in specified Storage mode.
<avg>	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Average)
<max>	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Maximum)
<min>	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Minimum)
<sflatness(n)>	Nth difference between the maximum value in Range 2 and the minimum value in Range 1 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Measurement count

**Example of Use**

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

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

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

**:FETCh:CELLular:CATM:FUNDamental:MODulation:FERRor?**

Carrier Frequency Error Result

**Function**

Queries the Frequency Error measurement result.

**Query**`:FETCh:CELLular:CATM:FUNDamental:MODulation:FERRor? <mode>`**Response**When `<mode> = AVG, MAX, MIN, DVT`,`<freq_ppm>, <freq_Hz>`When `<mode> = TTL`,`<avg_ppm>, <avg_Hz>, <max_ppm>, <max_Hz>, <min_ppm>, <min_Hz>`**Parameters**

<code>&lt;mode&gt;</code>	Storage mode	
AVG	Average	
MAX	Maximum	
MIN	Minimum	
TTL	Average • Maximum • Minimum	
DVT	Standard deviation	
<code>&lt;avg_ppm&gt;</code>	Measurement result in ppm (Average)	
<code>&lt;avg_Hz&gt;</code>	Measurement result in Hz (Average)	
<code>&lt;max_ppm&gt;</code>	Measurement result in ppm (Maximum)	
<code>&lt;max_Hz&gt;</code>	Measurement result in Hz (Maximum)	
<code>&lt;min_ppm&gt;</code>	Measurement result in ppm (Minimum)	
<code>&lt;min_Hz&gt;</code>	Measurement result in Hz (Minimum)	
<code>&lt;freq_ppm&gt;</code>	Measurement result in ppm in specified Storage mode	
<code>&lt;freq_Hz&gt;</code>	Measurement results in Hz in specified Storage mode	
Resolution	0.01 ppm	(Measurement result in ppm)
	0.1 Hz	(Measurement result in Hz)
Unit	ppm	(Measurement result in ppm)
	Hz	(Measurement result in Hz)

**Example of Use**

To query the average of Frequency Error measurement result:

`:FETC:CELL:CATM:FUND:MOD:FERR? AVG``> 0.03, 60.0`

## :FETCh:CELLular:CATM:FUNDamental:MODulation:FERRor:WORSt?

Worst Carrier Frequency Error Result

### Function

Queries the worst value in Frequency Error measurement results.

### Query

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

### Response

<freq\_ppm>,<freq\_Hz>

### Parameters

<freq_ppm>	Worst value in Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
<freq_Hz>	Worst value in Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

### Example of Use

To query the worst value in Frequency Error measurement results:

:FETC:CELL:CATM:FUND:MOD:FERR:WORS?

> 0.03,60.0

**:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions:CARLeakage?**

In-Band Emissions (Carrier Leakage) Result

**Function**

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

**Query**

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

**Response**

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

**Parameters**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth value in In-Band Emissions (Carrier Leakage) measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Number of valid measurement results

**Example of Use**

To query the maximum of in-band emissions (Carrier Leakage) measurement result:  

```
:FETC:CELL:CATM:FUND:MOD:IEM:CARL? MAX
> 0.04
```

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:GENeral?

In-Band Emissions (General) Result

### Function

Queries in-band emissions (General) for non-allocated RB measurement result.

### Query

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

### Response

When <mode> =AVG, MAX, MIN, DVT,  
<ibe>

When <mode> = TTL,  
<avg>, <max>, <min>

When <mode> = IND,  
<s>, <ibe (1)>, <ibe (2)>, . . . , <ibe (s)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth value in In-Band Emissions (General) measurement result (n = 1 to s)
Unit	dB
Resolution	0.01 dB
<s>	Number of valid measurement results

### Example of Use

To query the maximum of in-band emissions (General) measurement result:

```
:FETC:CELL:CATM:FUND:MOD:IEM:GEN? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

:FETCh:CELLular:CATM: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:CATM: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:CATM:FUND:MOD:IEM:ITEM?  
> 4

## :FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:IQIMage?

In-Band Emissions (IQ Image) Result

### Function

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

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT,  
<ibe>

When <mode> = TTL,  
<avg>, <max>, <min>

When <mode> = IND,  
<s>, <ibe (1)>, <ibe (2)>, . . . , <ibe (s)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
<ibe>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<ibe(n)>	Nth value in In-Band Emissions (IQ Image) measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
<s>	Number of valid measurement results

### Example of Use

To query the maximum of in-band emissions (IQ Image) measurement result:

```
:FETC:CELL:CATM:FUND:MOD:IEM:IQIM? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.



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

In-Band Emissions Judgement

Function

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

Query

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

Response

<judgement>

Parameter

<judgement>	Judgement
PASS	Pass
FAIL	Fail
–	Not measured

Example of Use

To query the judgement on the in-band emission measurement result:  
:FETC:CELL:CATM:FUND:MOD:IEM:JUDG?  
> PASS

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions:LIMit:CARLeakage?

In-Band Emissions limit (Carrier Leakage)

Function

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

Query

:FETCh:CELLular:CATM: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 (Carrier Leakage).

:FETC:CELL:CATM:FUND:MOD:IEM:LIM:CARL?

> 1.4

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions:LIMit:GENeral?

In-Band Emissions limit (General)

Function

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

Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions:LIMit:GENeral?

Response

<level>

Parameter

<level>	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of in-band emission (General):  
:FETC:CELL:CATM:FUND:MOD:IEM:LIMit:GEN?  
> 2.4

## :FETCh:CELLular:CATM:FUNDamental:MODulation:IEmissions:LIMit:IQIMage?

In-Band Emissions limit (IQ Image)

### Function

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

### Query

```
:FETCh:CELLular:CATM: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 (IQ Image).

```
:FETC:CELL:CATM:FUND:MOD:IEM:LIM:IQIM?  
> 1.4
```

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:MARGin?

In-Band Emissions Margin

Function

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

Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:IEMissions:MARGin?

Response

<margin>

Parameter

<margin>	Worst margin
Resolution	0.01 dB
Unit	dB

Example of Use

Queries the worst margin in the entire bandwidth of in-band emission measurement:  
:FETC:CELL:CATM:FUND:MOD:IEM:MARG?  
> 1.40

## :FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:DB?

IQ Imbalance (dB) Result

### Function

Queries the IQ Imbalance measurement result.

### Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:DB? [<mode>]

### Response

When <mode> = AVG, MAX, MIN, DVT,  
<magnitude>

When <mode> = TTL,  
<avg>, <max>, <min>

### Parameters

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

### Example of Use

To query the average of IQ Imbalance measurement result:

```
:FETC:CELL:CATM:FUND:MOD:IQIM:DB? AVG  
> 0.05
```

**:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:PERCent?**

IQ Imbalance (%) Result

**Function**

Queries the IQ Imbalance measurement result.

**Query**

:FETCh:CELLular:CATM:FUNDamental:MODulation:IQIMbalance:PERCent? [&lt;mode&gt;]

**Response**When <mode> = AVG, MAX, MIN, DVT,  
<percent>When <mode> = TTL,  
<avg>, <max>, <min>**Parameters**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
<percent>	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 IQ Imbalance measurement result:

:FETC:CELL:CATM:FUND:MOD:IQIM:PERC? AVG  
> 0.05

## :FETCh:CELLular:CATM:FUNDamental:MODulation:MERRor?

Magnitude Error Result

### Function

Queries the Magnitude Error measurement result.

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT,  
<magnitude>

When <mode> = TTL,  
<avg>, <max>, <min>

### Parameters

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

### Example of Use

To query the average of Magnitude Error measurement result:

:FETC:CELL:CATM:FUND:MOD:MERR? AVG

> 1.05



**:FETCh:CELLular:CATM:FUNDamental:MODulation:PEVM?**

Peak EVM Result

**Function**

Queries the peak EVM (Error Vector Magnitude) measurement result.

**Query**`:FETCh:CELLular:CATM:FUNDamental:MODulation:PEVM? [<mode>]`**Response**When `<mode> = AVG, MAX, MIN, DVT`,  
`<pevm>`When `<mode> = TTL`,  
`<avg>, <max>, <min>`**Parameters**

<code>&lt;mode&gt;</code>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
<code>&lt;pevm&gt;</code>	Measurement result in specified Storage mode
<code>&lt;avg&gt;</code>	Measurement result (Average)
<code>&lt;max&gt;</code>	Measurement result (Maximum)
<code>&lt;min&gt;</code>	Measurement result (Minimum)
Resolution	0.01%
Unit	%

**Example of Use**

To query the average of Peak EVM measurement result:

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

## :FETCh:CELLular:CATM:FUNDamental:MODulation:PHERror?

Phase Error Result

### Function

Queries the Phase Error measurement result.

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT,  
<phase>

When <mode> = TTL,  
<avg>, <max>, <min>

### Parameters

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

### Example of Use

To query the average of Phase Error measurement result:

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

**:FETCh:CELLular:CATM:FUNDamental:MODulation:RHO?**

Rho Result

## Function

Queries the Rho (waveform quality) measurement result.

## Query

:FETCh:CELLular:CATM:FUNDamental:MODulation:RHO? [&lt;mode&gt;]

## Response

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

## Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
<rho>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
Resolution	0.00001

## Example of Use

To query the average of Signal Quality measurement (Rho) result:

:FETC:CELL:CATM:FUND:MOD:RHO? AVG  
> 0.00004

## :FETCh:CELLular:CATM:FUNDamental:MODulation:RSEVm?

Reference Signal EVM Result

### Function

Queries the EVM measurement result of Reference Signal.

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT,  
<rsevm>

When <mode> = TTL,  
<avg>, <max>, <min>

When <mode> = IND,  
<s>, <rsevm(1)>, <rsevm(2)>, ..., <rsevm(s)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)>	The n-th Measurement result (n=1 to s)
Resolution	0.01%
Unit	%
<s>	Number of valid measurement results

### Example of Use

To query the average of Reference Signal EVM measurement result:  
:FETC:CELL:CATM:FUND:MOD:RSEV? AVG  
> 1.51

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

**:FETCh:CELLular:CATM:FUNDamental:OBW?**

OBW Result

## Function

Queries the OBW (Occupied Bandwidth) measurement result.

## Query

`:FETCh:CELLular:CATM:FUNDamental:OBW?`

## Response

&lt;bw&gt;

## Parameter

<bw>	Occupied Bandwidth
Resolution	1 Hz
Unit	Hz

## Example of Use

To query the OBW measurement result:

`:FETC:CELL:CATM:FUND:OBW?`

&gt; 1080000

## :FETCh:CELLular:CATM:FUNDamental:OBW:FREQuency?

OBW Frequency Result

### Function

Queries the upper, lower and center frequency of OBW (Occupied Bandwidth) measurement results.

### Query

:FETCh:CELLular:CATM:FUNDamental:OBW:FREQuency? <pos>

### Response

<freq>

### Parameters

<pos>	Offset type
UPPER	Upper frequency
LOWER	Lower frequency
CENTER	Center frequency
<freq>	Offset frequency
Resolution	0.1 Hz
Unit	Hz

### Example of Use

To query the upper frequency of OBW measurement result:

```
:FETC:CELL:CATM:FUND:OBW:FREQ? UPPER  
> 1951920000.0
```

**:FETCh:CELLular:CATM:FUNDamental:POWer:CHPower?**

Channel Power Result

**Function**

Queries the Channel Power measurement result.

**Query**

:FETCh:CELLular:CATM:FUNDamental:POWer:CHPower? [&lt;mode&gt;]

**Response**

When &lt;mode&gt; = AVG, MAX, MIN or DVT,

&lt;pwr&gt;

When &lt;mode&gt; = TTL,

&lt;avg&gt;, &lt;max&gt;, &lt;min&gt;

When &lt;mode&gt; = IND,

&lt;s&gt;, &lt;pwr(1)&gt;, &lt;pwr(2)&gt;, &lt;pwr(3)&gt;, ..., &lt;pwr(s)&gt;

**Parameters**

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Average
<pwr>	Measurement result in specified Storage mode
<avg>	Measurement result (Average)
<max>	Measurement result (Maximum)
<min>	Measurement result (Minimum)
<pwr(n)>	The n-th measurement result (n=1 to s)
Resolution	0.01 dB
Unit	dBm
<s>	Number of valid measurement results

**Example of Use**

To query the average of Channel Power measurement result:

:FETC:CELL:CATM:FUND:POW:CHP? AVG

&gt; -20.00

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## :FETCh:CELLular:CATM:FUNDamental:POWer:TXPower?

Tx Power Result

### Function

Queries the Tx Power measurement result.

### Query

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

### Response

When <mode> = AVG, MAX, MIN, DVT,

<pwr>

When <mode> = TTL,

<avg>, <max>, <min>

When <mode> = IND

<s>, <pwr(1)>, <pwr(2)>, . . . , <pwr(s)>

### Parameters

<mode>	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)>	The n-th Measurement result (n=1 to s)
Resolution	0.01 dB
Unit	dBm
<s>	Number of valid measurement results

### Example of Use

To query the Tx Power measurement result:

:FETC:CELL:CATM:FUND:POW:TXP? AVG

> -20.00

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.



**:FETCh:CELLular:CATM:FUNDamental:SEMask:JUDGement?**

SEM Judgement

**Function**

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

**Query**`:FETCh:CELLular:CATM:FUNDamental:SEMask:JUDGement?`**Response**`<judgement>`**Parameter**

<code>&lt;judgement&gt;</code>	Judgement result
PASS	Pass
FAIL	Fail
—	Not measured

**Example of Use**

To query the judgement result of SEM measurement:

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

## :FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel?

SEM Worst Value

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel? <range>

### Response

<level>,<freq>

### Parameter

<range>	Frequency Range
Range	–4 to –1, 1 to 4
Resolution	1
Suffix code	None
<level>	Worst spectrum level in the specified frequency range
Resolution	0.01 dB
Unit	dB
<freq>	Offset frequency of the worst spectrum level in the specified frequency range
Resolution	1 Hz
Unit	Hz

### Details

The frequency range varies according to the channel bandwidth.  
Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:LEV? 1
> -20.01,705
```

## :FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail?

SEM Worst Value (Detail)

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail? <range>

**Response**

<level>,<freq>

**Parameter**

<range>	Frequency Range
Range	–9 to –1, 1 to 9
Resolution	1
Suffix code	None
<level>	Worst spectrum level in the specified frequency range
Resolution	0.01 dB
Unit	dB
<freq>	Offset frequency of the worst spectrum level in the specified frequency range
Resolution	1 Hz
Unit	Hz

**Details**

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

**Example of Use**

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:LEV:DET? 1
> -20.01,705
```

## :FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail:TTL?

SEM Worst Value (Detail) (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:DETail:TTL?

### Response

<level(-1)>,<freq(-1)>,...,<level(-9)>,<freq(-9)>,<level(1)>,<freq(1)>,...,  
<level(9)>,<freq(9)>

### Parameters

<level(n)>	Worst spectrum level in each frequency range (Frequency range: n = -9 to -1, 1 to 9)
Resolution	0.01 dB
Unit	dBm
<freq(n)>	Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = -9 to -1, 1 to 9)
Resolution	1 Hz
Unit	Hz

### Details

Refer to Table 2.4-3 “Frequency ranges of Range 1 to Range 9 (Detail)” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETCh:CELL:CATM:FUND:SEM:LEV:DET:TTL?  
> -94.90,-855000,-79.73,-1500000,-79.82,-2300000,-78.96,-4300000,  
-79.62,-5500000,-79.54,-9500000,-79.47,-14500000,-79.54,-19500000,  
-79.42,-23500000,-93.80,735000,-77.64,2000000,-77.61,2300000,  
-9.48,4500000,-72.78,5500000,-77.38,6500000,-78.50,12500000,  
-78.60,16500000,-78.73,22500000
```

**:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:TTL?**

SEM Worst Value (All range)

**Function**

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

**Query**

```
:FETCh:CELLular:CATM:FUNDamental:SEMask:LEVel:TTL?
```

**Response**

```
<level(-1)>,<freq(-1)>,...,<level(-4)>,<freq(-4)>,<level(1)>,<freq(1)>,...,
<level(4)>,<freq(4)>
```

**Parameters**

<level(n)>	Worst spectrum level in each frequency range (Frequency range: n = -4 to -1, 1 to 4)
Resolution	0.01 dB
Unit	dBm
<freq(n)>	Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = -4 to -1, 1 to 4)
Resolution	1 Hz
Unit	Hz

**Details**

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4 (General)” for Frequency ranges.

**Example of Use**

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:LEV:TTL?
> -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0,
30, -20.0, 30
```

## :FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin?

SEM Template Margin

### Function

Queries the worst margin from the template of the spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin? <range>

### Response

<margin>,<freq>

### Parameter

<range>	Frequency Range
Range	–4 to –1, 1 to 4
Resolution	1
Suffix code	None
<margin>	Worst margin in the specified frequency range
Resolution	0.01 dB
Unit	dB
<freq>	Offset frequency of the worst margin in the specified frequency range
Resolution	1 Hz
Unit	Hz

### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:MARG? 1
> -20.01,705
```

**:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail?**

SEM Template Margin (Detail)

**Function**

Queries the worst margin from the template of the spectrum level with offset frequency in the specified frequency range of SEM measurement.

**Query**

```
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail? <range>
```

**Response**

```
<margin>,<freq>
```

**Parameter**

<range>	Frequency Range
Range	–9 to –1, 1 to 9
Resolution	1
Suffix code	None
<margin>	Worst margin in the specified frequency range
Resolution	0.01 dB
Unit	dB
<freq>	Offset frequency of the worst margin in the specified frequency range
Resolution	1 Hz
Unit	Hz

**Details**

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

**Example of Use**

To query the worst margin from the template of the spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:MARG:DET? 1
> -20.01,705
```

## :FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail:TTL?

SEM Template Margin (Detail) (All range)

### Function

Queries the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:DETail:TTL?

### Response

<margin(-1)>,<freq(-1)>,...,<margin(-9)>,<freq(-9)>,<margin(1)>,<freq(1)>,...,  
<margin(9)>,<freq(9)>

### Parameters

<margin(n)>	Worst margin in each frequency range (Frequency range: n= -9 to -1, 1 to 9)
Resolution	0.01 dB
Unit	dB
<freq(n)>	Offset frequency of the worst margin in each frequency range (Frequency range: n= -9 to -1, 1 to 9)
Resolution	1 Hz
Unit	Hz

### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

The frequency range varies according to the channel bandwidth.

Refer to Table 2.4-3 “Frequency ranges of Range 1 to Range 9 (Detail)” for Frequency ranges.

### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement:

:FETC:CELL:CATM:FUND:SEM:MARG:DET:TTL?

> -20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000



**:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:TTL?**

SEM Template Margin (All range)

**Function**

Queries the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement.

**Query**

```
:FETCh:CELLular:CATM:FUNDamental:SEMask:MARGin:TTL?
```

**Response**

```
<margin(-1)>,<freq(-1)>,...,<margin(-4)>,<freq(-4)>,<margin(1)>,<freq(1)>,...,  
<margin(4)>,<freq(4)>
```

**Parameters**

<margin(n)>	Worst margin in each frequency range (Frequency range: n= -4 to -1, 1 to 4)
Resolution	0.01 dB
Unit	dB
<freq(n)>	Offset frequency of the worst margin in each frequency range (Frequency range: n= -4 to -1, 1 to 4)
Resolution	1 Hz
Unit	Hz

**Details**

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

**Example of Use**

To query the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement:

```
:FETC:CELL:CATM:FUND:SEM:MARG:TTL?
```

```
> -20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20
```

## :FETCh:CELLular:CATM:FUNDamental:TRACe?

Waveform

Function

Queries the spectrum waveform data of each measurement result.

Query

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

Response

<data(1)>,...,<data(length)>

Parameter

<format>	format	<format>	format
1	Occupied Bandwidth	11	In-band Emissions (dB) (average)
2	Spectrum Emission Mask	12	In-band Emissions (dB) (maximum)
3	Constellation (I)	13	In-band Emissions (dBc) (average)
4	Constellation (Q)	14	In-band Emissions (dBc) (maximum)
5	EVM (average)	15	Spectrum Flatness (average)
6	EVM (maximum)	16	Spectrum Flatness (maximum)
7	Phase Error (average)	17	Spectrum Flatness (minimum)
8	Phase Error (maximum)		
9	Magnitude Error (average)		
10	Magnitude Error (maximum)		

<position> Start point of waveform data

Range

format	Channel Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Occupied Bandwidth	0 to 654	0 to 1358	0 to 2254	0 to 4494	0 to 6734	0 to 8974
Spectrum Emission Mask	0 to 1134	0 to 2254	0 to 3694	0 to 5486	0 to 7246	0 to 9038
Constellation						
EVM						
Phase Error	0 to 71	0 to 179	0 to 299	0 to 599	0 to 899	0 to 1199
Magnitude Error						
Spectrum Flatness						
In-band Emissions	0 to 5	0 to 14	0 to 24	0 to 49	0 to 74	0 to 99

Resolution 1

Suffix code None

<length>                      Number of read data

Range

format	Channel Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Occupied Bandwidth	1 to 655	1 to 1359	1 to 2255	1 to 4495	1 to 6735	1 to 8975
Spectrum Emission Mask	1 to 1135	1 to 2255	1 to 3695	1 to 5487	1 to 7247	1 to 9039
Constellation						
EVM						
Phase Error	1 to 72	1 to 180	1 to 300	1 to 600	1 to 900	1 to 1200
Magnitude Error						
Spectrum Flatness						
In-band Emissions	1 to 6	1 to 15	1 to 25	1 to 50	1 to 75	1 to 100

Resolution                      1

Suffix code                    None

<symbol>                      Position of SC-FDMA symbol

Range                            0 to 6 (Constellation, EVM, Phase Error, Magnitude Error)

<data(n)>                      Waveform data

Resolution                      0.01 dB    (Occupied Bandwidth, Spectrum Emission Mask, In-band Emissions, Spectrum Flatness)

                                     0.01 deg. (Phase Error)

                                     0.01 %    (EVM, Magnitude Error)

                                     0.0001    (Constellation)

Unit                               dBm        (Spectrum Emission Mask)

                                     dB         (Occupied Bandwidth, In-band Emissions (dB), Spectrum Flatness)

                                     dBc        (In-band Emissions (dBc) )

                                     degree     (Phase Error)

                                     %         (EVM, Magnitude Error)

                                     None       (Constellation)

#### Details

Refer to Table 2.7-1 “Waveform Data Type and Data Interval” for Data Interval.

When RMC Configuration is PUCCH, format 3 through 17 are all “Not measured”.

#### Example of Use

To query the Occupied Bandwidth of 20 data from 25 of each measurement:

```
:FETC:CELL:CATM:FUND:TRAC? 1,25,20
```

```
> -42.12,-40.14,...,-41.22
```

## :TRIGger:CELLular:CATM:FUNDamental:DElay

Trigger Delay

### Function

Sets or queries the Trigger Delay.

### Command

```
:TRIGger:CELLular:CATM:FUNDamental:DElay <delay>
```

### Query

```
:TRIGger:CELLular:CATM:FUNDamental:DElay?
```

### Response

```
<delay>
```

### Parameters

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

### Example of Use

To set the Trigger Delay to 0.001 ms:

```
:TRIG:CELL:CATM:FUND:DEL 0.001
```

```
:TRIG:CELL:CATM:FUND:DEL?
```

```
> 0.001
```

## :TRIGger:CELLular:CATM:FUNDamental:LEVel

Trigger Level

### Function

Sets or queries the Trigger Level.

### Command

```
:TRIGger:CELLular:CATM:FUNDamental:LEVel <level>
```

### Query

```
:TRIGger:CELLular:CATM:FUNDamental:LEVel?
```

### Response

```
<level>
```

### Parameters

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

### Details

This command is available when trigger source is set to Rise Config.

### Example of Use

To set the Trigger Level to –30 dB:

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

## :TRIGger:CELLular:CATM:FUNDamental:SOURce

Trigger Source

### Function

Sets or queries the Trigger Source.

### Command

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

### Query

```
:TRIGger:CELLular:CATM:FUNDamental:SOURce?
```

### Response

```
<source>
```

### Parameters

<source>	Trigger Source
FRAME	Frame
RISE_CONFIG	Rise Config
Default	RISE_CONFIG

### Example of Use

To set the Trigger Source to Rise Config:

```
:TRIG:CELL:CATM:FUND:SOUR RISE_CONFIG
```

```
:TRIG:CELL:CATM:FUND:SOUR?
```

```
> RISE_CONFIG
```

## :TRIGger:CELLular:CATM:FUNDamental:TOUT

Trigger Timeout

### Function

Sets or queries the Trigger Timeout.

### Command

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

### Query

```
:TRIGger:CELLular:CATM:FUNDamental:TOUT?
```

### Response

```
<time>
```

### Parameters

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

### Example of Use

```
To set the Trigger Timeout to 10 s:  
:TRIG:CELL:CATM:FUND:TOUT 10  
:TRIG:CELL:CATM:FUND:TOUT?  
> 10
```





## *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.

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5.1.2	Fundamental measurement commands .....	5-5
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5.2.1	Common commands .....	5-19
5.2.2	Fundamental measurement commands .....	5-34

## 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.
{ }	Choose one of the groups in braces. A   B({C   D}) indicates a choice of A, B(C), or A, 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	PORT?	input,output

#### Measurement

Function	Command	Query	Response
Measurement Stop	MEASSTOP	-----	-----
Measurement Status	-----	MSTAT	m_status
Tx Measurement Status	-----	TXMSTAT?	m_status
Measurement Start	SNGLS	-----	-----
Measurement Start (Synchronization)	SWP	SWP?	status
End Event Status (Measurement) Register Query	-----	ESR2?	register
Error Event Status (Measurement) Register Query	-----	ESR3?	register

## Common Parameters

Function	Command	Query	Response
Output Level On/Off	LVL on_off	LVL?	on_off
Output Signal Modulation	MOD on_off	MOD?	on_off
Waveform File Select	PACKAGE pac	PACKAGE?	pac
Waveform Pattern Select	DLPAT pat	DLPAT?	pat
Waveform Pattern Select (SYNC)	DLPAT_SYNC pat	DLPAT_SYNC?	pat

## System

Function	Command	Query	Response
Application Select	SYSSEL app	SYSSEL?	app
Language Selection of Remote Command	SYST:LANG mode	SYST:LANG?	mode

## 5.1.2 Fundamental measurement commands

### Common Parameters

Function	Command	Query	Response
Channel Bandwidth	BANDWIDTH bandwidth	BANDWIDTH?	bandwidth
Uplink Channel	ULCHAN ul_ch	ULCHAN?	ul_ch
Uplink Frequency	ULFREQ ul_freq TXFREQ ul_freq	ULFREQ? TXFREQ?	ul_freq
Downlink Channel	DLCHAN dl_ch	DLCHAN?	dl_ch
Downlink Frequency	DLFREQ dl_freq RXFREQ dl_freq	DLFREQ? RXFREQ?	dl_freq
Operation Band	BAND band	BAND?	band
Input Level	ILVL level	ILVL?	Input Level
Output Level (Total)	OLVL level	OLVL?	level
Output Level ( Total 1.4 MHz)	OLVL_NB level	OLVL_NB?	level

## Category M Setting

Function	Command	Query	Response
Frame Structure	FRAMETYPE mode	FRAMETYPE?	mode
Duplex Mode	DUPLEXMODE mode	DUPLEXMODE?	mode
Channel Coding	CHCODING object	CHCODING?	object
RMC Configuration	CHCONFIG val	CHCONFIG?	val
nRB-CQI	NRBCQI value	NRBCQI?	value
UL RMC Narrowband Index	ULRMC_NARROW index	ULRMC_NARROW?	index
UL RMC Number of RB	ULRMC_RB ul_rmc_rb	ULRMC_RB?	ul_rmc_rb
UL RMC Starting RB	ULRB_START ulrb	ULRB_START?	ulrb
UL RMC MCS Index	ULIMCS ulimcs	----	----
UL RMC Modulation	ULRMC_MOD ul_rmc_mod	ULRMC_MOD?	ul_rmc_mod
Group Hopping	GROUPOP on_off	GROUPOP?	on_off
Cell ID	CELLID id	CELLID?	id
Cyclic Shift	CSHIFT val	CSHIFT?	val
Delta SS	DELTASS val	DELTASS?	val
RB Search	RBSEARCH on_off	RBSEARCH?	on_off
In-band Emissions/ EVM Carrier Leakage Frequency	IBEM_CLFR clf	IBEM_CLFR?	clf
Trigger Source	TRGSRC source	TRGSRC?	source
Trigger Level	TRGLVL level	TRGLVL?	level
Trigger Delay	TRGDLY delay	TRGDLY?	delay
Trigger Timeout	TRGTOUT time	TRGTOUT?	time

## Fundamental Measurement Parameters

Function	Command	Query	Response
Power Measurement On/Off and Meas. Count	PWR_SET on_off[,avg_count]	PWR_SET?	on_off,avg_count
OBW On/Off and Meas. Count	OBW_SET on_off[,avg_count]	OBW_SET?	on_off,avg_count
SEM On/Off and Meas. Count	SEM_SET on_off[,avg_count]	SEM_SET?	on_off,avg_count
ACLR On/Off and Meas. Count	ACLR_SET on_off[,avg_count]	ACLR_SET?	on_off,avg_count
Modulation Analysis On/Off and Meas. Count	MOD_SET on_off[,avg_count]	MOD_SET?	on_off,avg_count
All Measurement Items Off	ALLMEASITEMS_OFF	----	----
additionalSpectrumEmission	SIB2_NS sib2_ns	SIB2_NS?	sib2_ns

## Result (Power Measurement, Occupied Bandwidth)

Function	Command	Query	Response
Tx Power Result	----	POWER? [mode]	pwr mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,pwr(1),pwr(2),...,pwr(s) mode=IND AVG when mode is omitted
Channel Power Result	----	CHPWR? [mode]	pwr mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,pwr(1),pwr(2),...,pwr(s) mode=IND AVG when mode is omitted
OBW Result	----	OBW?	bw
OBW Frequency Result	----	OBWFREQ? pos	freq



## Result (Spectrum Emission Mask)

Function	Command	Query	Response
SEM Judgement	----	SEMPASS?	judgement
SEM Worst Value	----	WORST_SEM_LV? range	level,freq
SEM Worst Value (All range)	----	TTL_WORST_SEM_LV?	level(-1),freq(-1),...,level(-4),freq(-4), level(1),freq(1),...,level(4),freq(4)
SEM Template Margin	----	WORST_SEM? range	margin,freq
SEM Template Margin (All range)	----	TTL_WORST_SEM?	margin(-1),freq(-1),...,margin(-4),freq(-4), margin(1),freq(1),...,margin(4),freq(4)
SEM Worst Value (Detail)	----	WORST_SEM_DET_LV? range	level,freq
SEM Worst Value (Detail) (All range)	----	TTL_WORST_SEM_DET_LV?	level(-1),freq(-1),...,level(-9),freq(-9), level(1),freq(1),...,level(9),freq(9)
SEM Template Margin (Detail)	----	WORST_SEM_DET? range	margin,freq
SEM Template Margin (Detail) (All range)	----	TTL_WORST_SEM_DET?	margin(-1),freq(-1),...,margin(-4),freq(-4), margin(1),freq(1),...,margin(4),freq(4)

## Result (Adjacent Channel Power)

Function	Command	Query	Response
ACLR Result	----	ACLR? mode	<pre>ac1r(E-UTRA_LOW),ac1r(E-UTRA_UP), ac1r(UTRA_LOW2),ac1r(UTRA_LOW1), ac1r(UTRA_UP1),ac1r(UTRA_UP2) mode=AVG,MAX,MIN avg(E-UTRA_LOW),avg(E-UTRA_UP),avg(UTRA_LOW2), avg(UTRA_LOW1),avg(UTRA_UP1),avg(UTRA_UP2), max(E-UTRA_LOW),max(E-UTRA_UP),max(UTRA_LOW2), max(UTRA_LOW1),max(UTRA_UP1),max(UTRA_UP2), min(E-UTRA_LOW),min(E-UTRA_UP),min(UTRA_LOW2), min(UTRA_LOW1),min(UTRA_UP1),min(UTRA_UP2) mode=TTL</pre>

## Result (Modulation Analysis)

Function	Command	Query	Response
Carrier Frequency Result	----	CARRF? AVG	freq
Carrier Frequency Error Result	----	CFERR? mode	freq_ppm,freq_Hz mode=AVG,MAX,MIN,DVT avg_ppm,avg_Hz,max_ppm,max_Hz,min_ppm,min_Hz mode=TTL
Worst Carrier Frequency Error Result	----	CFERR_WORST?	freq_ppm,freq_Hz
EVM Result	----	EVM? [mode]	evm mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,evm(1),...,evm[s] mode=IND AVG when mode is omitted
EVM Result (Low)		EVM_L? [mode]	evm mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,evm(1),...,evm[s] mode=IND AVG when mode is omitted
EVM Result (High)		EVM_H? [mode]	evm mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,evm(1),...,evm[s] mode=IND AVG when mode is omitted

## Result (Modulation Analysis) (Cont'd)

Function	Command	Query	Response
Reference Signal EVM Result	----	RSEVM? [mode]	rsevm mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,rsevm(1),...,rsevm[s] mode=IND AVG when mode is omitted
Peak EVM Result	----	PVECTERR? [mode]	pevm mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted
Phase Error Result	----	PHASEERR? [mode]	phase mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted
Magnitude Error Result	----	MAGTDERR? [mode]	magnitude mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted
Carrier Leakage Result	----	CARRLEAK? [mode]	cleakage mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted
Rho Result	----	RHO? [mode]	rho mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted

## Result (In-band emissions for non allocated RB)

Function	Command	Query	Response
In-Band Emissions Measured Item	----	INBANDEITEM?	flag
In-Band Emissions Judgement	----	INBANDEPASS?	judgement
In-Band Emissions (General) Result	----	INBANDE_GEN? [mode]	ibe mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,ibe(1),...,ibe[s] mode=IND AVG when mode is omitted
In-Band Emissions limit (General)	----	INBANDE_GENUL?	level
In-Band Emissions (IQ Image) Result	----	INBANDE_IMG? [mode]	ibe mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,ibe(1),...,ibe[s] mode=IND AVG when mode is omitted
In-Band Emissions limit (IQ Image)	----	INBANDE_IMGUL?	level

## Result (In-band emissions for non allocated RB (Cont'd), IQ Imbalance)

Function	Command	Query	Response
In-Band Emissions (Carrier Leakage) Result	----	INBANDE_LEAK? [mode]	ibe mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,ibe(1),...,ibe[s] mode=IND MAX when mode is omitted
In-Band Emissions limit (Carrier Leakage)	----	INBANDE_LEAKUL?	level
In-Band Emissions Margin	----	INBANDE_MARG?	margin
IQ Imbalance (%) Result	----	IQIMB_PER? [mode]	percent mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted
IQ Imbalance (dB) Result	----	IQIMB_DB? [mode]	level mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL AVG when mode is omitted

## Result (Spectrum flatness)

Function	Command	Query	Response
Spectrum Flatness Measured Item	----	SPECFLATITEM?	flag
Spectrum Flatness Judgement	----	SPECFLATPPPASS?	judgement
Spectrum Flatness ( $\geq 3$ MHz (RP1)) Result	----	SPECFLAT_RP1? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,sflatness(1),...,sflatness(s) mode=IND MAX when mode is omitted
Spectrum Flatness (RP12) Result	----	SPECFLAT_RP12? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,sflatness(1),...,sflatness(s) mode=IND MAX when mode is omitted
Spectrum Flatness (<3 MHz (RP2)) Result	----	SPECFLAT_RP2? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,sflatness(1),...,sflatness(s) mode=IND MAX when mode is omitted
Spectrum Flatness (RP21) Result	----	SPECFLAT_RP21? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL s,sflatness(1),...,sflatness(s) mode=IND MAX when mode is omitted

## Result (Spectrum flatness) (Cont'd)

Function	Command	Query	Response
Spectrum Flatness ( $\geq 3$ MHz) Result	----	SPECFLAT1?	worst
Spectrum Flatness ( $\geq 3$ MHz (R1-)) Result	----	SPECFLAT1_M? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL MIN when mode is omitted
Spectrum Flatness ( $\geq 3$ MHz (R1+)) Result	----	SPECFLAT1_P? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL MAX when mode is omitted
Spectrum Flatness ( $< 3$ MHz) Result	----	SPECFLAT2?	worst
Spectrum Flatness ( $< 3$ MHz (R2-)) Result	----	SPECFLAT2_M? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL MIN when mode is omitted
Spectrum Flatness ( $< 3$ MHz (R2+)) Result	----	SPECFLAT2_P? [mode]	sflatness mode=AVG,MAX,MIN,DVT avg,max,min mode=TTL MAX when mode is omitted
Spectrum Flatness (RP Total) Result	----	SPECFLAT_RP? [mode]	sflat(RP1),sflat(RP2),sflat(RP12),sflat(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,sflat(RP1)(1),sflat(RP2)(1),sflat(RP12)(1), sflat(RP21)(1),...,sflat(RP1)(s),sflat(RP2)(s), sflat(RP12)(s),sflat(RP21)(s) mode=IND MAX when mode is omitted



Result (Waveform)

Function	Command	Query	Response
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	
register	End event status register (measurement)
Range	0 to 255
register	Value = bit0 + bit1 + ... + bit7
bit0 = 2 <sup>0</sup> = 1	End of measurement
bit1 = 2 <sup>1</sup> = 2	Trigger preparation completed
bit2 = 2 <sup>2</sup> = 4	Unused (reserved for application use)
bit3 = 2 <sup>3</sup> = 8	Unused (reserved for application use)
bit4 = 2 <sup>4</sup> = 16	Unused (reserved for application use)
bit5 = 2 <sup>5</sup> = 32	Unused (reserved for application use)
bit6 = 2 <sup>6</sup> = 64	Unused (reserved for application use)
bit7 = 2 <sup>7</sup> = 128	Unused (reserved for application use)

## Details

The sum of the values for bits of the occurring event from the values 2<sup>0</sup> = 1, 2<sup>1</sup> = 2, 2<sup>2</sup> = 4, 2<sup>3</sup> = 8, 2<sup>4</sup> = 16, 2<sup>5</sup> = 32, 2<sup>6</sup> = 64, and 2<sup>7</sup> = 128, that correspond to the end event status register (measurement) bits 0, 1, 2, 3, 4, 5, 6, and 7 becomes the response.

## Example of Use

To query the end event status register (measurement) value:  
ESR2?  
> 0

## ESR3?

### Error Event Status (Measurement) Register Query

#### Function

Queries the error event status register (measurement).  
The event occurrence can be identified using the retrieved value.

#### Query

ESR3?

#### Response

register

register	Error event status register (measurement)
Range	0 to 255

register	Value = bit0 + bit1 + ... + bit7
----------	----------------------------------

bit0 = $2^0 = 1$	Over level
------------------	------------

bit1 = $2^1 = 2$	Under level
------------------	-------------

bit2 = $2^2 = 4$	Timeout
------------------	---------

bit3 = $2^3 = 8$	Unused (reserved for application use)
------------------	---------------------------------------

bit4 = $2^4 = 16$	Unused (reserved for application use)
-------------------	---------------------------------------

bit5 = $2^5 = 32$	Unused (reserved for application use)
-------------------	---------------------------------------

bit6 = $2^6 = 64$	Unused (reserved for application use)
-------------------	---------------------------------------

bit7 = $2^7 = 128$	Unused (reserved for application use)
--------------------	---------------------------------------

#### Details

The sum of the values for bits of the occurring event from the values  $2^0 = 1$ ,  $2^1 = 2$ ,  $2^2 = 4$ ,  $2^3 = 8$ ,  $2^4 = 16$ ,  $2^5 = 32$ ,  $2^6 = 64$ , and  $2^7 = 128$ , that correspond to the error event status register (measurement) bits 0, 1, 2, 3, 4, 5, 6, and 7 becomes the response.

#### Example of Use

To query the error event status register (measurement) value:

ESR3?

> 4

## LVL

Output Level On/Off

Function

Sets or queries RF signal output at MU887000A connector.

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 turn on the RF signal transmitted from the MU887000A connector:

```
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 MU887000A RF signal output 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 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.

#### Example of Use

To query current measurement status:

MSTAT?

> 0

## PACKAGE

### Waveform File Select

#### Function

Selects and queries the waveform file for arbitrary waveform signal 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 connectors for inputting and outputting RF signals.

## Command

PORT input,output

## Query

PORT?

## Response

input,output

## Parameters

input	Test Port No.
PORT1	Test Port1
PORT2	Test Port2
PORT3	Test Port3
PORT4	Test Port4
Default	PORT1
output	Test Port No.
PORT1	Test Port1
PORT2	Test Port2
PORT3	Test Port3
PORT4	Test Port4
Default	PORT1

## Details

Both Test Port1 and Test Port2 can be set to input and output simultaneously.  
Test Port3 and Test Port4 can be set to either input or output at one time.  
Only Port1 and Port2 are used by the MX887065A.

## Example of Use

To set the RF signal input and output connectors to Test Port1 and Test Port2, respectively:  
PORT PORT1,PORT2  
PORT?  
> PORT1,PORT2

## 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)
NBIOT	NB-IoT	(requires MX887067A)
CATM	Category M	(requires MX887065A)
SEQUENCE	Sequence measurement	(requires MX887010A)
SEQ	Sequence measurement	(requires MX887010A)
Default	COMMON	

Example of Use

To switch the measurement standard to SEQUENCE:

```
STDSEL SEQUENCE
```

```
STDSEL?
```

```
> SEQUENCE
```

Remarks

This parameter must be set to CATM 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 executing on MU887000A.

### Command

```
SYSSEL app
```

### Query

```
SYSSEL?
```

### Response

```
app
```

### Parameter

app	Type of application software
CELLULAR	Cellular Application
SRW	SRW Application

### Details

Set the parameter to CELLULAR and send the command before using the MX887065A.

### Example of Use

To set the application software to CELLULAR:

```
SYSSEL CELLULAR
```

```
SYSSEL?
```

```
> CELLULAR
```

### Remarks

When using the MX887065A, set the application to CELLULAR using the SYSSEL command, and then set the standard to CATM 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 of the measurement and signal transmission, and executes the measurement.

The following command is not processed until the measurement ends, so the MX887065A and the controller can synchronize.

Queries the measurement end.

#### Command

SWP

#### Query

SWP?

#### Response

status

#### Parameter

status	Measurement status
0	Measurement finished
1	Measurement in progress

#### Details

When this command is sent, the measurement is performed only once.

To average, the measurements are performed for the specified average count (number of measurements to average).

#### Example of Use

To start the measurement.

SWP



## TXMSTAT?

Tx Measurement Status

### Function

Queries the Tx measurement status.

### Query

TXMSTAT?

### Response

m\_status

### Parameter

m_status	Measurement status
0	Measurement completed
2	Over level
5	Synchronization word not detected
9	Measurement in progress or not measured
12	Tx measurement timeout

### Details

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

### Example of Use

To query current Tx measurement status:

TXMSTAT?

> 0

## 5.2.2 Fundamental measurement commands

### ACLR?

ACLR Result

Function

Queries the result of ACLR (Adjacent Channel Leakage Power Ratio) measurement.

Query

ACLR? mode

Response

When mode = AVG, MAX, MIN, DVT,

ac1r (E-UTRA\_LOW) , ac1r (E-UTRA\_UP) , ac1r (UTRA\_LOW2) , ac1r (UTRA\_LOW1) ,  
ac1r (UTRA\_UP1) , ac1r (UTRA\_UP2)

When mode = TTL,

avg (E-UTRA\_LOW) , avg (E-UTRA\_UP) , avg (UTRA\_LOW2) , avg (UTRA\_LOW1) , avg (UTRA\_UP1) , avg (UTRA\_UP2) ,  
max (E-UTRA\_LOW) , max (E-UTRA\_UP) , max (UTRA\_LOW2) , max (UTRA\_LOW1) , max (UTRA\_UP1) , max (UTRA\_UP2) ,  
min (E-UTRA\_LOW) , min (E-UTRA\_UP) , min (UTRA\_LOW2) , min (UTRA\_LOW1) , min (UTRA\_UP1) , min (UTRA\_UP2)

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
ac1r(offset)	Result of Adjacent Channel Leakage Power Ratio measurement in specified Storage mode
avg(offset)	ACLR measurement result (Average)
max(offset)	ACLR measurement result (Maximum)
min(offset)	ACLR measurement result (Minimum)
Resolution	0.01dB
Response unit	dB

Details

The measurement bandwidth of the target adjacent channel varies with the channel bandwidth setting.

Example of Use

To query the average of ACLR measurement result:

ACLR? AVG

> -61.23, -30.06, -65.68, -62.44, -65.68, -62.44

# ACLR\_SET

ACLR On/Off and Meas. Count

**Function**  
Sets or queries the ACLR measurement On/Off state and measurement count.

**Command**  
ACLR\_SET on\_off[,avg\_count]

**Query**  
ACLR\_SET?

**Response**  
on\_off,avg\_count

Parameters	
on_off	Enables/disables measurement.
ON	Enables measurement
OFF	Disables measurement
Default	ON
avg_count	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

**Examples of Use**  
To set the ACLR measurement to OFF:  
ACLR\_SET OFF  
ACLR\_SET?  
> OFF

## ALLMEASITEMS\_OFF

All Measurement Items Off

### Function

Sets all fundamental measurement items to off at one time.

### Command

```
ALLMEASITEMS_OFF
```

### Example of Use

To set all fundamental measurement items to off at one time:

```
ALLMEASITEMS_OFF
```

# BAND

Operation band

## Function

Sets or queries the operation band.

## Command

BAND band

## Query

BAND?

## Response

band

## Parameter

band	Operation band
Range	0 to 256
Resolution	1
Default	1

## Example of Use

To query the operation band:

BAND 1  
BAND?  
> 1

Remarks

“0” is returned when the uplink or downlink channel number is set, but the set band is not found in Table 2.1.6-3.

When setting the operation band, change UL and DL channels as the following table.

Band	UL Channel	DL Channel	Band	UL Channel	DL Channel	Band	UL Channel	DL Channel
0	Not changed	4980	...	Not changed	Not changed	31	27785	9895
1	18300	300	17	23790	5790	32	Not changed	10140
2	18900	900	18	23925	5925	...		
3	19575	1575	19	24075	6075	65	131522	65986
4	20175	2175	20	24300	6300	66	132422	66886
5	20525	2525	21	24525	6525	67	Not changed	67436
6	20700	2700	22	25000	7000	68	132822	67686
7	21100	3100	23	25600	7600	69	Not changed	68086
8	21625	3625	24	25870	7870	70	133047	68461
9	21975	3975	25	26365	8365	71	133297	68761
10	22450	4450	26	26865	8865	...	Not changed	Not changed
11	22850	4850	27	27125	9125	252	Not changed	255644
12	23095	5095	28	27435	9435	...	Not changed	Not changed
13	23230	5230	29	Not changed	9715	255	Not changed	261494
14	23330	5330	30	27710	9820			

# BANDWIDTH

Channel Bandwidth

Function  
Sets or queries the Channel Bandwidth.

Command  
BANDWIDTH bandwidth

Query  
BANDWIDTH?

Response  
bandwidth

Parameter	
bandwidth	Bandwidth
1.4MHZ	1.4 MHz
3MHZ	3 MHz
5MHZ	5 MHz
10MHZ	10 MHz
15MHZ	15 MHz
20MHZ	20 MHz
Default	1.4MHZ

Example of Use  
To set the channel bandwidth to 1.4 MHz:  
BANDWIDTH 1.4MHZ  
BANDWIDTH?  
> 1.4MHZ

Remarks  
When the channel bandwidth is updated, Narrowband Index, Number of RB, Starting RB, and Output Level (Total) are changed accordingly.  
Narrowband Index is reset to 0, Number of RB is reset to 6, Starting RB is reset to 0.

## CARRF?

### Carrier Frequency Result

#### Function

Queries the Carrier Frequency measurement result.

#### Query

CARRF? mode

#### Response

freq

#### Parameter

mode	Storage mode
AVG	Average
freq	Carrier frequency
Resolution	1 Hz
Unit	Hz

#### Example of Use

To query the result of Carrier Frequency measurement:

CARRF?

> 1951000000



# CARRLEAK?

## Carrier Leakage Result

### Function

Queries the Carrier Leakage (Origin offset) measurement result.

### Query

CARRLEAK? [mode]

### Response

When mode = AVG, MAX, MIN, DVT  
    cleakage

When mode = TTL,  
    avg,max,min

### Parameters

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

### Example of Use

To query the average of Carrier Leakage measurement result:  
CARRLEAK? AVG  
> 20.00

## CELLID

Cell ID

Function

Sets or queries the Cell ID.

Command

CELLID id

Query

CELLID?

Response

id

Parameter

id	Cell ID
Range	0 to 503
Resolution	1
Default	0
Suffix code	None

Example of Use

To set the Cell ID to 0:

```
CELLID 0
```

```
CELLID?
```

```
> 0
```

## CFERR?

### Carrier Frequency Error Result

#### Function

Queries the Frequency Error measurement result.

#### Query

CFERR? mode

#### Response

When mode = AVG, MAX, MIN, DVT,  
freq\_ppm, freq\_Hz

When mode = TTL,  
avg\_ppm, avg\_Hz, max\_ppm, max\_Hz, min\_ppm, min\_Hz

#### Parameters

mode	Storage mode	
AVG	Average	
MAX	Maximum	
MIN	Minimum	
TTL	Average • Maximum • Minimum	
DVT	Standard deviation	
avg_ppm	Measurement result in ppm (Average)	
avg_Hz	Measurement result in Hz (Average)	
max_ppm	Measurement result in ppm (Maximum)	
max_Hz	Measurement result in Hz (Maximum)	
min_ppm	Measurement result in ppm (Minimum)	
min_Hz	Measurement result in Hz (Minimum)	
freq_ppm	Measurement result in ppm in specified Storage mode	
freq_Hz	Measurement results in Hz in specified Storage mode	
Resolution	0.01 ppm	(Measurement result in ppm)
	0.1 Hz	(Measurement result in Hz)
Unit	ppm	(Measurement result in ppm)
	Hz	(Measurement result in Hz)

#### Example of Use

To query the average of Frequency Error measurement result:

```
CFERR? AVG
> 0.03, 60.0
```

## CFERR\_WORST?

Worst Carrier Frequency Error Result

### Function

Queries the worst value in Frequency Error measurement results.

### Query

CFERR\_WORST?

### Response

freq\_ppm, freq\_Hz

### Parameters

freq_ppm	Worst value in Frequency Error measurement results in ppm
Resolution	0.01 ppm
Unit	ppm
freq_Hz	Worst value in Frequency Error measurement results in Hz
Resolution	0.1 Hz
Unit	Hz

### Example of Use

To query the worst value in Frequency Error measurement results:

```
CFERR_WORST?
```

```
> 0.03, 60.0
```

# CHCODING

Channel Coding

Function

Sets or queries the channel coding.

Command

CHCODING object

Query

CHCODING?

Response

object

Parameter

object	Target for channel coding
RMC	Reference Measurement Channel
Default	RMC

Examples of Use

To set the channel coding to RMC:  
CHCODING RMC  
CHCODING?  
> RMC

## CHCONFIG

### RMC Configuration

#### Function

Sets or queries the channel configuration of uplink signal when Channel Coding is RMC.

#### Command

```
CHCONFIG val
```

#### Query

```
CHCONFIG?
```

#### Response

```
val
```

#### Parameter

val	RMC channel configuration
PUSCH	PUSCH
PUCCH	PUCCH
Default	PUSCH

#### Example of Use

To set the channel configuration of uplink signal to PUSCH:

```
CHCONFIG PUSCH
CHCONFIG?
> PUSCH
```

## CHPWR?

### Channel Power Result

#### Function

Queries the Channel Power measurement result.

#### Query

CHPWR? [mode]

#### Response

When mode = AVG, MAX, MIN or DVT,

pwr

When mode = TTL,

avg,max,min

When mode = IND,

s,pwr(1),pwr(2),pwr(3),...,pwr(s)

#### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Average
pwr	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
pwr(n)	The n-th measurement result (n=1 to s)
Resolution	0.01 dB
Unit	dBm
s	Number of valid measurement results

#### Example of Use

To query the average of Channel Power measurement result:

CHPWR? AVG

> -20.00

#### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## CSHIFT

Cyclic Shift

### Function

Sets or queries the Cyclic Shift.

### Command

CSHIFT val

### Query

CSHIFT?

### Response

val

### Parameter

val	Enables/disables Cyclic Shift
ON	Enables Cyclic Shift
OFF	Disables Cyclic Shift
AUTO	Sets the Cyclic Shift to Auto.
Default	ON

### Example of Use

To enable the Cyclic Shift:

```
CSHIFT ON
```

```
CSHIFT?
```

```
> ON
```



# DELTASS

Delta SS

Function

Sets or queries the Delta SS.

Command

DELTASS val

Query

DELTASS?

Response

val

Parameter

val	Delta SS
Range	0 to 29
Resolution	1
Default	0
Suffix code	None

Example of Use

To set the Delta SS to 0:  
DELTASS 0  
DELTASS?  
> 0

# DLCHAN

## Downlink Channel

### Function

Sets or queries the Downlink Channel.

### Command

DLCHAN dl\_ch

### Query

DLCHAN?

### Response

dl\_ch

### Parameter

dl_ch	Downlink Channel
Range	0 to 262143
Resolution	1
Default	300
Suffix code	None

### Details

When the Downlink Channel is updated, Operation Band, Uplink Channel, Downlink Frequency and Uplink Frequency are changed accordingly.  
For the relationship between the channel and frequency settings refer to Table 2.1.6-2 “Relationship between Uplink Channel Number and Downlink Channel Number” and Table 2.1.6-3 “E-UTRA Channel Numbers and Default UE TX-RX Frequency Separation”.

### Example of Use

To set the Downlink Channel to 300:  
DLCHAN 300  
DLCHAN?  
> 300

# DLFREQ

Downlink Frequency

Function

Sets or queries the downlink frequency.

Command

DLFREQ dl\_freq

Query

DLFREQ?

Response

dl\_fleq

Parameter

dl_freq	Downlink frequency
Range	400 000 000 to 3800.000 000 Hz 400 000 000 to 6000.000000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	2140 000 000 Hz
Unit	Hz

Details

The Rx frequency for the mobile station is set.  
Updating the Downlink Frequency setting does not affect the Downlink Channel setting.

Example of Use

To set the downlink frequency to 2140 MHz:  
DLFREQ 2140MHZ  
DLFREQ?  
>2140000000

## DUPLEXMODE

Duplex Mode

Function

Sets or queries the Duplex Mode.

Command

DUPLEXMODE mode

Query

DUPLEXMODE?

Response

mode

Parameter

mode	Duplex Mode
HALF	Half Duplex
Default	HALF

Example of Use

To set the Duplex Mode to HALF:

```
DUPLEXMODE HALF
```

```
DUPLEXMODE?
```

```
> HALF
```

## EVM?

### EVM Result

#### Function

Queries the EVM (Error Vector Magnitude) measurement result.

#### Query

EVM? [mode]

#### Response

When mode = AVG, MAX, MIN, DVT

evm

When mode = TTL,

avg,max,min

When mode = IND,

s, evm(1), evm(2), ..., evm(s)

#### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
s	Number of valid measurement results

#### Example of Use

To query the average of EVM measurement result:

EVM? AVG

> 1.50

#### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## EVM\_H?

EVM Result (High)

### Function

Queries the EVM (Error Vector Magnitude) measurement result.

### Query

EVM\_H? [mode]

### Response

When mode = AVG, MAX, MIN, DVT

evm

When mode = TTL,

avg,max,min

When mode = IND,

s, evm(1), evm(2), ..., evm(s)

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
s	Number of valid measurement results

### Example of Use

To query the average of EVM measurement result:

EVM\_H? AVG

> 1.50

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

EVM\_L?

EVM Result (Low)

Function

Queries the EVM (Error Vector Magnitude) measurement result.

Query

EVM\_L? [mode]

Response

When mode = AVG, MAX, MIN, DVT  
evm

When mode = TTL,  
avg,max,min

When mode = IND,  
s, evm(1), evm(2), . . . , evm(s)

Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)	n-th EVM measurement result (n=1 to s)
Resolution	0.01%
Unit	%
s	Number of valid measurement results

Example of Use

To query the average of EVM measurement result:  
EVM\_L? AVG  
> 1.50

Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## FRAMETYPE

### Frame Structure

#### Function

Sets or queries the frame structure.  
This setting determines the duplex mode.

#### Command

```
FRAMETYPE mode
```

#### Query

```
FRAMETYPE?
```

#### Response

```
mode
```

#### Parameter

mode	Frame Structure
FDD	Frequency Division Multiplexing
Default	FDD

#### Example of Use

To set the frame structure to FDD:

```
FRAMETYPE FDD
FRAMETYPE?
> FDD
```



# GROUPHOP

Group Hopping

## Function

Sets or queries the Group Hopping On/Off state.

## Command

GROUPHOP on\_off

## Query

GROUPHOP?

## Response

on\_off

## Parameter

on_off	Enables/disables Group hopping.
ON	Enables Group hopping.
OFF	Disables Group hopping.
Default	ON

## Example of Use

To enable Group hopping:  
GROUPHOP ON  
GROUPHOP?  
> ON

## IBEM\_CLFR

In-band Emissions/EVM Carrier Leakage Frequency

### Function

Sets and queries the position of Carrier Leakage Frequency of the UE in the In-band Emission/EVM measurement

### Command

```
IBEM_CLFR clf
```

### Query

```
IBEM_CLFR?
```

### Response

```
clf
```

### Parameter

clf	Position of Carrier Leakage Frequency
CFR	Carrier Frequency
NBC	Narrow Band Center
Default	CFR

### Details

CFR: The In-band Emission/EVM measurement is performed, treating the resource block located at the center frequency of Aggregated Channel Bandwidth as the carrier leakage frequency.

NBC: The In-band Emission/EVM measurement is performed, treating the center of assigned Narrow Band Index (6RB) as the carrier leakage frequency.

### Example of Use

To set the position of Carrier Leakage Frequency to CFR:

```
IBEM_CLFR CFR
IBEM_CLFR?
> CFR
```

ILVL

Input Level

Function

Sets or queries the input level of the MU887000A connector.

Command

ILVL level

Query

ILVL?

Response

level

Parameter

level	Input level of PCC
Range	–65.0 to +35.0 dBm (Port 1/Port 2) –65.0 to +25.0 dBm (Port 3/Port 4)
Resolution	0.1 dB
Suffix Code	DBM, (uses dBm when omitted)
Default	–1.0 dBm
Unit	dBm

Details

The setting range varies according to the External Loss setting.  
When Cable Loss Correction is ON, the cable loss is added to the input level setting range.  
When the cable loss is 5 dB, the Port1/Port2 setting range is –60.0 to +40.0 dBm.

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

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 result.

Query

INBANDEPASS?

Response

judgement

Parameter

judgement	Judgement
PASS	Pass
FAIL	Fail
—	Not measured

Example of Use

To query the judgement on the in-band emission measurement result:  
INBANDEPASS?  
> PASS

## INBANDE\_GEN?

In-Band Emissions (General) Result

### Function

Queries in-band emissions (General) for non-allocated RB measurement result.

### Query

INBANDE\_GEN? [mode]

### Response

When mode =AVG, MAX, MIN, DVT,  
ibe

When mode = TTL,  
avg,max,min

When mode = IND,  
s,ibe(1),ibe(2),...,ibe(s)

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth value in In-Band Emissions (General) measurement result (n = 1 to s)
Unit	dB
Resolution	0.01 dB
s	Number of valid measurement results

### Example of Use

To query the maximum of in-band emissions (General) measurement result:

```
INBANDE_GEN? MAX
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## INBANDE\_GENUL?

In-Band Emissions limit (General)

Function

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

Query

INBANDE\_GENUL?

Response

level

Parameter

level	Limit
Resolution	0.1 dB
Unit	dB

Example of Use

To query the limit of in-band emission (General):  
INBANDE\_GENUL?  
> 2.4

## INBANDE\_IMG?

In-Band Emissions (IQ Image) Result

### Function

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

### Query

```
INBANDE_IMG? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,  
ibe

When mode = TTL,  
avg,max,min

When mode = IND,  
s,ibe(1),ibe(2),...,ibe(s)

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth value in In-Band Emissions (IQ Image) measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Number of valid measurement results

### Example of Use

To query the maximum of in-band emissions (IQ Image) measurement result:

```
INBANDE_IMG? MAX  
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.



## INBANDE\_IMGUL?

In-Band Emissions limit (IQ Image)

### Function

Queries the limit of in-band emission (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 (IQ Image).  
INBANDE\_IMGUL?  
> 1.4

## INBANDE\_LEAK?

In-Band Emissions (Carrier Leakage) Result

### Function

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

### Query

```
INBANDE_LEAK? [mode]
```

### Response

When mode = AVG, MAX, MIN, DVT,  
ibe

When mode = TTL,  
avg,max,min

When mode = IND,  
s,ibe(1),ibe(2),...,ibe(s)

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
ibe	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
ibe(n)	Nth value in In-Band Emissions (Carrier Leakage) measurement result (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Number of valid measurement results

### Example of Use

To query the maximum of in-band emissions (Carrier Leakage) measurement result:

```
INBANDE_LEAK? MAX  
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## INBANDE\_LEAKUL?

In-Band Emissions limit (Carrier Leakage)

Function

Queries the limit of in-band emission (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 (Carrier Leakage).  
INBANDE\_LEAKUL?  
> 1.4

## 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
Resolution	0.01 dB
Unit	dB

### Example of Use

Queries the worst margin in the entire bandwidth of in-band emission measurement:

```
INBANDE_MARG?  
> 1.40
```

# IQIMB\_DB?

IQ Imbalance (dB) Result

## Function

Queries the IQ Imbalance measurement result.

## Query

IQIMB\_DB? [mode]

## Response

When mode = AVG, MAX, MIN, DVT,  
magnitude

When mode = TTL,  
avg,max,min

## Parameters

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

## Example of Use

To query the average of IQ Imbalance measurement result:  
IQIMB\_DB? AVG  
> 0.05

## IQIMB\_PER?

IQ Imbalance (%) Result

### Function

Queries the IQ Imbalance measurement result.

### Query

IQIMB\_PER? [mode]

### Response

When mode = AVG, MAX, MIN, DVT,  
percent

When mode = TTL,  
avg,max,min

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
percent	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 IQ Imbalance measurement result:

```
IQIMB_PER? AVG
> 0.05
```

# MAGTDERR?

Magnitude Error Result

## Function

Queries the Magnitude Error measurement result.

## Query

MAGERR? [mode]

## Response

When mode = AVG, MAX, MIN, DVT,  
magnitude

When mode = TTL,  
avg,max,min

## Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
magnitude	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01%
Unit	%

## Example of Use

To query the average of Magnitude Error measurement result:  
MAGTDERR? AVG  
> 1.05

## MOD\_SET

Modulation Analysis On/Off and Meas. Count

### Function

Sets or queries the Modulation Analysis On/Off state and measurement count.

### Command

```
MOD_SET on_off[,avg_count]
```

### Query

```
MOD_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	OFF
avg_count	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set the Modulation Analysis to On and measurement count to 200:

```
MOD_SET ON,200
```

```
MOD_SET?
```

```
> ON,200
```



## NRBCQI

nRB-CQI

Function

Sets or queries the nRB-CQI.

Command

NRBCQI value

Query

NRBCQI?

Response

value

Parameter

value	nRB-CQI
Range	0 to 8
Resolution	1
Suffix code	None
Default	0

Details

This command sets the number of RBs to send the Uplink PUCCH signal.

Example of Use

To set the nRB-CQI to 3:  
NRBCQI 3  
NRBCQI?  
> 3

## OBW?

### OBW Result

#### Function

Queries the OBW (Occupied Bandwidth) measurement result.

#### Query

OBW?

#### Response

bw

#### Parameter

bw	Occupied Bandwidth
Resolution	1 Hz
Unit	Hz

#### Example of Use

To query the OBW measurement result:

OBW?

> 1080000

## OBWFREQ?

### OBW Frequency Result

#### Function

Queries the upper, lower and center frequency of OBW (Occupied Bandwidth) measurement results.

#### Query

OBWFREQ? pos

#### Response

freq

#### Parameters

pos	Offset type
UPPER	Upper frequency
LOWER	Lower frequency
CENTER	Center frequency
freq	Offset frequency
Resolution	0.1 Hz
Unit	Hz

#### Example of Use

To query the upper frequency of OBW measurement result:  
OBWFREQ? UPPER  
> 1951920000.0

## OBW\_SET

OBW On/Off and Meas. Count

### Function

Sets or queries the OBW (Occupied Bandwidth) measurement On/Off state and measurement count.

### Command

```
OBW_SET on_off[,avg_count]
```

### Query

```
OBW_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
avg_count	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set OBW measurement on and set the measurement count to 50:

```
OBW_SET ON,50
```

```
OBW_SET?
```

```
> ON,50
```

## OLVL

Output Level (Total)

### Function

Sets or queries the total output level of all channels.

### Command

OLVL level

### Query

OLVL?

### Response

level

### Parameter

level	Output level
Range	–130.0 to –10.0 dBm (Port 1/Port 2) –120.0 to 0.0 dBm (Port 3/Port 4)
Resolution	0.1 dB
Suffix Code	DBM (uses dBm when omitted)
Default	–66.4 dBm
Unit	dBm

### Details

The setting range varies with the output port setting.

When the Cable Loss Calibration is ON, the cable loss is subtracted from the output level setting range.

When the cable loss is 5 dB, the Port1/Port2 setting range is –135.0 to –15.0 dBm.

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

### Example of Use

To set the output level to –50.0 dBm:

OLVL –50.0

OLVL?

> –50.0

### Related Commands

EXTLOSSW

LOSSTBL

LOSSTBLVAL

For details of the commands, refer to Chapter 6 “Native Command Reference” in the *MU887000A TRX Test Module Operation Manual*.

Remarks

When the Output Level (Total) is updated, the Output Level (Total 1.4 MHz) is changed accordingly.

Output Level (Total 1.4 MHz) = Output Level (Total) –  $10\log_{10}(nSC/72)$

Channel Bandwidth	nSC	$10\log_{10}(nSC/72)$ Round to one decimal place
1.4 MHz	72	0
3 MHz	180	4.0
5 MHz	300	6.2
10 MHz	600	9.2
15 MHz	900	10.9
20 MHz	1200	12.2

## OLVL\_NB

Output Level(Total 1.4MHz)

### Function

Sets or queries the output level of Narrowband total (dBm/1.4 MHz).

### Command

OLVL\_NB level

### Query

OLVL\_NB?

### Response

level

### Parameter

level	Output level
Range	Refer to the following table.
Resolution	0.1 dB/1.4 MHz
Default	-66.4 dBm
Suffix code	DBM, (uses dBm when omitted)
Unit	dBm

Channel Bandwidth	Port 1 / Port 2	Port 3 / Port 4
1.4 MHz	-130.0 to -10.0 dBm	-120.0 to 0.0 dBm
3 MHz	-134.0 to -14.0 dBm	-124.0 to -4.0 dBm
5 MHz	-136.2 to -16.2 dBm	-126.2 to -6.2 dBm
10 MHz	-139.2 to -19.2 dBm	-129.2 to -9.2 dBm
15 MHz	-140.9 to -20.9 dBm	-130.9 to -10.9 dBm
20 MHz	-142.2 to -22.2 dBm	-132.2 to -12.2 dBm

### Details

The setting range varies with the output port setting.

When the Cable Loss Calibration is ON, the cable loss is subtracted from the output level setting range.

### Example of Use

To set the output level to -50.0 dBm:

OLVL\_NB -50.0

OLVL\_NB?

>-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*.

#### Remarks

When the Output Level (Total 1.4 MHz) is updated, the Output Level (Total) is changed accordingly.

Output Level (Total) = Output Level (Total 1.4 MHz) +  $10\log_{10}(nSC/72)$

Channel Bandwidth	nSC	$10\log_{10}(nSC/72)$ Round to one decimal place
1.4 MHz	72	0
3 MHz	180	4.0
5 MHz	300	6.2
10 MHz	600	9.2
15 MHz	900	10.9
20 MHz	1200	12.2

When changing Channel Bandwidth, if the set value exceeds the upper limit or falls below the lower limit, the value is rounded to the limit.

## PHASEERR?

#### Phase Error Result

#### Function

Queries the Phase Error measurement result.

#### Query

PHASEERR? [mode]

#### Response

When mode = AVG, MAX, MIN, DVT,

phase

When mode = TTL,

avg,max,min

#### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
phase	Measurement result in specified Storage mode



avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01 degree
Unit	degree

**Example of Use**

To query the average of Phase Error measurement result:

```
PHASEERR? AVG
```

```
> 1.55
```

## POWER?

### Tx Power Result

#### Function

Queries the Tx Power measurement result.

#### Query

POWER? [mode]

#### Response

When mode = AVG, MAX, MIN, DVT,

pwr

When mode = TTL,

avg,max,min

When mode = IND

s,pwr(1),pwr(2),...,pwr(s)

#### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)	The n-th Measurement result (n=1 to s)
Resolution	0.01 dB
Unit	dBm
s	Number of valid measurement results

#### Example of Use

To query the Tx Power measurement result:

POWER? AVG

> -20.00

#### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

# PVECTERR?

Peak EVM Result

## Function

Queries the peak EVM (Error Vector Magnitude) measurement result.

## Query

PVECTERR? [mode]

## Response

When mode = AVG, MAX, MIN, DVT,  
pevm

When mode = TTL,  
avg,max,min

## Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
pevm	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.01%
Unit	%

## Example of Use

To query the average of Peak EVM measurement result:

PVECTERR? AVG  
> 1.75

## PWR\_SET

Power Measurement On/Off and Meas. Count

### Function

Sets or queries the Tx Power Measurement On/Off state and measurement count.

### Command

```
PWR_SET on_off[,avg_count]
```

### Query

```
PWR_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

on_off	Enables/disables measurement.
ON	Enables measurement.
OFF	Disables measurement.
Default	ON
avg_count	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

To set Tx Power measurement ON and set the measurement count to 200:

```
PWR_SET ON,200
```

```
PWR_SET?
```

```
> ON,200
```

# RBSEARCH

RB Search

Function

Sets or queries the RB Search On/Off state.

Command

RBSEARCH on\_off

Query

RBSEARCH?

Response

on\_off

Parameter

on_off	RB Search On/Off
ON	Enables RB Search. Detects the Resource Block automatically in 20 MHz bandwidth.
OFF	Disables RB Search. Measures the Resource Block specified by Narrowband Index.
Default	OFF

Example of Use

To enable the RB Search:  
RBSEARCH ON  
RBSEARCH?  
> ON

## RHO?

### Rho Result

#### Function

Queries the Rho (waveform quality) measurement result.

#### Query

RHO? [mode]

#### Response

When mode = AVG, MAX, MIN, DVT,  
rho

When mode = TTL,  
avg,max,min

#### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Average
rho	Measurement result in specified Storage mode
avg	Measurement result (Average)
max	Measurement result (Maximum)
min	Measurement result (Minimum)
Resolution	0.00001

#### Example of Use

To query the average of Signal Quality measurement (Rho) result:

```
RHO? AVG  
> 0.00004
```

## RSEVM?

Reference Signal EVM Result

### Function

Queries the EVM measurement result of Reference Signal.

### Query

RSEVM? [mode]

### Response

When mode = AVG, MAX, MIN, DVT,

rsevm

When mode = TTL,

avg,max,min

When mode = IND,

s,rsevm(1),rsevm(2),...,rsevm(s)

### Parameters

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
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)	The n-th Measurement result (n=1 to s)
Resolution	0.01%
Unit	%
s	Number of valid measurement results

### Example of Use

To query the average of Reference Signal EVM measurement result:

RSEVM? AVG

> 1.51

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## RXFREQ

Downlink Frequency

### Function

Sets or queries the downlink frequency.

### Command

```
RXFREQ dl_freq
```

### Query

```
RXFREQ?
```

### Response

```
dl_freq
```

### Parameter

dl_freq	Downlink frequency
Range	400 000 000 to 3800 000 000 Hz 400 000 000 to 6000 000 000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	2140 000 000 Hz
Unit	Hz

### Details

The Rx frequency for the mobile station is set.

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

### Example of Use

To set the downlink frequency to 2140 MHz:

```
RXFREQ 2140MHZ
```

```
RXFREQ?
```

```
>2140000000
```



# SEMPASS?

## SEM Judgement

### Function

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

### Query

SEMPASS?

### Response

judgement

### Parameter

judgement	Judgement result
PASS	Pass
FAIL	Fail
—	Not measured

### Example of Use

To query the judgement result of SEM measurement:  
SEMPASS?  
> PASS

## SEM\_SET

SEM On/Off and Meas. Count

### Function

Sets or queries the SEM (Spectrum Emission Mask) Measurement On/Off state and measurement count.

### Command

```
SEM_SET on_off[,avg_count]
```

### Query

```
SEM_SET?
```

### Response

```
on_off,avg_count
```

### Parameters

on_off	Enables/disables the measurement.
ON	Enables the measurement.
OFF	Disables the measurement.
Default	OFF
avg_count	Measurement count
Range	1 to 500
Resolution	1
Suffix code	None
Default	1

### Example of Use

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

```
SEM_SET ON,100
SEM_SET?
> ON,100
```

## SIB2\_NS

additionalSpectrumEmission

Function

Sets or queries the additionalSpectrumEmission in SIB2.  
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_02	NS_02
NS_03	NS_03
...	
NS_31	NS_31
NS_32	NS_32
Default	NS_01

Example of Use

To set the additionalSpectrumEmission in SIB2 to NS\_02:  
SIB2\_NS NS\_02  
SIB2\_NS?  
> NS\_02

## SPECFLAT1?

Spectrum Flatness ( $\geq 3$  MHz) Result

### Function

Queries the worst value in the Spectrum Flatness measurement result in Range 1.

### Query

SPECFLAT1?

### Response

worst

### Parameter

worst	Worst value in Range 1
Resolution	0.01 dB
Unit	dB

### Details

The worst value should be either the maximum or minimum of the Flatness measurement results in Range 1, whichever has a larger absolute value.

### Example of Use

To query the worst value in the Spectrum Flatness measurement result in Range 1:

```
SPECFLAT1?
```

```
> 0.04
```

# SPECFLAT1\_M?

Spectrum Flatness ( $\geq 3$  MHz (R1 --)) Result

## Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 1.

## Query

SPECFLAT1\_M? [mode]

## Response

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

## Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Minimum
sflatness	Minimum value in Range 1 in specified Storage mode.
avg	Minimum value in Range 1 (Average)
max	Minimum value in Range 1 (Maximum)
min	Minimum value in Range 1 (Minimum)
Resolution	0.01 dB
Unit	dB

## Example of Use

To query the average of minimum value in the Spectrum Flatness measurement result in Range 1:  
SPECFLAT1\_M? AVG  
> 0.04

## SPECFLAT1\_P?

Spectrum Flatness ( $\geq 3$  MHz (R1 +)) Result

### Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 1.

### Query

SPECFLAT1\_P? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

### Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Maximum
sflatness	Maximum value in Range 1 in specified Storage mode.
avg	Maximum value in Range 1 (Average)
max	Maximum value in Range 1 (Maximum)
min	Maximum value in Range 1 (Minimum)
Resolution	0.01 dB
Unit	dB

### Example of Use

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

```
SPECFLAT1_P? AVG
```

```
> 0.04
```

# SPECFLAT2?

Spectrum Flatness (<3 MHz) Result

Function

Queries the worst value in the Spectrum Flatness measurement result in Range 2.

Query

SPECFLAT2?

Response

worst

Parameter

worst	Worst value in Range 2
Resolution	0.01 dB
Unit	dB

Details

The worst value should be either the maximum or minimum of the Flatness measurement results in Range 2, whichever has a larger absolute value.

Example of Use

To query the worst value in the Spectrum Flatness measurement result in Range 2:  
SPECFLAT2?  
> 0.04

## SPECFLAT2\_M?

Spectrum Flatness (<3 MHz (R2 –)) Result

### Function

Queries the minimum value in the Spectrum Flatness measurement result in Range 2.

### Query

SPECFLAT2\_M? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

### Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Minimum
sflatness	Minimum value in Range 2 in specified Storage mode.
avg	Minimum value in Range 2 (Average)
max	Minimum value in Range 2 (Maximum)
min	Minimum value in Range 2 (Minimum)
Resolution	0.01 dB
Unit	dB

### Example of Use

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

```
SPECFLAT2_M? AVG
> 0.04
```



## SPECFLAT2\_P?

Spectrum Flatness (<3 MHz (R2 +)) Result

Function

Queries the maximum value in the Spectrum Flatness measurement result in Range 2.

Query

SPECFLAT2\_P? [mode]

Response

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

Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
Omitted	Maximum
sflatness	Maximum value in Range 2 in specified Storage mode.
avg	Maximum value in Range 2 (Average)
max	Maximum value in Range 2 (Maximum)
min	Maximum value in Range 2 (Minimum)
Resolution	0.01 dB
Unit	dB

Example of Use

To query the average of maximum value in the Spectrum Flatness measurement result in Range 2:  
SPECFLA21\_P? AVG  
> 0.04

## SPECFLATITEM?

Spectrum Flatness Measured Item

### Function

Queries whether a spectrum flatness measurement item(s) is measured or not.

### Query

SPECFLATITEM?

### Response

flag

### Parameter

flag	Measured/Not measured flag (0 to 3) Returns the sum of the following measurement items.
0	Not measured
1	$\geq 3$ MHz area
2	$< 3$ MHz area
Unit	None

### Example of Use

To query whether a spectrum flatness measurement item(s) is measured or not.

SPECFLATITEM?

> 2

# SPECFLATPPPASS?

Spectrum Flatness Judgement

## Function

Queries the judgement of Spectrum Flatness measurement result.

## Query

SPECFLATPPPASS?

## Response

judgement

## Parameter

judgement	Judgement
PASS	Pass
FAIL	Fail
—	Not measured

## Example of Use

To query the judgement of Spectrum Flatness measurement result:  
SPECFLATPPPASS?  
> PASS

## Remarks

Queries a pass/fail judgement result only when the corresponding test parameter is selected.

## SPECFLAT\_RP?

Spectrum Flatness (RP Total) Result

### Function

Queries all ripple values in the Spectrum Flatness measurement result.

### Query

```
SPECFLAT_RP? [mode]
```

### Response

mode = AVG, MAX, MIN, DVT

```
sflat (RP1) , sflat (RP2) , sflat (RP12) , sflat (RP21)
```

mode = TTL

```
avg (RP1) , avg (RP2) , avg (RP12) , avg (RP21) ,
```

```
max (RP1) , max (RP2) , max (RP12) , max (RP21) ,
```

```
min (RP1) , min (RP2) , min (RP12) , min (RP21)
```

mode = IND

```
s , sflat (RP1) (1) , sflat (RP2) (1) , sflat (RP12) (1) , sflat (RP21) (1) ,
```

```
... , sflat (RP1) (s) , sflat (RP2) (s) , sflat (RP12) (s) , sflat (RP21) (s)
```

### Parameter

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

### Example of Use

To query the average of every ripple value in the Spectrum Flatness measurement result:

```
SPECFLAT_RP? AVG
```

```
> 0.04,0.03,0.06,0.05
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## SPECFLAT\_RP1?

Spectrum Flatness ( $\geq 3$  MHz (RP1)) Result

### Function

Queries the ripple value(s) in the Spectrum Flatness measurement result in Range 1.

### Query

SPECFLAT\_RP1? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

mode = IND

s,sflatness(1),sflatness(2),...,sflatness(s)

### Parameter

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

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 1:

```
SPECFLAT_RP1? AVG
> 0.04
```

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## SPECFLAT\_RP12?

Spectrum Flatness (RP12) Result

### Function

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

### Query

SPECFLAT\_RP12? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

mode = IND

s,sflatness(1),sflatness(2),...,sflatness(s)

### Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
sflatness	Difference between the maximum value in Range 1 and the minimum value in Range 2 in specified Storage mode.
avg	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Average)
max	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Maximum)
min	Difference between the maximum value in Range 1 and the minimum value in Range 2 (Minimum)
sflatness(n)	Nth difference between the maximum value in Range 1 and the minimum value in Range 2 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

#### Example of Use

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

```
SPECFLAT_RP12? AVG  
> 0.04
```

#### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.

## SPECFLAT\_RP2?

Spectrum Flatness (<3 MHz (RP2)) Result

### Function

Queries the ripple value(s) in the Spectrum Flatness measurement result in Range 2.

### Query

SPECFLAT\_RP2? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

mode = IND

s,sflatness(1),sflatness(2),...,sflatness(s)

### Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
sflatness	Ripple value in Range 2 in specified Storage mode.
avg	Ripple value in Range 2 (Average)
max	Ripple value in Range 2 (Maximum)
min	Ripple value in Range 2 (Minimum)
sflatness(n)	Nth ripple value in Range 2 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

### Example of Use

To query the average of ripple values in the Spectrum Flatness measurement result in Range 2:

SPECFLAT\_RP2? AVG

> 0.04

### Remarks

By specifying the argument IND, the measurement results for the average count can be queried.



## SPECFLAT\_RP21?

Spectrum Flatness (RP21) Result

### Function

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

### Query

SPECFLAT\_RP21? [mode]

### Response

mode = AVG, MAX, MIN, DVT

sflatness

mode = TTL

avg,max,min

mode = IND

s,sflatness(1),sflatness(2),...,sflatness(s)

### Parameter

mode	Storage mode
AVG	Average
MAX	Maximum
MIN	Minimum
TTL	Average • Maximum • Minimum
DVT	Standard deviation
IND	Individual measurement result
Omitted	Maximum
sflatness	Difference between the maximum value in Range 2 and the minimum value in Range 1 in specified Storage mode.
avg	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Average)
max	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Maximum)
min	Difference between the maximum value in Range 2 and the minimum value in Range 1 (Minimum)
sflatness(n)	Nth difference between the maximum value in Range 2 and the minimum value in Range 1 (n = 1 to s)
Resolution	0.01 dB
Unit	dB
s	Measurement count

**Example of Use**

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

```
SPECFLAT_RP21? AVG  
> 0.04
```

**Remarks**

By specifying the argument IND, the measurement results for the average count can be queried.

## TTL\_WORST\_SEM?

SEM Template Margin (All range)

### Function

Queries the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

TTL\_WORST\_SEM?

### Response

margin(-1),freq(-1),...,margin(-4),freq(-4),margin(1),freq(1),...,  
margin(4),freq(4)

### Parameters

margin(n)	Worst margin in each frequency range (Frequency range: n= -4 to -1, 1 to 4)
Resolution	0.01 dB
Unit	dB
freq(n)	Offset frequency of the worst margin in each frequency range (Frequency range: n= -4 to -1, 1 to 4)
Resolution	1 Hz
Unit	Hz

### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement:

TTL\_WORST\_SEM?

> -20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20,-20.0,20

## TTL\_WORST\_SEM\_DET?

SEM Template Margin (Detail) (All range)

### Function

Queries the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

TTL\_WORST\_SEM\_DET?

### Response

margin(-1),freq(-1),...,margin(-9),freq(-9),margin(1),freq(1),...,  
margin(9),freq(9)

### Parameters

margin(n)	Worst margin in each frequency range (Frequency range: n= -9 to -1, 1 to 9)
Resolution	0.01 dB
Unit	dB
freq(n)	Offset frequency of the worst margin in each frequency range (Frequency range: n= -9 to -1, 1 to 9)
Resolution	1 Hz
Unit	Hz

### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

The frequency range varies according to the channel bandwidth.

Refer to Table 2.4-3 “Frequency ranges of Range 1 to Range 9 (Detail)” for Frequency ranges.

### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in each frequency range of SEM measurement:

TTL\_WORST\_SEM\_DET?

```
> -20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,-20.0,1900000000,  
-20.0,1900000000,-20.0,1900000000
```

## TTL\_WORST\_SEM\_DET\_LV?

SEM Worst Value (Detail) (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

TTL\_WORST\_SEM\_DET\_LV?

### Response

level(-1),freq(-1),...,level(-9),freq(-9),level(1),freq(1),...,  
level(9),freq(9)

### Parameters

level(n)	Worst spectrum level in each frequency range (Frequency range: n = -9 to -1, 1 to 9)
Resolution	0.01 dB
Unit	dBm
freq(n)	Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = -9 to -1, 1 to 9)
Resolution	1 Hz
Unit	Hz

### Details

Refer to Table 2.4-3 “Frequency ranges of Range 1 to Range 9 (Detail)” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

```
TTL_WORST_SEM_DET_LV?
> -94.90,-855000,-79.73,-1500000,-79.82,-2300000,-78.96,-4300000,
-79.62,-5500000,-79.54,-9500000,-79.47,-14500000,-79.54,-19500000,
-79.42,-23500000,-93.80,735000,-77.64,2000000,-77.61,2300000,
-9.48,4500000,-72.78,5500000,-77.38,6500000,-78.50,12500000,
-78.60,16500000,-78.73,22500000
```

## TTL\_WORST\_SEM\_LV?

SEM Worst Value (All range)

### Function

Queries the worst spectrum level with offset frequency in each frequency range of SEM measurement.

### Query

TTL\_WORST\_SEM\_LV?

### Response

level(-1),freq(-1),...,level(-4),freq(-4),level(1),freq(1),...,  
level(4),freq(4)

### Parameters

level(n)	Worst spectrum level in each frequency range (Frequency range: n = -4 to -1, 1 to 4)
Resolution	0.01 dB
Unit	dBm
freq(n)	Offset frequency of the worst spectrum level in each frequency range (Frequency range: n = -4 to -1, 1 to 4)
Resolution	1 Hz
Unit	Hz

### Details

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4 (General)” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in each frequency range of SEM measurement:

TTL\_WORST\_SEM\_LV?

> -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0, 30, -20.0,  
30, -20.0, 30

# TRGDLY

Trigger Delay

Function

Sets or queries the Trigger Delay.

Command

TRGDLY delay

Query

TRGDLY?

Response

delay

Parameters

delay	Trigger Delay
Range	0.000 to 10.000 ms
Resolution	0.001 ms
Suffix code	S MS US NS (uses ms when omitted)
Default	0.000 ms
Unit	ms

Example of Use

To set the Trigger Delay to 0.001 ms:

TRGDLY 0.001  
TRGDLY?  
> 0.001

## TRGLVL

Trigger Level

### Function

Sets or queries the Trigger Level.

### Command

TRGLVL level

### Query

TRGLVL?

### Response

level

### Parameters

level	Trigger Level
Range	–40 to 0 dB
Resolution	1 dB
Suffix code	DB
Default	–30 dB
Unit	dB

### Details

This command is available when trigger source is set to Rise Config.

### Example of Use

To set the Trigger Level to –30 dB:

```
TRGLVL -30
```

```
TRGLVL?
```

```
> -30
```



# TRGSRC

Trigger Source

Function

Sets or queries the Trigger Source.

Command

TRGSRC source

Query

TRGSRC?

Response

source

Parameters

source	Trigger Source
FRAME	Frame
RISE_CONFIG	Rise Config
Default	RISE_CONFIG

Example of Use

To set the Trigger Source to Rise Config:

```
TRGSRC RISE_CONFIG
TRGSRC?
> RISE_CONFIG
```

## TRGTOUT

Trigger Timeout

### Function

Sets or queries the Trigger Timeout.

### Command

```
TRGTOUT time
```

### Query

```
TRGTOUT?
```

### Response

```
time
```

### Parameters

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

### Example of Use

To set the Trigger Timeout to 10 s:

```
TRGTOUT 10
```

```
TRGTOUT?
```

```
> 10
```

# TXFREQ

Uplink Frequency

## Function

Sets or queries the uplink frequency.  
This command has the same function as ULFREQ.

## Command

TXFREQ ul\_freq

## Query

TXFREQ?

## Response

ul\_freq

## Parameter

ul_freq	Uplink frequency
Range	400 000 000 to 3800 000 000 Hz 400 000 000 to 6000 000 000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	1950 000 000 Hz
Unit	Hz

## Details

This setting corresponds to the mobile station Tx frequency setting.  
Updating this Uplink frequency does not affect the Uplink Channel parameters.

## Example of Use

To set the Uplink frequency to 1950 MHz:  
TXFREQ 1950MHZ  
TXFREQ?  
>1950000000

# ULCHAN

Uplink Channel

Function

Sets or queries the Uplink Channel.

Command

ULCHAN ul\_ch

Query

ULCHAN?

Response

ul\_ch

Parameter

ul_ch	Uplink Channel
Range	0 to 262143
Resolution	1
Suffix code	None
Default	18300

Details

When the Uplink Channel is updated, the related Operation Band, Downlink Channel, Uplink Frequency, Downlink Frequency 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 and Default UE TX-RX Frequency Separation”.

Example of Use

To set the Uplink Channel to 18300:

```
ULCHAN 18300
ULCHAN?
> 18300
```

# ULFREQ

Uplink Frequency

Function

Sets or queries the Uplink frequency.

Command

ULFREQ ul\_freq

Query

ULFREQ?

Response

ul\_fleq

Parameter

ul_freq	Uplink frequency
Range	400 000 000 to 3800 000 000 Hz 400 000 000 to 6000 000 000 Hz (with MU887000A-001/101)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ (uses Hz when omitted)
Default	1950 000 000 Hz
Unit	Hz

Details

This setting corresponds to the mobile station Tx frequency setting.  
Updating this Uplink frequency does not affect the Uplink Channel parameters.

Example of Use

To set the Uplink frequency to 1950 MHz:  
ULFREQ 1950MHZ  
ULFREQ?  
>1950000000

# ULIMCS

UL RMC MCS Index

Function  
Sets or queries the MCS Index of Uplink signal.

Command  
ULIMCS ulimcs

Parameter	
ulimcs	UL MCS Index
Range	0 to 15
Resolution	1
Default	None
Suffix code	None

Details  
When the UL RMC MCS Index is set, Modulation scheme is set according to Table 2.1.6-1 “Relation Between MCS Index of UL RMC and Modulation”.

Example of Use  
To set the UL RMC MCS Index to 1:  
ULIMCS 1

## ULRB\_START

UL RMC Starting RB

Function

Sets or queries the start number for Uplink signal RB.

Command

ULRB\_START ulrb

Query

ULRB\_START?

Response

ulrb

Parameter

ulrb	RB start number
Range	0 to (6 – RBn) RBn is set using the ULRMC_RB command.
Resolution	1
Default	0
Suffix code	None

Example of Use

To set the RB start number to 0:  
ULRB\_START 0  
ULRB\_START?  
> 0

Remarks

The RB start number is reset to 0 when the channel bandwidth is updated.  
The RB start number is reset to 0 when the number of RB is updated.

## ULRMC\_MOD

### UL RMC Modulation

#### Function

Sets or queries the Modulation scheme of uplink signal.  
When the MCS Index is updated, the this parameter is changed accordingly.

#### Command

```
ULRMC_MOD ul_rmc_mod
```

#### Query

```
ULRMC_MOD?
```

#### Response

```
ul_rmc_mod
```

#### Parameter

ul_rmc_mod	Modulation scheme
QPSK	QPSK
16QAM	16QAM
Default	QPSK

#### Example of Use

To set the Modulation scheme to QPSK:

```
ULRMC_MOD QPSK
ULRMC_MOD?
> QPSK
```



ULRMC\_NARROW

ULRMC Narrowband Index

Function

Sets or queries the Narrowband Index.

Command

ULRMC\_NARROW index

Query

ULRMC\_NARROW?

Response

index

Parameter

Index	Narrowband Index value
Range	0 (Channel Bandwidth = 1.4 MHz) 0 to 1 (Channel Bandwidth = 3 MHz) 0 to 3 (Channel Bandwidth = 5 MHz) 0 to 7 (Channel Bandwidth = 10 MHz) 0 to 11 (Channel Bandwidth = 15 MHz) 0 to 15 (Channel Bandwidth = 20 MHz)
Resolution	1
Default	0
Suffix code	None

Example of Use

To set the Narrowband Index to 0:  
ULRMC\_NARROW 0  
ULRMC\_NARROW?  
> 0

Remarks

The Narrowband Index is reset to 0 when the channel bandwidth is updated.

## ULRMC\_RB

UL RMC Number of RB

### Function

Sets or queries the number of assigned RBs (Resource Blocks) at Uplink RMC.

### Command

```
ULRMC_RB ul_rmc_rb
```

### Query

```
ULRMC_RB?
```

### Response

```
ul_rmc_rb
```

### Parameter

ul_rmc_rb	Number of RBs
Range	0 to 6
Resolution	1
Default	6
Suffix code	None

### Example of Use

To set the number of RBs to 1.

```
ULRMC_RB 1
ULRMC_RB?
> 1
```

### Remarks

The number of RBs is reset to 6 when the channel bandwidth is updated.

## 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	format	format
1	Occupied Bandwidth	11	In-band Emissions (dB) (average)
2	Spectrum Emission Mask	12	In-band Emissions (dB) (maximum)
3	Constellation (I)	13	In-band Emissions (dBc) (average)
4	Constellation (Q)	14	In-band Emissions (dBc) (maximum)
5	EVM (average)	15	Spectrum Flatness (average)
6	EVM (maximum)	16	Spectrum Flatness (maximum)
7	Phase Error (average)	17	Spectrum Flatness (minimum)
8	Phase Error (maximum)		
9	Magnitude Error (average)		
10	Magnitude Error (maximum)		

position Start point of waveform data

Range

format	Channel Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Occupied Bandwidth	0 to 654	0 to 1358	0 to 2254	0 to 4494	0 to 6734	0 to 8974
Spectrum Emission Mask	0 to 1134	0 to 2254	0 to 3694	0 to 5486	0 to 7246	0 to 9038
Constellation						
EVM						
Phase Error	0 to 71	0 to 179	0 to 299	0 to 599	0 to 899	0 to 1199
Magnitude Error						
Spectrum Flatness						
In-band Emissions	0 to 5	0 to 14	0 to 24	0 to 49	0 to 74	0 to 99

Resolution 1

Suffix code None

length                      Number of read data

Range

format	Channel Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Occupied Bandwidth	1 to 655	1 to 1359	1 to 2255	1 to 4495	1 to 6735	1 to 8975
Spectrum Emission Mask	1 to 1135	1 to 2255	1 to 3695	1 to 5487	1 to 7247	1 to 9039
Constellation						
EVM						
Phase Error	1 to 72	1 to 180	1 to 300	1 to 600	1 to 900	1 to 1200
Magnitude Error						
Spectrum Flatness						
In-band Emissions	1 to 6	1 to 15	1 to 25	1 to 50	1 to 75	1 to 100

Resolution              1

Suffix code            None

symbol                  Position of SC-FDMA symbol

Range                   0 to 6 (Constellation, EVM, Phase Error, Magnitude Error)

data(n)                Waveform data

Resolution            0.01 dB    (Occupied Bandwidth, Spectrum Emission Mask, In-band Emissions, Spectrum Flatness)

                          0.01 deg.   (Phase Error)

                          0.01 %     (EVM, Magnitude Error)

                          0.0001    (Constellation)

Unit                    dBm        (Spectrum Emission Mask)

                          dB          (Occupied Bandwidth, In-band Emissions (dB), Spectrum Flatness)

                          dBc        (In-band Emissions (dBc) )

                          degree     (Phase Error)

                          %          (EVM, Magnitude Error)

                          None       (Constellation)

#### Details

Refer to Table 2.7-1 “Waveform Data Type and Data Interval” for Data Interval.

When RMC Configuration is PUCCH, format 3 through 17 are all “Not measured”.

#### Example of Use

To query the Occupied Bandwidth of 20 data from 25 of each measurement:

WAVEFMEAS? 1,25,20

> -42.12,-40.14,...,-41.22

## WORST\_SEM?

### SEM Template Margin

#### Function

Queries the worst margin from the template of the spectrum level with offset frequency in the specified frequency range of SEM measurement.

#### Query

WORST\_SEM? range

#### Response

margin,freq

#### Parameter

range	Frequency Range
Range	–4 to –1, 1 to 4
Resolution	1
Suffix code	None
margin	Worst margin in the specified frequency range
Resolution	0.01 dB
Unit	dB
freq	Offset frequency of the worst margin in the specified frequency range
Resolution	1 Hz
Unit	Hz

#### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

#### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM? 1
> -20.01,705
```

## WORST\_SEM\_DET?

### SEM Template Margin (Detail)

#### Function

Queries the worst margin from the template of the spectrum level with offset frequency in the specified frequency range of SEM measurement.

#### Query

```
WORST_SEM_DET? range
```

#### Response

```
margin,freq
```

#### Parameter

range	Frequency Range
Range	–9 to –1, 1 to 9
Resolution	1
Suffix code	None
margin	Worst margin in the specified frequency range
Resolution	0.01 dB
Unit	dB
freq	Offset frequency of the worst margin in the specified frequency range
Resolution	1 Hz
Unit	Hz

#### Details

The margin is calculated as (limit value – measured value).

If the measured value exceeds the limit value, the margin becomes negative.

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

#### Example of Use

To query the worst margin from the template of the spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_DET? 1  
> -20.01,705
```

# WORST\_SEM\_DET\_LV?

SEM Worst Value (Detail)

## Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

## Query

WORST\_SEM\_DET\_LV? range

## Response

level,freq

## Parameter

range	Frequency Range
Range	−9 to −1, 1 to 9
Resolution	1
Suffix code	None
level	Worst spectrum level in the specified frequency range
Resolution	0.01 dB
Unit	dB
freq	Offset frequency of the worst spectrum level in the specified frequency range
Resolution	1 Hz
Unit	Hz

## Details

Refer to Table 2.4-3 “Frequency Ranges for Measurement Results” for Frequency ranges.

## Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_DET_LV? 1
> -20.01,705
```

## WORST\_SEM\_LV?

SEM Worst Value

### Function

Queries the worst spectrum level with offset frequency in the specified frequency range of SEM measurement.

### Query

WORST\_SEM\_LV? range

### Response

level,freq

### Parameter

range	Frequency Range
Range	–4 to –1, 1 to 4
Resolution	1
Suffix code	None
level	Worst spectrum level in the specified frequency range
Resolution	0.01 dB
Unit	dB
freq	Offset frequency of the worst spectrum level in the specified frequency range
Resolution	1 Hz
Unit	Hz

### Details

The frequency range varies according to the channel bandwidth.

Refer to Table 2.4-1 “Frequency ranges of Range 1 to Range 4” for Frequency ranges.

### Example of Use

To query the worst spectrum level with offset frequency in Frequency Range 1 of SEM measurement:

```
WORST_SEM_LV? 1
> -20.01,705
```



## Chapter 6 Performance Test

---

This chapter explains how to setup the measuring instruments required for the MX887065A Category M FDD performance tests as well as the test procedures.

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## 6.1 Outline

The performance tests are performed to assure that the MU887000A performance does not deteriorate. Test the performance of the MU887000A at the initial acceptance inspection, at periodic inspections, and after repairs. Test important items periodically to assure the performance. This chapter explains the following test items.

- 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 MU887000A and the required measuring instruments for at least 30 minutes (except when specified otherwise) to stabilize them. To achieve the highest accuracy, the test should be performed at room temperature using a power supply with as little voltage fluctuation as possible in an environment free from noise, vibration, dust and humidity.**

---

## 6.2 Instruments for Testing Performance

The following table lists the measuring instruments required for testing the MU887000A performance and the specifications for each instrument.

**Table 6.2-1 Measuring Instruments for Performance Tests**

Test Item	Required Specifications*	Recommendation
Tx Power Measurements • Measurement Accuracy (CW)	Signal Generator • Frequency Range: 600 to 3800 MHz With MU887000A-001/101: 3800 to 4200 MHz • Frequency Resolution: 1 Hz • Output Level Range Unmodulated: -143 to +13 dBm Resolution: 0.01 dB	Vector Signal Generator (MG3700A) Mechanical Attenuator (MG3700A-002) High Frequency 6 GHz (MG3700A-011)
	Signal Analyzer Same as above	Signal Analyzer (MS2690A or MS2830A)
	Power Meter • Frequency Range: 600 to 3800 MHz With MU887000A-001/101: 3800 to 4200 MHz • Level Accuracy: $\pm 0.02$ dB • Level Resolution: 0.01 dB	Power Meter (ML2437A)
	Power Sensor • Frequency Range: 600 to 3800 MHz With MU887000A-001/101: 3800 to 4200 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 3GPP Category M modulation signals	Same as above
	Power Meter	Same as above
	Power Sensor • Frequency Range: 600 to 3800 MHz With MU887000A-001/101: 3800 to 4200 MHz • Level Range: -30 to +20 dBm • Input Connector: N type	Power Sensor (MA24002A)
Common	3-dB Attenuator	3-dB Attenuator (AT-103)

## 6.3 Calibration (MX887065A)

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: MG3700A
- Power Meter: ML2437A
- Power Sensor: MA2442D
- 3-dB Attenuator: AT-103 (2 sets)

#### (2) Setup

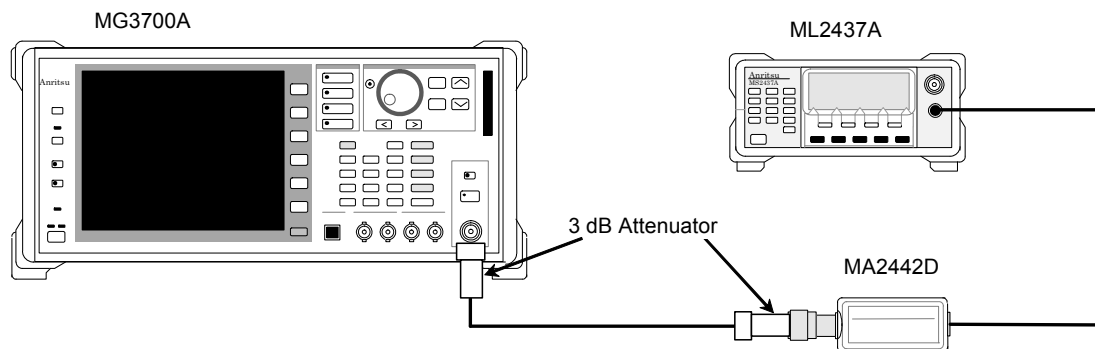


Figure 6.3.1-1 SG Calibration (CW)

#### (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: 599.99 MHz (600 MHz –10 kHz)
  - Output level: 6 dBm (0 dBm + 6 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.

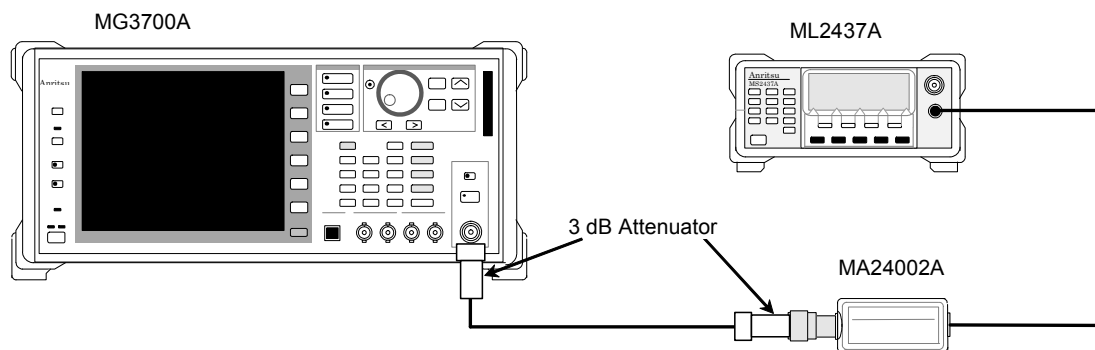
### 6.3.2 SG Calibration (MOD)

This section explains how to obtain the calibration values of the modulation wave signal source.

(1) Measuring instruments

- Vector signal generator: MG3700A
- Power Meter: ML2437A
- Power sensor: MA24002A
- 3-dB Attenuator: AT-103 (2 sets)

(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/Moduration”.  
Output frequency: 599.99 MHz (600 MHz –10 kHz)  
Output level: –4 dBm (–10 dBm + 6 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.

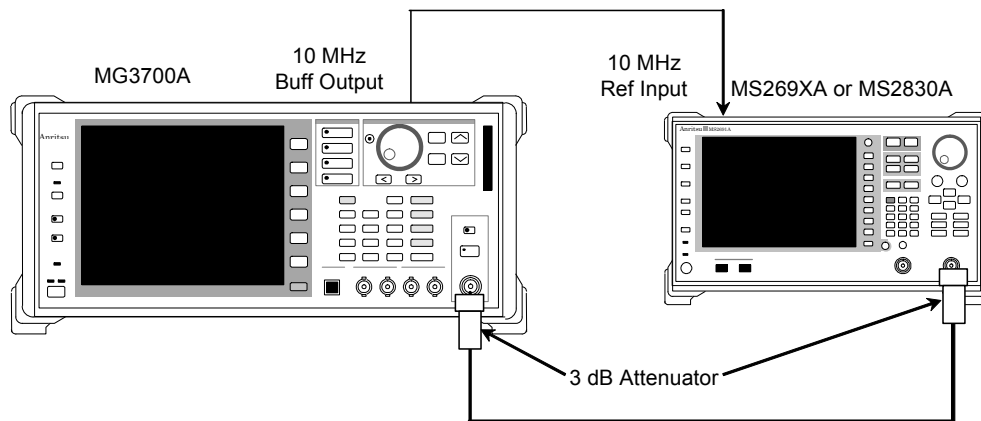
### 6.3.3 Linearity Calibration

This section explains how to obtain the calibration values for linearity.

#### (1) Measuring instruments

- Vector signal generator: MG3700A
- Signal Analyzer: MS269XA or MS2830A
- 3-dB Attenuator: AT-103 (2 sets)

#### (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:	599.99 MHz (600 MHz –10 kHz)
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	100Hz	781.3Hz	AUTO	20dB	OFF	0dBm
#2	Signal Analyzer	100Hz	781.3Hz	AUTO	0dB	OFF	–20dBm



### 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 4000 MHz and more frequency is measured only when MU887000A-001/101 is installed.

**Table 6.3.4-1 Measurement Point and Frequency**

Meas. Point	Frequency (MHz)	Meas. Point	Frequency (MHz)
1	600	8	2200
2	700	9	2700
3	880	10	3400
4	940	11	3600
5	1000	12	3800
6	1800	13	4000
7	2000	14	4200

**Note:**

Add an offset of –10 kHz to the frequency in the above table and set the frequency as SG output frequency, except for the measurement described in section 6.4.2, 6.4.3 and 6.4.4.

## 6.4 Performance Tests (MX887065A)

### Common test items

The following list shows the common settings for each measurement at the MU887000A.

Application Select:	Cellular
Standard Select:	CATM
Channel Coding:	RMC
Channel Bandwidth:	20 MHz
RMC Configuration:	PUSCH
Uplink RMC Modulation:	QPSK

### 6.4.1 Tx Power Measurement Accuracy (CW)

This test is related to the accuracy of Tx power measurements.

(1) Test specifications

Test Port1/2

(600 MHz ≤ Frequency ≤ 2700 MHz, 3400 MHz ≤ Frequency ≤ 3800 MHz)

Measurement Accuracy	Input Level	Temperature
±0.5 dB	−20 dBm ≤, ≤+35 dBm	10 to 40°C
±0.7 dB	−50 dBm ≤, <−20 dBm	10 to 40°C
±0.9 dB	−60 dBm ≤, <−50 dBm	10 to 40°C

Test Port1/2 (3800 MHz < Frequency ≤ 4200 MHz)

Measurement Accuracy	Input Level	Temperature
±0.7 dB	−20 dBm ≤, ≤+35 dBm	20 to 30°C
±0.9 dB	−50 dBm ≤, <−20 dBm	20 to 30°C
±1.1 dB	−60 dBm ≤, <−50 dBm	20 to 30°C

Test Port3/4

(600 MHz ≤ Frequency ≤ 2700 MHz, 3400 MHz ≤ Frequency ≤ 3800 MHz)

Measurement Accuracy	Input Level	Temperature
±0.7 dB	−20 dBm ≤, ≤+25 dBm	10 to 40°C
±0.9 dB	−50 dBm ≤, <−20 dBm	10 to 40°C
±1.1 dB	−60 dBm ≤, <−50 dBm	10 to 40°C

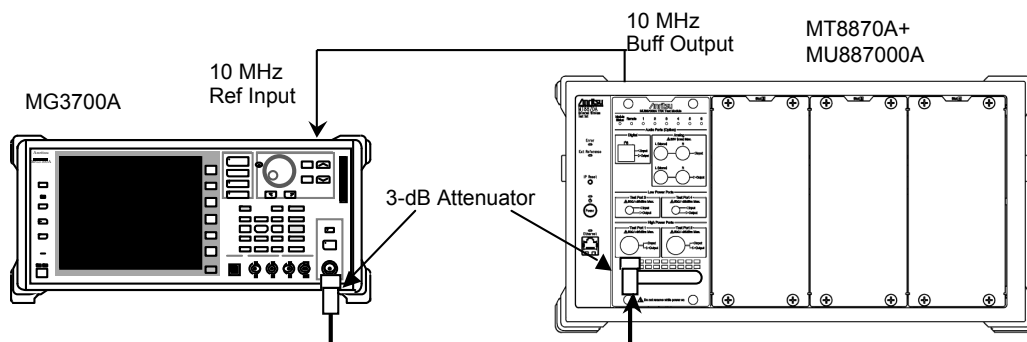
Test Port3/4 (3800 MHz < Frequency ≤ 4200 MHz)

Measurement Accuracy	Input Level	Temperature
±0.7 dB	−20 dBm ≤, ≤+25 dBm	20 to 30°C
±0.9 dB	−50 dBm ≤, <−20 dBm	20 to 30°C
±1.1 dB	−60 dBm ≤, <−50 dBm	20 to 30°C

(2) Measuring instruments

- Vector signal generator: MG3700A
- 3-dB Attenuator: AT-103 (2 sets)

(3) Setup



**Figure 6.4.1-1 Setup for Measuring Amplitude Measurement Accuracy**

(4) Test procedure

1. Setup the instruments as shown in Figure 6.4.2-1.
2. Set the MU887000A as follows:
 

Connect port:	Test Port1
Output level ON/OFF:	OFF
Input level:	-10 dBm
Uplink frequency:	600 MHz
Trigger Source	Free Run (TRGSRC FREE_CW)
Turn Off All measurement:	OFF
Tx Power measurement:	ON, 1 time
3. Set the Vector signal generator (SG) as follows:
 

Modulation:	OFF
Output frequency:	599.99 MHz
Output level:	-10 dBm (This output level reflects the calibration value for item 6.3.1.)
4. Change the frequency of the MU887000A and SG according to Table 6.3.4 "Measurement Frequencies" and measure the Tx power.
 

Tx Power Measurement Results:	Average value
-------------------------------	---------------
5. Change the SG output level and MU887000A input level each to -50, and -60 dBm and repeat steps 2 to 4 over and measure the Tx power. (This output level reflects the calibration value for item 6.3.3.)
6. Change the Connect port setting for the connection with the MU887000A to Test Port2/3/4 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	$\pm(\text{Set frequency} \times \text{Reference oscillator accuracy} + 15 \text{ Hz})$
Residual EVM	$\leq 2.5\%$ (rms)

Test Port1/2 Input Level range:       $-40 \text{ dBm} \leq \leq +35 \text{ dBm}$   
Test Port3/4 Input Level range:       $-40 \text{ dBm} \leq \leq +25 \text{ dBm}$

(2) Measuring instruments

- Vector signal generator:      MG3700A
- 3-dB Attenuator:              AT-103 (2 sets)

(3) Setup

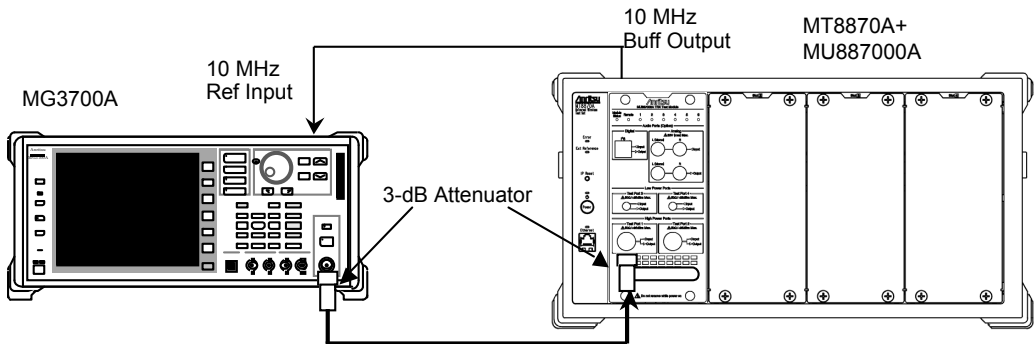


Figure 6.4.2-1 Setup for Measuring Frequency/Modulation

(4) Test procedure

- 1 Setup the instruments as shown in Figure 6.4.4-1.
- 2 Set the MU887000A as follows:

Connect port:	Test Port1
Output level ON/OFF:	OFF
Input level:	-10 dBm
Uplink frequency:	600 MHz
Trigger Source:	Rise Config
Trigger Level:	-15 dBm
UL RMC Narrowband Index:	0
UL RMC Number of RB:	6
Turn Off All measurement:	OFF
Modulation Analysis measurement:	ON, 20 times
- 3 Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Analyzable waveform pattern in Step 2 above.
Output frequency:	600 MHz
Output level:	-10 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 SG output level and the MU887000A input level to -40 dBm and measure by repeating steps 2 to 5 over. (This output level reflects the calibration value for item 6.3.2.)
- 7 Change the Connect port setting for the connection with the MU887000A to Test Port2/3/4 successively, and repeat steps 2 to 6 over.

### 6.4.3 In-band Emissions

This test is related to in-band emissions.

(1) Test specifications

(600 MHz  $\leq$  Frequency  $\leq$  2700 MHz, 3400 MHz  $\leq$  Frequency  $\leq$  4200 MHz)

In-Band Emissions	$\leq -40$ dBc
-------------------	----------------

Input level:  $\geq -10$  dBm

Allocated RB  $\leq 18$

(2) Measuring instruments

- Vector signal generator: MG3700A
- 3-dB Attenuator: AT-103 (2 sets)

(3) Setup

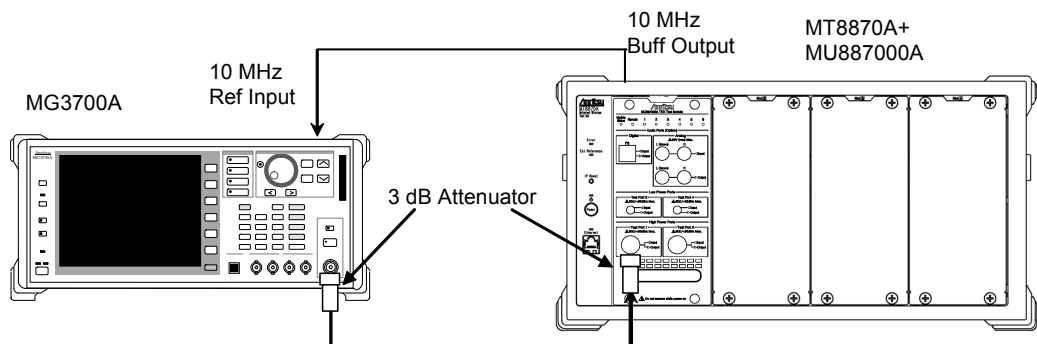


Figure 6.4.3-1 In-Band Emissions Measurement Setup

(4) Test procedure

1. Setup the instruments as shown in Figure 6.4.5-1.
2. Set the MU887000A as follows:

Connect port:	Test Port1
Output level ON/OFF:	OFF
Input level:	-10 dBm
Uplink frequency:	600 MHz
Trigger Source:	Rise Config
Trigger Level:	-15 dBm
UL RMC Narrowband Index:	0
UL RMC Number of RB:	1
Turn Off All measurement:	OFF
Modulation Analysis measurement:	ON, 20 times
3. Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Analyzable waveform pattern in Step 2 above.
Output frequency:	600 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 to Test Port2/3/4 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

(600 MHz ≤ Frequency ≤ 2700 MHz, 3400 MHz ≤ Frequency ≤ 4200 MHz)

Adjacent Channel Leakage Power Ratio	Measurement Point
≥ 45 dB	E-UTRA ACLR1
≥ 50 dB	UTRA ACLR1
≥ 55 dB	UTRA ACLR2

Test Port1/2 Input Level range: -10 dBm ≤, ≤+35 dBm

Test Port3/4 Input Level range: -10 dBm ≤, ≤+25 dBm

(2) Measuring instruments

- Vector signal Generator: MG3700A
- 3 dB Attenuator: AT-103 (2 sets)

(3) Setup

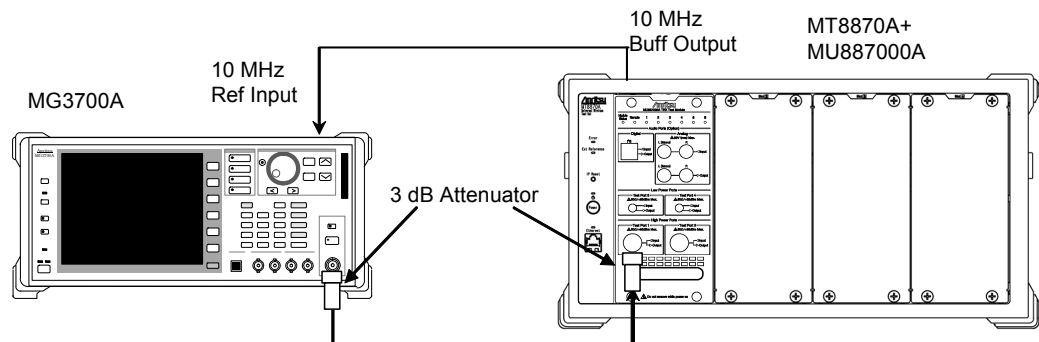


Figure 6.4.4-1 Setup for Measuring Adjacent Channel Leakage Power Ratio

(4) Test procedure

1. Setup the instruments as shown in Figure 6.4.6-1.

2. Set the MU887000A as follows:

Connect port:	Test Port1
Output level ON/OFF:	OFF
Input level:	-10 dBm
Uplink frequency:	600 MHz
Trigger Source:	Rise Config
Trigger Level:	-15 dBm
UL RMC Narrowband Index:	0
UL RMC Number of RB:	6
Turn Off All measurement:	OFF
ACLR measurement:	ON, 20 times

3. Set the Vector signal generator (SG) as follows:

Modulation:	ON
Modulation wave:	Analyzable waveform pattern in Step 2 above.
Output frequency:	600 MHz
Output level:	-10 dBm (This output level reflects the calibration value for item 6.3.2.)

4. Measure the Adjacent Channel Leakage Power and read the following value:

ACLR Result:	Max value
--------------	-----------

5. Change the MU887000A and SG frequencies according to 6.3.4 “Measurement Frequencies” and repeat steps 2 to 4 over.

6. Change the Connect port setting for the connection with the MU887000A to Test Port2/3/4 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 MX887065A performance. Duplicate these sheets as necessary for tests.

Test location		Report No.	
		Date	
		Person-in-charge	
Model:			
Serial No.		Ambient temperature	°C
Power source		Relative humidity	%
frequency	Hz		
Remarks			

SG Calibration (CW)

SG Calibration Value (CW)

MG3700A Unmodulated Wave

Frequency (MHz)	SG Setting (dBm)		
	0 dBm	-10 dBm	-20 dBm
600			
700			
880			
940			
1000			
1800			
2000			
2200			
2700			
3400			
3600			
3800			
4000			
4200			

## SG Calibration (MOD)

## SG Calibration Value (MOD)

MG3700A Modulation Wave

Frequency (MHz)	SG Setting (dBm)
	-10 dBm
600	
700	
880	
940	
1000	
1800	
2000	
2200	
2700	
3400	
3600	
3800	
4000	
4200	

Linearity Calibration

Linearity Calibration

Frequency (MHz)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)
600	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
700	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
880	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
940	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
1000	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
1800	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	

Linearity Calibration (Cont'd)

Linearity Calibration (Cont'd)

Frequency (MHz)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)
2000	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
2200	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
2700	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
3400	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
3600	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
3800	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	

Linearity Calibration (Cont'd)

Linearity Calibration (Cont'd)

Frequency (MHz)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)	SG Level (dBm)	SA Measured Value (dBm)	Calibration Value (C) (B) – (A) (dB)
4000	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	
4200	0	(A)		–20	(A)	
	–10	(B)		–30	(B)	
	–20	(B)		–40	(B)	
	–30	(B)		–50	(B)	
	–40	(B)		–60	(B)	



## 6.4 Performance Tests (MX887065A)

Tx Power Measurement Accuracy (CW)

### Tx Power Measurement Accuracy Port1/2

MU887000A Input Level: -10 dBm (Item 6.3.1 Calibration Value)

Frequency (MHz)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy -10 - (Pow)	Hi Limit	Measurement uncertainty
600		-0.5		+0.5	±0.15
700					
880					
940					
1000					
1800					
2000					
2200					
2700					
3400					
3600					
3800					
4000		-0.7		+0.7	0.33
4200					

6

### Tx Power Measurement Accuracy Port1/2

MU887000A Input Level: -50 dBm (Item 6.3.3 Calibration Value)

Frequency (MHz)	Item 6.3.3 -50 dBm Calibration Value (C) (dB)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy -20 + (C) - (Pow)	Hi Limit	Measurement uncertainty
600			-0.7		+0.7	±0.14
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000			-0.9		+0.9	±0.33
4200						

Performance Test

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy Port1/2**

MU887000A Input Level : -60 dBm (Item 6.3.3 Calibration Value)

Frequency (MHz)	Item 6.3.3 -60 dBm Calibration Value (C) (dB)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy -20 + (C) - (Pow)	Hi Limit	Measurement uncertainty
600			-0.9		+0.9	±0.14
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000			-1.1		+1.1	±0.33
4200						

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy Port3/4**

MU887000A Input Level: -10 dBm (Item 6.3.1 Calibration Value)

Frequency (MHz)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy -10 - (Pow)	Hi Limit	Measurement uncertainty
600		-0.7		+0.7	±0.17
700					
880					
940					
1000					
1800					
2000					
2200					
2700					
3400					
3600					
3800					
4000		-0.7		+0.7	±0.28
4200					

**Tx Power Measurement Accuracy Port3/4**

MU887000A Input Level: -50 dBm (Item 6.3.3 Calibration Value)

Frequency (MHz)	6 Item 6.3.3 -50 dBm Calibration Value (C) (dB)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy -20 + (C) - (Pow)	Hi Limit	Measurement uncertainty
600			-0.9		+0.9	±0.14
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000			-0.9		+0.9	±0.20
4200						

Tx Power Measurement Accuracy (CW) (Cont'd)

**Tx Power Measurement Accuracy Port3/4**

MU887000A Input Level : -60 dBm (Item 6.3.3 Calibration Value)

Frequency (MHz)	Item 6.3.3 -60 dBm Calibration Value (C) (dB)	MX887065A Measured Value (Pow) (dBm)	Measurement Accuracy (dB)			
			Lo Limit	Measurement Accuracy -20 + (C) - (Pow)	Hi Limit	Measurement uncertainty
600			-1.1		+1.1	±0.14
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000			-1.1		+1.1	±0.20
4200						

## Frequency/Modulation Measurement

## Residual EVM/Carrier Frequency Accuracy

MU887000A Input Level: –10 dBm/–40 dBm

Frequency (MHz)	Residual EVM (%)			Carrier Frequency Accuracy (Hz)		
	Measured Value	Spec.	Measurement uncertainty	Measured Value	Spec.	Measurement uncertainty
600		$\leq 2.5$	$\pm 0.1$		$\pm 15.0$	$\pm 2.6$
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000		$\leq 2.5$	$\pm 0.1$		$\pm 15.0$	$\pm 3.8$
4200						

In-Band Emission Measurement

**In-Band Emission**

Frequency (MHz)	Input Level: -10 dBm	
	Measured Value (dB)	Spec.
600		$\leq -40$ dBc
700		
880		
940		
1000		
1800		
2000		
2200		
2700		
3400		
3600		
3800		
4000		
4200		

Adjacent Channel Leakage Power Measurement (ACLR)

**Adjacent Channel Leakage Power (Cont'd)**

MU887000A Input Level: -10 dBm

Frequency (MHz)	Adjacent Channel Leakage Power Ratio (dB)					
	Band					
	UTRA (-2)	UTRA (-1)	UTRA (+1)	UTRA (+2)	E-UTRA (-1)	E-UTRA (+1)
600						
700						
880						
940						
1000						
1800						
2000						
2200						
2700						
3400						
3600						
3800						
4000						
4200						
Spec. (dB)	≥ 55 dB	≥ 50 dB	≥ 50 dB	≥ 55 dB	≥ 45 dB	≥ 45 dB
Measurement uncertainty	1 dB					

## **6.5 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*

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This appendix lists the specifications of the MX887065A Category M FDD Uplink TX Measurement. Refer to section 1.2 “Composition” for details of the product configuration.

This section explains the specifications of MX887065A Category M FDD 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.

Table A-1 MX887065A Specifications

Item	Specification
Common Items	
Frequency	600 to 2700 MHz, 3400 to 3800 MHz 600 to 2700 MHz, 3400 to 4200 MHz (with MU887000A-001/101)
Measuring Object	PUSCH, PUCCH

Table A-1 MX887065A Specifications (Cont'd)

Item	Specification																																				
Tx Power Measurement																																					
Input Level Range	Port1, Port2: -65.0 to +35.0 dBm Port3, Port4: -65.0 to +25.0 dBm																																				
Measurement Accuracy	<p>Port1, Port2:</p> <p>Frequency: <math>600\text{ MHz} \leq f \leq 2700\text{ MHz}</math>, <math>3400\text{ MHz} \leq f \leq 3800\text{ MHz}</math> (After calibration, 20 to 30°C)</p> <table> <tr> <th>Input Level</th><th>Measurement Accuracy</th></tr> <tr> <td>-20 to +35 dBm</td><td>±0.3 dB (typ.)</td></tr> </table> <p>Frequency: <math>600\text{ MHz} \leq f \leq 2700\text{ MHz}</math>, <math>3400\text{ MHz} \leq f \leq 3800\text{ MHz}</math> (After calibration, 10 to 40°C)</p> <table> <tr> <th>Input Level</th><th>Measurement Accuracy</th></tr> <tr> <td>-20 to +35 dBm</td><td>±0.5 dB</td></tr> <tr> <td>-50 to -20 dBm</td><td>±0.7 dB</td></tr> <tr> <td>-60 to -50 dBm</td><td>±0.9 dB</td></tr> </table> <p>Frequency: <math>3800\text{ MHz} &lt; f \leq 4200\text{ MHz}</math> (After calibration, 20 to 30°C)</p> <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>±0.9 dB</td></tr> <tr> <td>-60 to -50 dBm</td><td>±1.1 dB</td></tr> </table> <p>Port3, Port4:</p> <p>Frequency: <math>600\text{ MHz} \leq f \leq 2700\text{ MHz}</math>, <math>3400\text{ MHz} \leq f \leq 3800\text{ MHz}</math> (After calibration, 10 to 40°C)</p> <table> <tr> <th>Input Level</th><th>Measurement Accuracy</th></tr> <tr> <td>-20 to +25 dBm</td><td>±0.7 dB</td></tr> <tr> <td>-50 to -20 dBm</td><td>±0.9 dB</td></tr> <tr> <td>-60 to -50 dBm</td><td>±1.1 dB</td></tr> </table> <p>Frequency: <math>3800\text{ MHz} &lt; f \leq 4200\text{ MHz}</math> (After calibration, 20 to 30°C)</p> <table> <tr> <th>Input Level</th><th>Measurement Accuracy</th></tr> <tr> <td>-20 to +25 dBm</td><td>±0.7 dB</td></tr> <tr> <td>-50 to -20 dBm</td><td>±0.9 dB</td></tr> <tr> <td>-60 to -50 dBm</td><td>±1.1 dB</td></tr> </table>	Input Level	Measurement Accuracy	-20 to +35 dBm	±0.3 dB (typ.)	Input Level	Measurement Accuracy	-20 to +35 dBm	±0.5 dB	-50 to -20 dBm	±0.7 dB	-60 to -50 dBm	±0.9 dB	Input Level	Measurement Accuracy	-20 to +35 dBm	±0.7 dB	-50 to -20 dBm	±0.9 dB	-60 to -50 dBm	±1.1 dB	Input Level	Measurement Accuracy	-20 to +25 dBm	±0.7 dB	-50 to -20 dBm	±0.9 dB	-60 to -50 dBm	±1.1 dB	Input Level	Measurement Accuracy	-20 to +25 dBm	±0.7 dB	-50 to -20 dBm	±0.9 dB	-60 to -50 dBm	±1.1 dB
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Table A-1 MX887065A Specifications (Cont'd)

Item	Specification								
Modulation Analysis Input Level Range Carrier Frequency Accuracy Modulation accuracy  In-Band Emissions	Port1, Port2: -40.0 to +35.0 dBm Port3, Port4: -40.0 to +25.0 dBm $\pm(\text{Set frequency} \times \text{Reference oscillator accuracy} + 15 \text{ Hz})$ Frequency: $600 \text{ MHz} \leq f \leq 2700 \text{ MHz}$ , $3400 \text{ MHz} \leq f \leq 4200 \text{ MHz}$  Residual Vector Error: $\leq 2.5\%$ Frequency: $600 \text{ MHz} \leq f \leq 2700 \text{ MHz}$ , $3400 \text{ MHz} \leq f \leq 4200 \text{ MHz}$ (20 averaging times)  $\leq -40 \text{ dBc}$ (Input Level $\geq -10 \text{ dBm}$ , Allocated RB $\leq 18$ ) Frequency: $600 \text{ MHz} \leq f \leq 2700 \text{ MHz}$ , $3400 \text{ MHz} \leq f \leq 4200 \text{ MHz}$								
Occupied Bandwidth Input Level Range	Port1, Port2: -10.0 to +35.0 dBm Port3, Port4: -10.0 to +25.0 dBm								
Adjacent Channel Leakage Power Ratio Input Level Range Measurement Range	Port1, Port2: -10.0 to +35.0 dBm Port3, Port4: -10.0 to +25.0 dBm Frequency: $600 \text{ MHz} \leq f \leq 2700 \text{ MHz}$ , $3400 \text{ MHz} \leq f \leq 4200 \text{ MHz}$ <table><tr><td>Adjacent Channel</td><td>Measurement Range</td></tr><tr><td>E-UTRA ACLR1</td><td><math>\geq 45 \text{ dB}</math></td></tr><tr><td>UTRA ACLR1</td><td><math>\geq 50 \text{ dB}</math></td></tr><tr><td>UTRA ACLR2</td><td><math>\geq 55 \text{ dB}</math></td></tr></table>	Adjacent Channel	Measurement Range	E-UTRA ACLR1	$\geq 45 \text{ dB}$	UTRA ACLR1	$\geq 50 \text{ dB}$	UTRA ACLR2	$\geq 55 \text{ dB}$
Adjacent Channel	Measurement Range								
E-UTRA ACLR1	$\geq 45 \text{ dB}$								
UTRA ACLR1	$\geq 50 \text{ dB}$								
UTRA ACLR2	$\geq 55 \text{ dB}$								
Spectrum Emission Mask (SEM) Input Level Range	Port1, Port2: -10.0 to +35.0 dBm Port3, Port4: -10.0 to +25.0 dBm								

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