MX887021A
W-CDMA/HSPA Downlink
TX Measurement
Operation Manual

Second 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

Document No.: M-W3702AE-2.0

Safety Symbols

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

Symbols used in manual

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

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

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

Safety Symbols Used on Equipment and in Manual

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

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

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

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

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

These indicate that the marked part should be recycled.

MX887021A
W-CDMA/HSPA Downlink TX Measurement
Operation Manual

29 August 2014 (First Edition)
30 September 2014 (Second Edition)

Equipment Certificate

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

Anritsu Warranty

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

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

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Anritsu Corporation Contact

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

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Software End-User License Agreement (EULA)

Please read this Software End-User License Agreement (hereafter this EULA) carefully before using (includes executing, copying, registering, etc.) this software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment). By reading this EULA and using this software, you are agreeing to be bound by the terms of its contents and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu-specified equipment (hereafter Equipment) for the purposes set out in this EULA.

1. Grant of License and Limitations

1. Regardless of whether this Software was purchased from or provided free-of-charge by Anritsu, you agree not to rent, lease, lend, or otherwise distribute this Software to third parties and further agree not to disassemble, recompile, reverse engineer, modify, or create derivative works of this Software.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer this software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for personal injury, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, arising out of or related to your use or inability to use this Software.

3. Limitation of Liability

a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.
   i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
   ii) If this Software is used in conjunction with other non-Anritsu-approved software.
   iii) Recovery of lost or damaged data.
   iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
   v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.

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

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

4. Export Restrictions

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

5. Termination

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

6. Reparations

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

7. Responsibility after Termination

Upon termination of this EULA in accordance with item 5, you shall cease all use of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

8. Dispute Resolution

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

9. Court of Jurisdiction

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

Cautions against computer virus infection

- Copying files and data
  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
  All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
  Ensure that the network has sufficient anti-virus security protection in place.

CE Conformity Marking

Anritsu affixes the CE conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

1. Product Model

Software: MX887021A W-CDMA/HSPA Downlink TX Measurement

2. Applied Directive and Standards

When the MX887021A W-CDMA/HSPA Downlink TX Measurement is installed in the MT8870A, the applied directive and standards of this software conform to that of the MT8870A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX887021A can be used with.

C-Tick Conformity Marking

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

C-Tick mark

1. Product Model

Software: MX887021A W-CDMA/HSPA Downlink TX Measurement

2. Applied Directive and Standards

When the MX887021A W-CDMA/HSPA Downlink TX Measurement is installed in the MT8870A, the applied directive and standards of this software conform to that of the MT8870A main frame.

PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX887021A can be used with.

About This Manual

This manual mainly describes the use, panels, and specifications of the MX887021A W-CDMA/HSPA Downlink 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 of 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.

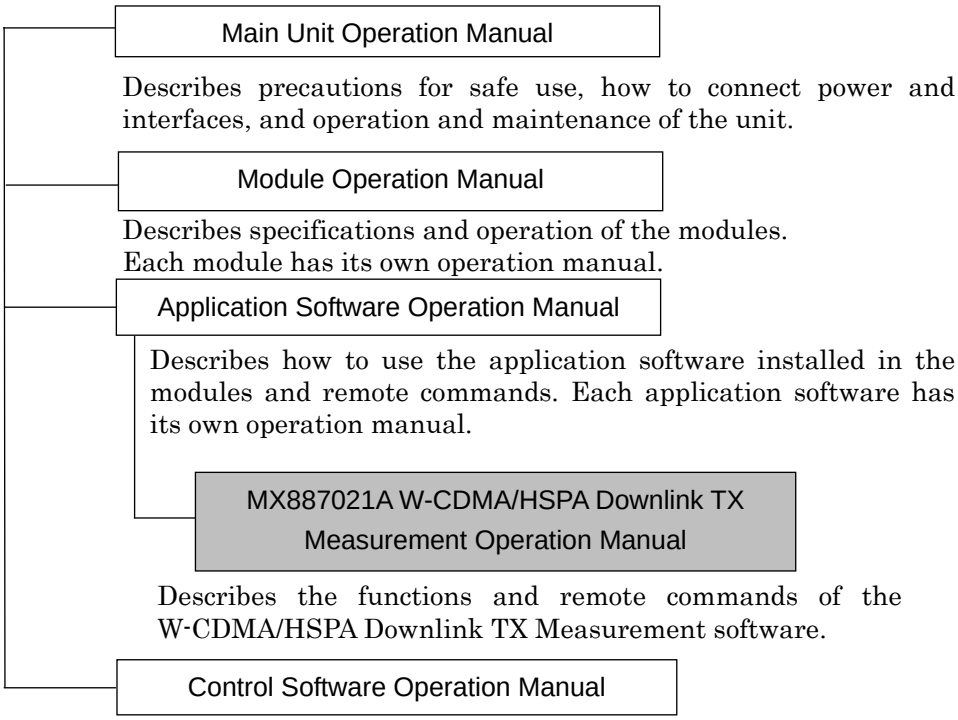

Table of Contents

IV.

Chapter 1 Outline

This chapter outlines the MX887021A W-CDMA/HSPA Downlink Tx Measurement. Refer to Appendix A "Specifications" for the software function and specifications.

1.1 Outline

The MX887021A W-CDMA/HSPA Downlink TX Measurement (hereafter MX887021A) measures the Tx characteristics of mobile stations specified by 3GPP (3rd Generation Partnership Project).

The RF (uplink) signal output from the MU887000A is input to the RF connector of the mobile station and the signal output (downlink) from the mobile station is input to the MU887000A.

1.2 Features

The MX887021A software features:

- High-speed measurement

  High-speed measurement is enabled by the latest processor and measurement algorithm equipped in the MU887000A.

1.3 Composition

The composition of the MX887021A is shown in the Table 1.3-1.

Table 1.3-1 Composition

Item	Model/Code	Name	Qty	Remarks
Software		DVD-R	1	
	MX887021A	W-CDMA/HSPA Downlink TX Measurement		On DVD-R
	W3702AE	MX887021A W-CDMA/HSPA Downlink TX Measurement Operation Manual		English, on DVD-R

1.4 License Registration

Before the MX887021A can be used, the software license must be registered in the MU887000A.

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

1.5 Abbreviations

The abbreviations used in this manual are listed in Table 1.5-1.

Table 1.5-1 Abbreviations

Abbreviations	Name
3GPP	Third Generation Partnership Project
ACLR	Adjacent Channel Leakage Power Ratio
AVG	Average
BER	Bit Error Rate
BLER	Block Error Rate
BS	Base Station
CDE	Code Domain Error
CDP	Code Domain Power
DL	Downlink
DPCH	Dedicated Physical Channel
EVM	Error Vector Magnitude
HSPA	High Speed Packet Access
IQ	In-band and Quadrature-band
OBW	Occupied Bandwidth
PCDE	Peak Code Domain Error
QAM	Quadrature Amplitude Modulation
RCDE	Relative Code Domain Error
RRC	Root-Raised Cosine
SEM	Spectrum Emission Mask
SCPI	Standard Commands for Programmable Instruments
SG	Signal Generator
TPC	Transmit Power Control
TTL	Total
TS	Technical Specification
UL	Uplink
W-CDMA	Wideband Code Division Multiple Access

Chapter 2 Fundamental Measurement

This chapter describes the fundamental functions and commands of the MX887021A. For details of the commands, refer to Chapter 3 “SCPI Command Reference”, and Chapter 4 “Native Command Reference”.

2.1 Common Operations

This section explains operations that are common to the measurements .

2.1.1 Selecting application

Switch the MU887000A application software to small cell by using the following command.

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

2.1.2 Selecting measurement functions

Next, switch the measurement functions of the Small Cell application software by the command below.
When performing W-CDMA Downlink transmission measurement by the MU887000A, set the parameter to WCDMA_BS,ACT.(=W-CDMA Downlink transmission measurement function)
When outputting signals such as W-CDMA Downlink signal, interferer, and others by the MU887000A, set the parameter to SG,ACT. (=SG function)

```
SYS
:INSTrument:SYSTem
```

2.1.3 Setting ports

Set the MU887000A ports to be used. The following command sets both the port for transmitting and receiving the signals.

The port for transmitting is used for SG function.
The port for receiving is used for W-CDMA Uplink transmission measurement function.
Set Port1 to Port4 at the parameter

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

The coaxial cable loss can be corrected for the output level, input level, and measured level of each port.
For the explanations of the command to be used for cable loss correction and loss correction data, refer to Chapter 3 “Fundamental Operation” in “MU887000A TRX Testing Module Operation Manual”.

2.2 Common Operations for SG Function

This section explains about the common operations for the case where SG function is selected as described in 2.1.2 “Selecting measurement functions”.

2.2.1 Frequency and level

Frequency

Set the frequency of the transmission signal using the following commands.

```
FREQ
[:SOURce]:FREQuency[:CW|:FIXed]
```

Level

Set the level of the transmission signal using the following commands.

```
OLVL
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]
```

2.2.2 Setting transmission signal

To transmit the waveform pattern from MU887000A by using the Small Cell 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. Set the Modulation On/Off and Output On/Off.

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

- Output On/Off
  ```
  LVL
  :OUTPut[:STATe]
  ```
- Modulation On/Off
  ```
  MOD
  :OUTPut:MODulation[:STATe]
  ```
- Waveform Pattern Select
  ```
  LOADEDFILESEL
  PAT
  [:SOURce]:RADio:ARB:WAVeform
  ```

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” for detail descriptions of the commands.

- To load the 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 the 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`

2.2.3 Waveform patterns

To send a W-CDMA waveform pattern for small cell, specify a file of MV887021A W-CDMA/HSPA Uplink waveform files as the waveform file.

Refer to Chapter 3, “Waveform File Details” in the “Waveform File for Small Cell Application Operation Manual” for an explanation of the MV887021A W-CDMA/HSPA Uplink Waveform files.

2.3 Common Operations for W-CDMA Downlink Transmission Measurement Function

This section explains about common operations for the case where W-CDMA Downlink transmission measurement function is selected as described in section 2.1.2 “Selecting measurement functions”.

Additionally, SCPI commands are not available for W-CDMA Downlink Transmission Measurement function. When set to SCPI mode, the commands of this function cannot be received.

2.3.1 Frequency and level

Frequency

Set the reception frequency of the MU887000A by the command below.

```
FREQ
[:SENSe]:FREQuency:CENTer
```

Level

Set the signal level that the MU887000A receives by the command below.

```
INPUTLVL
[:SENSe]:POWer[:RF]:RANGe:ILEVel
```

2.3.2 Setting W-CDMA signal

Set the following items to configure the W-CDMA signal.

DTX setting

Sets the function to correct the transmission OFF interval of PICH Offset. When set to On, PICH Channelization Code and PICH Timing Offset are enabled. They are disabled when set to Off.

Channel detection

Sets how to detect active channels for Modulation Analysis Measurement. When set to AUTO, active channels are detected automatically. Selectable detection methods are listed below.

- Test Model1 16DPCH
- Test Model1 32DPCH
- Test Model1 64DPCH
- Test Model1 4DPCH
- Test Model1 8DPCH
- Test Model2
- Test Model3 16DPCH

- Test Model3 32DPCH
- Test Model3 4DPCH
- Test Model3 8DPCH
- Test Model4
- Test Model4 include CPICH
- Test Model5 6DPCH
- Test Model5 14DPCH
- Test Model5 30DPCH
- Test Model5 4DPCH
- Test Model6 30DPCH
- Test Model6 4DPCH

The measurement items vary depending on the selected downlink signal channel configuration.

Table 2.3.2-1 Channel Configuration Settings and Measurement Items

Measurement Item	Channel Configuration		
	Test model6 30DPCH 64QAM	Test Model6 4DPCH 64QAM	Others
Occupied Bandwidth	✓	✓	✓
Spectrum Emission Mask	✓	✓	✓
Adjacent Channel Leakage Power Ratio	✓	✓	✓
Modulation Analysis			
Carrier Frequency	✓	✓	✓
EVM	✓	✓	✓
Transmit Power	✓	✓	✓
IQ Origin Offset	✓	✓	✓
Peak Code Domain Error	✓	✓	✓
Relative Code Domain Error	✓	✓	–

✓: Measurement supported

–: Measurement not supported

PICH channelization code

The setting range is 0 to 255. Available when DTX is set to On.

PICH timing offset

The setting range is 0 to 149 (unit: 256 chip). Available when DTX is set to On.

Scrambling code

A scrambling code consists of the primary scrambling code (PSC = 0 to 511) and the secondary scrambling code (SSC = 0 to 15).It is calculated by the formula below.

Scrambling Code = PSC × 16 + SSC

Scrambling code synchronization method

Sets the method to synchronize a scrambling code. When set to Auto, a scrambling code is detected automatically. When set to USER, the scrambling code set by the user is used.

The following commands are used to set the W-CDMA/HSPA signals.

- DTX setting
  `DTXSETUP_MOD`
  `[:SENSe]:EVM:DTX[:STATe]`
- Channel detection
  `CHDET`
  `[:SENSe]:EVM:CDETection[:BTS]`
- PICH channelization code
  `PICHNO_MOD`
  `[:SENSe]:EVM:PICH:CCODe`
- PICH timing offset
  `PICHTIMINGOFS_MOD`
  `[:SENSe]:EVM:PICH:TOFFset`
- Scrambling code
  `SCRCODE`
  `[:SENSe]:EVM:SYNC:SCRamble`
- Scrambling code synchronization method
  `SCRSYNC?`
  `[:SENSe]:EVM:SYNC:MODE`

2.3.3 Starting 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:MODE:SINGle
```

Note:

There is no trigger for starting W-CDMA/HSPA fundamental measurement. Measurement starts as soon as the measurement start command is sent.

Use the following command for specifying the measurement count.

- Setting measurement count for all measurement items

```
ALLMEASITEMS s1,n1,s2,n2,s3,n3,s4,n4
[:SENSe]:ALL[:STATe] s1,s2,s3,s4
[:SENSe]:ALL:AVERage:COUNt n1,n2,n3,n4
```

`s1` Execution of Modulation Analysis measurement
- `ON` Measures.
- `OFF` Does not measure.

`n1` Measurement count of Modulation Analysis measurement
`1` to `200`

`s2` Execution of Occupied Bandwidth measurement
- `ON` Measures.
- `OFF` Does not measure.

`n2` Measurement count of Occupied Bandwidth measurement
`1` to `200`

`s3` Execution of Spectrum Emission Mask measurement
- `ON` Measures.
- `OFF` Does not measure.

`n3` Measurement count of Spectrum Emission Mask measurement
`1` to `200`

`s4` Execution of Adjacent Channel Leakage Power Ratio measurement
- `ON` Measures.
- `OFF` Does not measure.

n4	Measurement count of Adjacent Channel Leakage Power Ratio measurement 1 to 200

Use the following query commands to acquire the measurement results.

- To query all measurement results
  ALLMEAS
  :FETCh:ALL?
- To query a specific measurement field (Native)
  ALLMEAS? meas
  meas:

MODANA	Modulation Analysis
OBW	Occupied Bandwidth
SMASK	Spectrum Emission Mask
ACLR	Adjacent Channel Power

- To query a specific measurement field (SCPI)

:FETCh:EVM?	Modulation Analysis
:FETCh:OBWidth?	Occupied Bandwidth
:FETCh:SEMask?	Spectrum Emission Mask
:FETCh:ACP?	Adjacent Channel Power

- To query a specific measurement item (Native)
  ALLMEAS? Meas,item1,item2,...itemn
  item :

1	On(Query results.)
0	Off(Does not query results.)

- To query a specific measurement item (SCPI)
  Obtain the response by the command to query a specific measurement field (SCPI), and extract the desired information.

For details of measurement items, refer to Chapter 3 “Native Command Reference”.

Checking measurement status

To query the measurement status and errors, send the following command.

```
MSTAT
:STATus:ERRor
```

Table 2.3.3-1 Query Responses (MSTAT)

Response	Meaning
0	Measurement completed normally
2	Level exceeded The MU887000A receive level is higher than the set input level.
4	Signal abnormal With channel detection set to Auto, a signal abnormal occurs when the measurement result shows that the active channel number is 0 owing to signal synchronization failure.
9	Not executed
11	Measurement is in progress
16	Tx Measurement Time out No trigger is received during the measurement.

Table 2.3.3-2 Query Responses (:STATus:ERRor)

Response	Meaning
0	Measurement completed normally
1	Not executed
2	Level exceeded The MU887000A receive level is higher than the set input level.
4	Signal abnormal With channel detection set to Auto, a signal abnormal occurs when the measurement result shows that the active channel number is 0 owing to signal synchronization failure.
16	Tx Measurement Time out No trigger is received during the measurement.

2.4 Modulation Analysis

Modulation analysis measures:

- Frequency Error
- EVM
- Transmit Power
- IQ Origin Offset
- Peak Code Domain Error
- Relative Code Domain Error

2.4.1 Frequency error

Frequency error measurement measures the downlink carrier frequency and frequency error. It is defined in 3GPP TS 25.141.

Set the downlink frequency as the reference frequency for error measurement by referring to section 2.3.1 “Frequency and level”.

When set to Native mode, use the following commands to query the frequency error measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by `:FETCh:EVM?` and extract the desired information.

- Average Carrier Frequency
  `AVG_CARRF`
- Maximum Carrier Frequency
  `MAX_CARRF`
- Minimum Carrier Frequency
  `MIN_CARRF`
- Average Frequency Error
  `AVG_CARRFERR`
- Maximum Frequency Error
  `MAX_CARRFERR`
- Minimum Frequency Error
  `MIN_CARRFERR`

2.4.2 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. It is defined in 3GPP TS 25.141.

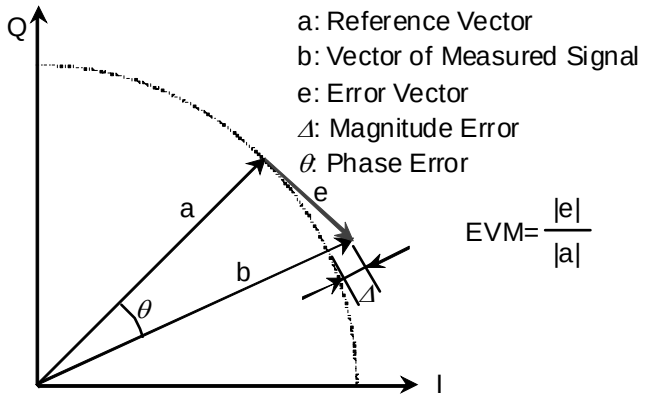

Figure 2.4.2-1 Definition of EVM

EVM is measured for each chip for up to 2560 data. The rms of the data is regarded as one measurement result.
The peak EVM is the maximum value among the obtained EVM data.

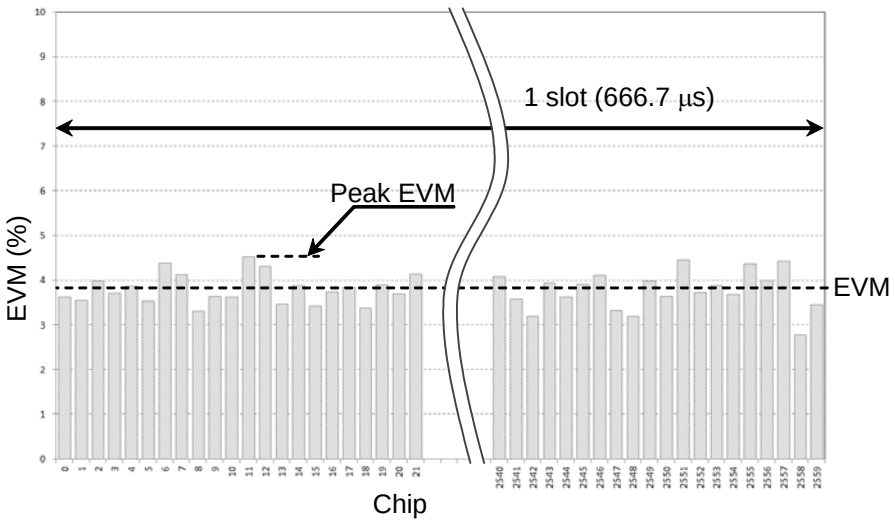

Figure 2.4.2-2 Difference between EVM and Peak EVM

When set to Native mode, use the following commands to query the EVM measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by FETCh:EVM? and extract the desired information.

- Average EVM RMS
  AVG_VECTERR
- Maximum EVM RMS
  MAX_VECTERR
- Minimum EVM RMS
  MIN_VECTERR
- Average Peak EVM
  AVG_PKEVM
- Maximum Peak EVM
  MAX_PKEVM
- Minimum Peak EVM
  MIN_PKEVM

2.4.3 Transmit Power

The Tx power measurement　measures the power of the uplink signal sent from the mobile stations as well as the power after passage through an RRC (Root Raised Cosine) filter. It corresponds to RRC filtered mean power defined in 3GPP TS 25.141.

The downlink Tx power measurement settings are:

Channel and frequency of input signals
Set the frequency of the RF signal input to the MU887000A by referring to the command in section 2.3.1 “Frequency and level”.

Input level
Set the level of the RF signal input to the MU887000A by referring to the command in section 2.3.1 “Frequency and level”.

Port
Set the input port for the MU887000A by referring to the command in section 2.1.3 “Setting ports”.

When set to Native mode, use the following commands to query the Tx power measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by FETCh:EVM? and extract the desired information.

- Average Tx Power
  AVG_TXPWR?
- Maximum Tx Power
  MAX_TXPWR?
- Minimum Tx Power
  MIN_TXPWR?

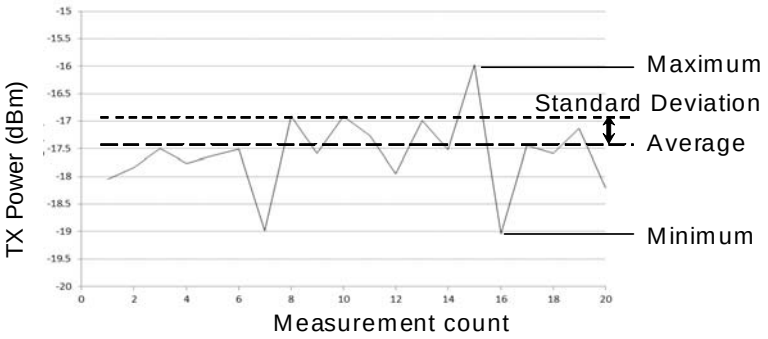

Figure 2.4.3-1 Types of Measurement Results

2.4.4 IQ Origin offset

The IQ origin offset is the offset of the IQ vector origin calculated as:

$$offset = 20\log_{10}\left(\frac{|offset\_vector|}{|Referrence\_vector|}\right) \text{ (dB)}$$

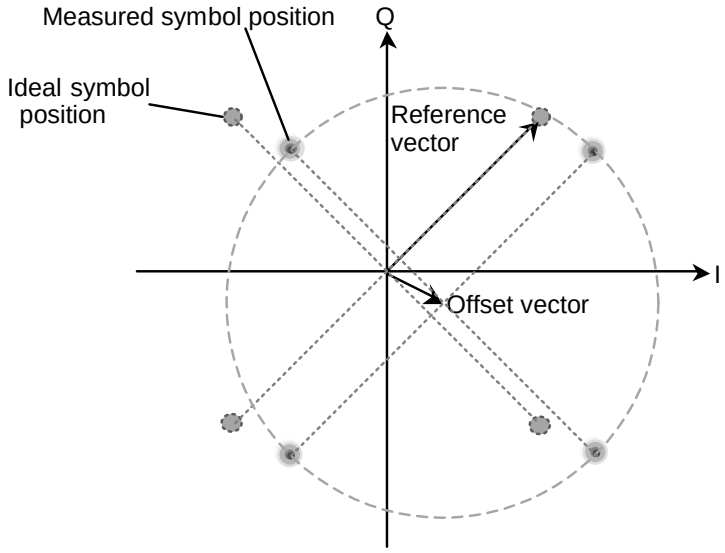

Figure 2.4.4-1 Definition of Origin Offset

When set to Native mode, use the following command to query the Origin Offset measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by FETCh:EVM? and extract the desired information.

- Average Origin Offset
  AVG_ORGOFS
- Maximum Origin Offset

MAX_ORGOFS

- Minimum Origin Offset
  MIN_ORGOFS

2.4.5 Peak Code Domain Error

Peak Code Domain Error is the maximum value among code domain errors for PICH channelization codes 0 to 255. It is defined in 3GPP TS 25.141.

A code domain error is the ratio of an error vector to the reference vector for each PICH channelization code.

$$CDE(code) = 20\log_{10}\left(\frac{|error\_vector(code)|}{|Referrence\_vector|}\right) \text{ (dB)}$$

code: 0 to 255

When set to Native mode, use the following command to query the Peak Code Domain Error measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by FETCh:EVM? and extract the desired information.

- Average Peak Code Domain Error
  AVG_PPCDPERR
- Maximum Peak Code Domain Error
  MAX_PPCDPERR
- Minimum Peak Code Domain Error
  MIN_PPCDPERR

2.4.6 Relative Code Domain Error

Relative Code Domain Error is the ratio of an error vector to the code domain power for each PICH channelization code. It is defined in 3GPP TS 25.141.

$$RCDE(code) = 20\log_{10}\left(\frac{|error\_vector(code)|}{|CDP(code)|}\right) \text{ (dB)}$$

code: 0 to 255

When set to Native mode, use the following commands to query the Relative Code Domain Error measurement results.
When set to SCPI mode, query the entire Modulation Analysis results by FETCh:EVM? and extract the desired information.

- Relative Code Domain Error or Code Domain Power
  `CDANAL`
- Average Relative Code Domain Error
  `AVG_RCDPERR`
- Maximum Relative Code Domain Error
  `MAX_RCDPERR`
- Average Relative Code Domain Error
  `MIN_RCDPERR`

2.5 Occupied Bandwidth

The Occupied Bandwidth is the width of the measured spectrum with a specified proportion of the total power.
In the Occupied Bandwidth measurement, the frequency bandwidth that occupies 99% of the input signal total power is measured as defined in 3GPP TS 25.141.

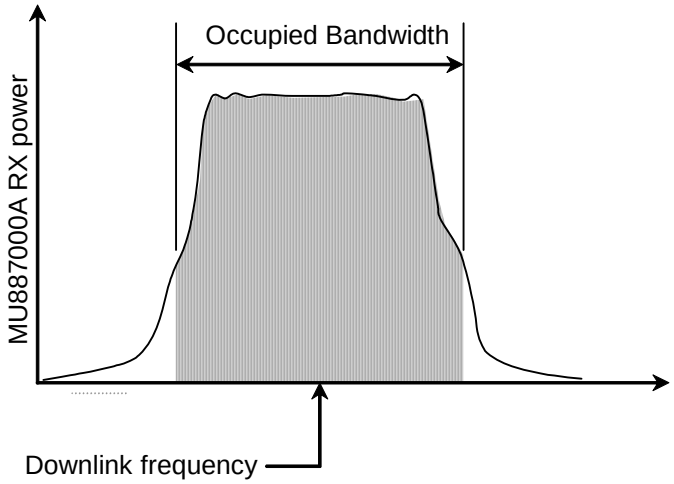

Figure 2.5-1 Occupied Bandwidth

The Occupied Bandwidth measurement settings are:

Frequency of input signals
Specify the frequency of the RF signal input to the MU887000A by referring to the command in section 2.3.1 “Frequency and level” .

Input level
Set the level of the RF signal input to the MU887000A by referring to the command in section 2.3.1 “Frequency and level”.

Port
Set the port for the MU887000A by referring to the command in section 2.1.3 “Setting ports”.

Measurement enable and measurement count
Use the following command to specify the measurement count. The Occupied Bandwidth for 1 slot (0.667 ms) is measured at each measurement count. The measurement count can be set from 1 to 200.

```
AVR_OBW
[:SENSe]:OBWidth:AVERage:COUNt
```

Use the following commands to query Occupied Bandwidth measurement results.

- Occupied Bandwidth
  ```
  AVG_OBW
  :FETCh:OBWidth?
  ```

2.6 Spectrum Emission Mask

Spectrum Emission Mask measurement measures the peak level and margin at the conditions specified in TS 25.141 6.5.2.1 Spectrum Emission Mask.

The frequency range of each standard line of Spectrum Emission Mask is called "range" in the MX887021A. The ranges are called Range A, B, C, D, and E in order from the channel bandwidth edge.

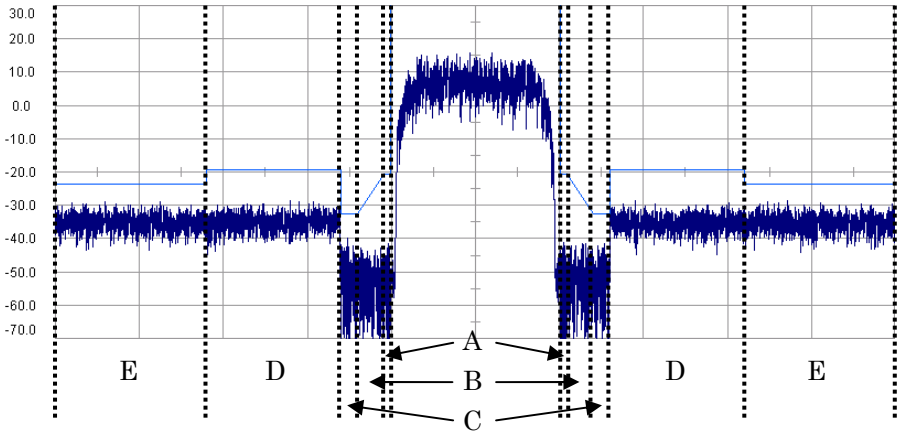

Figure 2.6-1 Relation of Frequency Ranges of Standard Lines and Range A, B, C, D, E

The tables below show the minimum requirements for the standard lines. Their definitions vary depending on the maximum output P (BS maximum output power P) from a base station as defined in 3GPP TS 25.141.

Table 2.6-1 Spectrum Emission Mask Requirement (Maximum Output P ≥ 43 dBm)

Range	Frequency Offset MHz	Minimum Requirement	Measurement Bandwidth (RBW)
A	2.515 to 2.715	–12.5 dBm	30 kHz
B	2.715 to 3.515	$-12.5dBm-15\cdot\left(\frac{f\_offset}{MHz}-2.715\right)dB$	30 kHz
C	3.515 to 4.0	–24.5 dBm	30 kHz
D	4.0 to 8.0	–11.5 dBm	1 MHz
E	8.0 to 12.5	–11.5 dBm	1 MHz

Table 2.6-2 Spectrum Emission Mask Requirement (Maximum Output 39 ≤ P < 43 dBm)

Range	Frequency Offset MHz	Minimum Requirement	Measurement Bandwidth (RBW)
A	2.515 to 2.715	–12.5 dBm	30 kHz
B	2.715 to 3.515	$-12.5dBm-15\cdot\left(\frac{f\_offset}{MHz}-2.715\right)dB$	30 kHz
C	3.515 to 4.0	–24.5 dBm	30 kHz
D	4.0 to 8.0	–11.5 dBm	1 MHz
E	8.0 to 12.5	P – 54.5 dB	1 MHz

Table 2.6-3 Spectrum Emission Mask Requirement (Maximum Output 31 ≤ P < 39 dBm)

Range	Frequency Offset MHz	Minimum Requirement	Measurement Bandwidth (RBW)
A	2.515 to 2.715	P – 51.5 dB	30 kHz
B	2.715 to 3.515	$P-51.5dB-15\cdot\left(\frac{f\_offset}{MHz}-2.715\right)dB$	30 kHz
C	3.515 to 4.0	P – 63.5 dB	30 kHz
D	4.0 to 8.0	P – 50.5 dB	1 MHz
E	8.0 to 12.5	P – 54.5 dB	1 MHz

Table 2.6-4 Spectrum Emission Mask Requirement (Maximum Output P < 31 dBm)

Range	Frequency Offset MHz	Minimum Requirement	Measurement Bandwidth (RBW)
A	2.515 to 2.715	–20.5 dBm	30 kHz
B	2.715 to 3.515	$-20.5dBm-15\cdot\left(\frac{f\_offset}{MHz}-2.715\right)dB$	30 kHz
C	3.515 to 4.0	–32.5 dBm	30 kHz
D	4.0 to 8.0	–19.5 dBm	1 MHz
E	8.0 to 12.5	–23.5 dBm	1 MHz

The next requirement is added to Range B depending on the frequency band.(Additional requirement)

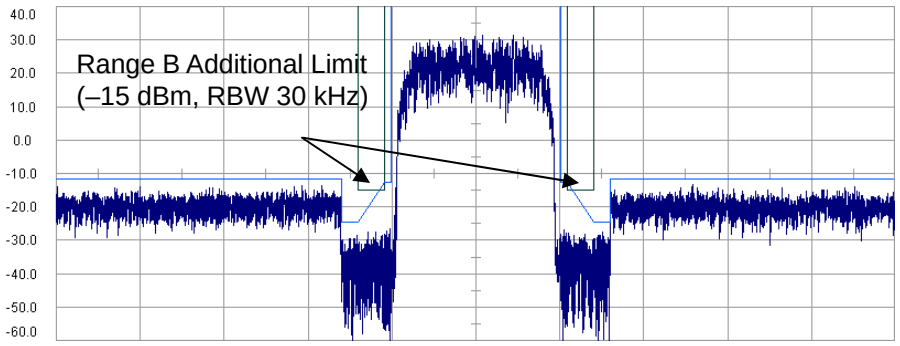

Figure 2.6-2 Standard Lines of Additional Limits (Additional requirement)

The Spectrum Emission Mask settings are:

Channel and frequency of input signals

Specify the downlink channel and downlink frequency of the RF signal input to the MU887000A by referring to the commands in section 2.3.1 “Frequency and level” and in section 2.3.2 “Setting W-CDMA signal”.

Input level

Set the level of the RF signal input to the MU887000A by referring to the command in section 2.3.1 “Frequency and level”.

Port

Set the input port for the MU887000A by referring to the command in section 2.1.3 “Setting ports”.

Template

The template is the thresholds for pass/fail judgment according to Figure 2.6-1 “Relation of Frequency Ranges of Standard Lines and Range A, B, C, D, E” and Figure 2.6-2 “Standard Lines of Additional Limits (Additional requirement)” of Spectrum Emission Mask measurement. Use the next command to set template.

```
TEMPMODE_SMASK
[:SENSe]:SEMask:STANdard
```

Measurement enable and measurement count

Enable Spectrum Emission Mask measurement and specify the measurement count. The Spectrum Emission Mask measurement for 1 slot (0.667 ms) is measured at each measurement count. The measurement count can be set from 1 to 200.

AVR_SMASK
`[:SENSe]:SEMask:AVERage:COUNt`

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

- Template
  TEMPMODE_SMASK
  `[:SENSe]:SEMask:STANdard`

The results of the spectrum emission mask measurement are as follows:

- Evaluation result
  If the spectrum is below the threshold, it is evaluated as PASS; if it above, it is evaluated as FAIL.
- Peak level
  The absolute level at frequency point where level difference from standard line is minimum (or relative value to carrier transmission power).
- Margin
  This is the minimum level difference from the threshold.

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

AVG_PEAK_SMASK
`:FETCh:SEMask?`

2.7 Adjacent Channel Leakage Power Ratio

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

The power leakage to adjacent channels is equivalent to the RRC filtered mean power centered around ±5 MHz and ±10 MHz from the downlink frequency.

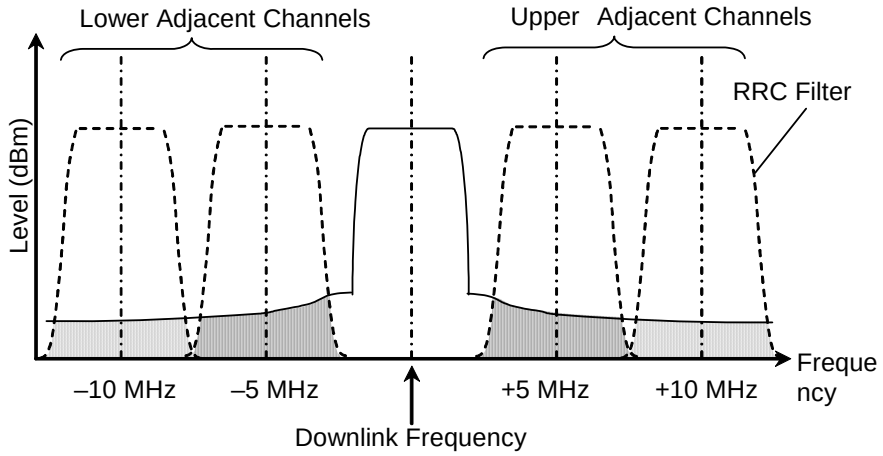

Figure 2.7-1 Measurement Range for Adjacent Channel Leakage Power Ratio

The Adjacent Channel Leakage Power Ratio measurement parameters are:

Measurement on/off and measurement count

Enable Adjacent Channel Leakage Power Ratio measurement and specify the measurement count. The Adjacent Channel Leakage Power Ratio measurement for 1 slot (0.667 ms) is measured at each measurement count. The measurement count can be set from 1 to 200.

```
AVR_ADJ
[:SENSe]:ACPower:AVERage:COUNt
```

Use the following command to query the results of the Adjacent Channel Leakage Power Ratio measurement (power ratio at offset frequency, –10 MHz, –5 MHz, +5 MHz, and +10 MHz).

```
AVG_ACPRRC
:FETCh:ACP?
```

2.8 Sample Commands

This section explains sample commands based on the concrete measurement examples.

2.8.1 Example of Spectrum emission mask measurement

An example of Spectrum Emission Mask measurement is described here.

Processing Flow

1. Initialize communication interface.

   For details, refer to the operation manual of the interface you use.
2. Set language mode.
3. Set the application software type to the MX887021A.
4. Initialize settings.
5. Set the following measurement conditions:

Test Port	Port 1
Input Level	–10 dBm
Downlink Frequency	2140 MHz
Scrambling Code	Automatic detection
Signal Configuration	Test Model1 64DPCH
Occupied Bandwidth Measurement	OFF
Spectrum Emission Mask Measurement	ON, 100 counts
Adjacent Channel Leakage Power Ratio Measurement	OFF
Modulation Analysis	OFF

6. Set the Spectrum Emission Mask.

Template	DNLNK (P<31 dBm)

7. Start measurement.
8. Query measurement results after measurement is completed.

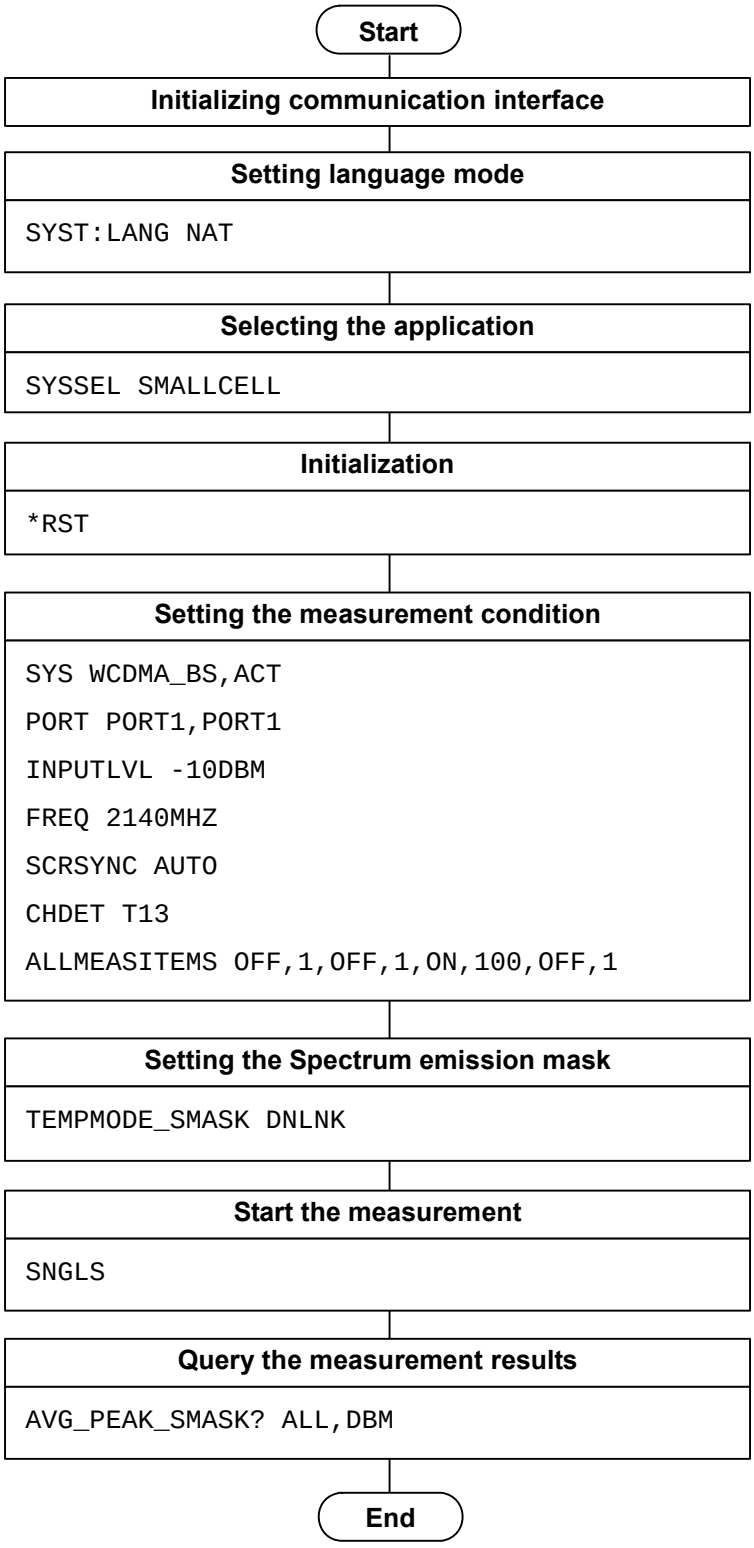

Figure 2.8.1-1 Example of Spectrum Emission Mask measurement

2.8.2 Example of modulation analysis measurement

An example of modulation analysis is described here.

Processing Flow

1. Initialize communication interface.

   For details, refer to the operation manual of the interface you use.
2. Set language mode.
3. Set the application software type to the MX887021A.
4. Initialize settings.
5. Set the following measurement conditions:

Test Port	Port 2
Input Level	–20 dBm
Downlink Frequency	2140 MHz
Scrambling Code	Automatic detection
Signal Configuration	Test Model4
Occupied Bandwidth Measurement	OFF
Spectrum Emission Mask Measurement	OFF
Adjacent Channel Leakage Power Ratio Measurement	OFF
Modulation Analysis	ON, 200 counts

6. Start measurement.
7. After measurement is completed, query the following measurement results:

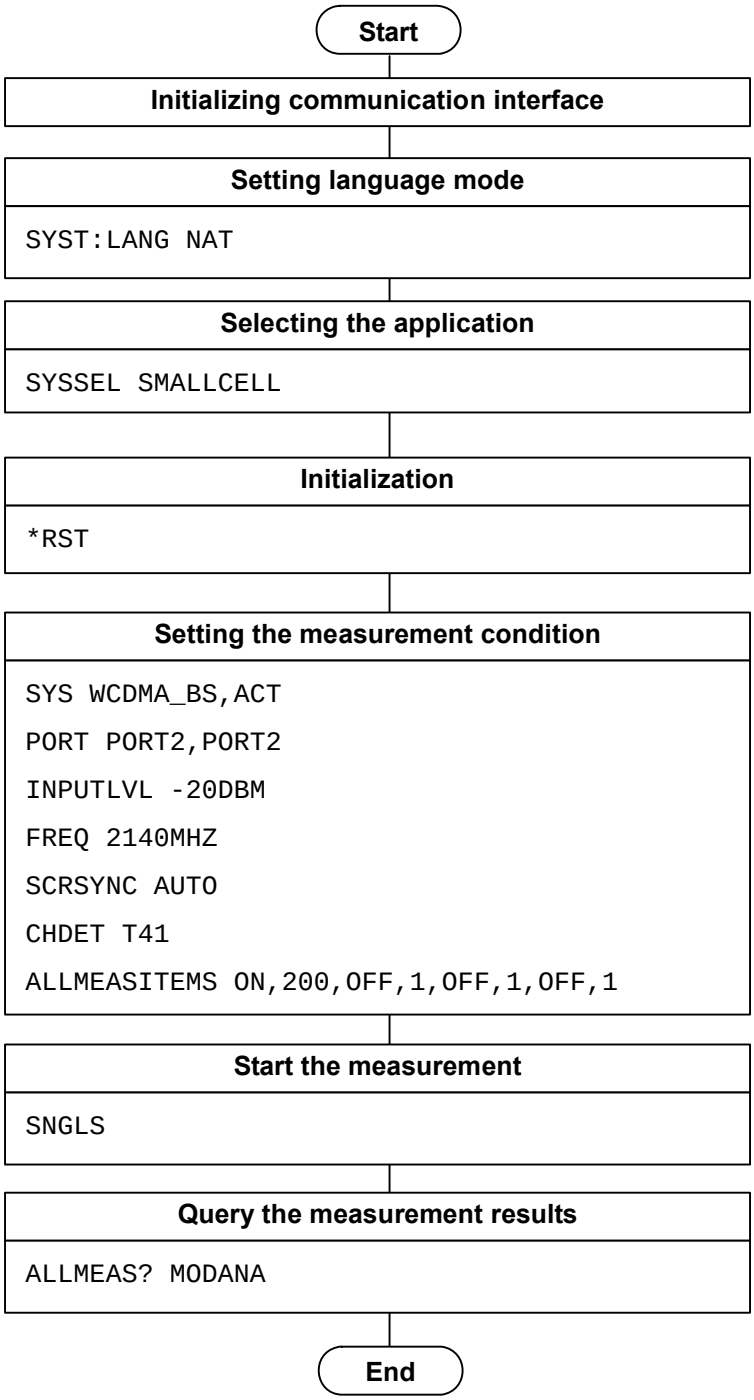

Figure 2.8.2-1 Example of Modulation Analysis measurement

Chapter 3 SCPI Command Reference

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

3.1 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).

3.1.1 Selecting Application and Initialization

Table 3.1.1-1 Selecting Application

Function	Command	Query	Response
Application Switch And Window Status	:INSTrument:SYSTem <apl>,<window>	:INSTrument:SYSTem? <apl>	<status>,<window>
Preset (All Application)	*RST	---	---

Refer to Chapter 6 “Native Command Reference” in the MU870000A TRX Test Module Operation Manual for detailed for *RST command.

3.1.2 Setting Basic Parameters

Table 3.1.2-1 Setting Basic Parameters

Function	Command	Query	Response
Carrier Frequency	[:SENSe]:FREQuency:CENTer <freq>	[:SENSe]:FREQuency:CENTer?	<freq>
Input Level	[:SENSe]:POWer[:RF]:RANGe:ILEVel <real>	[:SENSe]:POWer[:RF]:RANGe:ILEVel?	<real>

3.1.3 Setting System Parameters

Table 3.1.3-1 Setting System Parameters

Function	Command	Query	Response
Channel Detection for Modulation Analysis	[:SENSe]:EVM:CDETection[:BTS] <mode>	[:SENSe]:EVM:CDETection[:BTS]?	<mode>
DTX Setup for Modulation Analysis	[:SENSe]:EVM:DTX[:STATe] <on_off>	[:SENSe]:EVM:DTX[:STATe]?	<on_off>
PICH Channelization Code Number for Modulation Analysis	[:SENSe]:EVM:PICH:CCODe <integer>	[:SENSe]:EVM:PICH:CCODe?	<integer>
PICH Timing Offset for Modulation Analysis	[:SENSe]:EVM:PICH:TOFFset <integer>	[:SENSe]:EVM:PICH:TOFFset?	<integer>
Scrambling Code Sync for Modulation Analysis	[:SENSe]:EVM:SYNC:MODE <mode>	[:SENSe]:EVM:SYNC:MODE?	<mode>
Scrambling Code for Modulation Analysis	[:SENSe]:EVM:SYNC:SCRamble <integer>	[:SENSe]:EVM:SYNC:SCRamble?	<integer>
Scrambling Code Number for Modulation Analysis	-----	[:SENSe]:EVM:SYNC:RSCRamble?	<integer>
Select Template Mode for Spectrum Emission Mask	[:SENSe]:SEMask:STANdard <mode>	[:SENSe]:SEMask:STANdard	<mode>

3.1.4 Common Measurement Function

Table 3.1.4-1 Common Measurement Function

Function	Command	Query	Response
Single Measurement	:INITiate:MODE:SINGle	-----	-----
Initiate	:INITiate[:IMMediate]	-----	-----
Single Sweep	:INITiate:SWP	-----	-----
Trigger Source	:TRIGger[:SEQuence]:SOURce <mode>	:TRIGger[:SEQuence]:SOURce?	<mode>
Trigger Slope	:TRIGger[:SEQuence]:SLOPe <mode>	:TRIGger[:SEQuence]:SLOPe?	<mode>
Trigger Delay	:TRIGger[:SEQuence]:DELay <time>	:TRIGger[:SEQuence]:DELay?	<time>
	:TRIGger[:SEQuence]:DELay:CHIP <chip>	:TRIGger[:SEQuence]:DELay:CHIP?	<chip>

3.1.5 Measurement Function

Table 3.1.5-1 Batch Measurement Function

Function	Command	Query	Response
All Measure Query	-----	:FETCh:ALL?	<res1_1>,<res1_2>,...<res1_41>,<res2_1>,<res2_2>,<res2_3>,<res3_1>,<res3_2>,...<res3_21>,<res4_1>,<res4_2>,...<res4_12> See Table 3.2.5-1.
Modulation Analysis Query	-----	:FETCh:EVM?	<res1_1>,<res1_2>,...<res1_41> See Table 3.2.5-1.
Adjacent Channel Power Query	-----	:FETCh:ACP?	<res4_1>,<res4_2>,...<res4_12> See Table 3.2.5-1.
Occupied Bandwidth Query	-----	:FETCh:OBWidth?	<res2_1>,<res2_2>,<res2_3> See Table 3.2.5-1.
Spectrum Emission Mask Query	-----	:FETCh:SEMask?	<res3_1>,<res3_2>,...<res3_21> See Table 3.2.5-1.
All Code Domain Power and Error Query	-----	:FETCh:EVM:CDANalyis:ALL?	<sf_1>,<code_1>,<pwr_rel_1>,<err_1>,<pwr_abs_1>,<err_rel_1>,<sf_2>...
Symbol EVM Query	-----	:FETCh:EVM:EVM:SYMBol?	<sf_1>,<code_1>,<evm_1>,<sf_2>...
Parameters of Peak Code Domain Error Query	-----	:FETCh:EVM:PCDE:ALL?	<code>,<sf>,<slot>

Table 3.1.5-1 Common Measurement Function (Cont'd)

Function	Command	Query	Response
Spectrum Emission Mask Average Value Query	-----	:FETCh:SEMask:PEAK:ALL:AVERage:DB?	<pwr_rel_lower_5>,<template_rel_lower_5>,<judge_lower_5>,<pwr_rel_lower_4>,<template_rel_lower_4>,<judge_lower_4>... <pwr_rel_lower_1>,<template_rel_lower_1>,<judge_lower_1>,<pwr_rel_upper_1>,<template_rel_upper_1>,<judge_upper_1>... <pwr_rel_upper_5>,<template_rel_upper_5>,<judge_upper_5>
	-----	:FETCh:SEMask:PEAK:ALL:AVERage:DBM?	<pwr_abs_lower_5>,<template_rel_lower_5>,<judge_lower_5>,<pwr_abs_lower_4>,<template_rel_lower_4>,<judge_lower_4>... <pwr_abs_lower_1>,<template_rel_lower_1>,<judge_lower_1>,<pwr_abs_upper_1>,<template_rel_upper_1>,<judge_upper_1>... <pwr_abs_upper_5>,<template_rel_upper_5>,<judge_upper_5>
	-----	:FETCh:SEMask:PEAK:PEAK:AVERage:DB?	<pwr_rel_peak>,<template_rel_peak>,<judge_peak>
	-----	:FETCh:SEMask:PEAK:PEAK:AVERage:DBM?	<pwr_abs_peak>,<template_rel_peak>,<judge_peak>
Query Trace Data Occupied Bandwidth	-----	:TRACe[:DATA]:OBWidth?	<data_1>,<data_2>,...
Query Trace Data Spectrum Emission Mask	-----	:TRACe[:DATA]:SEMask?	<data_1>,<data_2>,...

3.1.6 Setting Measurement Parameters

Table 3.1.6-1 Setting Measurement Parameters

Function	Command	Query	Response
Measure All Items	[:SENSe]:ALL[:STATe] <on_off1>,<on_off2>,<on_off3>,<on_off4>	[:SENSe]:ALL[:STATe]?	<on_off1>,<on_off2>,<on_off3>,<on_off4>
Storage Count for All Items	[:SENSe]:ALL:AVERage:COUNt <integer1>,<integer2>,<integer3>,<integer4>	[:SENSe]:ALL:AVERage:COUNt?	<integer1>,<integer2>,<integer3>,<integer4>
Storage Count for Modulation Analysis	[:SENSe]:EVM:AVERage:COUNt <integer>	[:SENSe]:EVM:AVERage:COUNt?	<integer>
Storage Count for Adjacent Channel Leakage power Ratio	[:SENSe]:ACPower:AVERage:COUNt <integer>	[:SENSe]:ACPower:AVERage:COUNt?	<integer>
Storage Count for Occupied Bandwidth	[:SENSe]:OBWidth:AVERage:COUNt <integer>	[:SENSe]:OBWidth:AVERage:COUNt?	<integer>
Storage Count for Spectrum Emission Mask	[:SENSe]:SEMask:AVERage:COUNt <integer>	[:SENSe]:SEMask:AVERage:COUNt?	<integer>

3.1.7 Measurement Status Query

Table 3.1.7-1 Measurement Status Query

Function	Command	Query	Response
Measurement Status Query	-----	:STATus:ERRor?	<status>

3.1.8 Setting SG Frequency

Table 3.1.8-1 Setting SG Frequency

Function	Command	Query	Response
SG Frequency	[:SOURce]:FREQuency[:CW|:FIXed] <freq>	[:SOURce]:FREQuency[:CW|:FIXed]?	<freq>

3.1.9 Setting SG Level

Table 3.1.9-1 Setting SG Level

Function	Command	Query	Response
SG RF Output	:OUTPut[:STATe] <on_off>	:OUTPut[:STATe]?	<on_off>
SG Output Level	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <level>	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? <unit>	<level>

3.1.10 Playing/Selecting/Loading SG Waveform Pattern

Table 3.1.10-1 Playing/Selecting/Loading SG Waveform Pattern

Function	Command	Query	Response
SG Select Waveform File	[:SOURce]:RADio:ARB:WAVeform <file_name>,<group_number>	[:SOURce]:RADio:ARB:WAVeform?	<file_name>,<group_number>

3.1.11 Setting SG Modulation and AWGN

Table 3.1.11-1 Setting SG Modulation and AWGN

Function	Command	Query	Response
SG Modulation	:OUTPut:MODulation[:STATe] <on_off>	:OUTPut:MODulation[:STATe]?	<on_off>

3.1.12 Setting Parameters for MT8870

Table 3.1.12-1 Setting Parameters for MT8870

Function	Command	Query	Response
Application Select	:INSTrument[:SELect] <app>	:INSTrument[:SELect]?	<app>
Set Connect Port Direction	:ROUTe:PORT:CONNect:DIRection <input>,<output>	:ROUTe:PORT:CONNect:DIRection?	<input>,<output>
Language Selection of Remote Command	:SYSTem:LANGuage <mode>	:SYSTem:LANGuage?	<mode>

3.2 Details of Commands

This section describes the commands in functional 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		

3.2.1 Selecting application

:INSTrument:SYSTem

Application Switch And Window Status

Function

This command switches the target application for operation/control. Also queries the status of the specified application.

Command

```
:INSTrument:SYSTem <apl>,<window>
```

Query

```
:INSTrument:SYSTem? <apl>
```

Response

```
<status>,<window>
```

Parameter

<apl>	Target application name
WCDMA_BS	WCDMA BS Measurement Software
SG	SG

Any optional installed software other than those above can be specified. Refer to the operation manual (remote control) for each application for details.

<window>	Application status
ACTive	Operation enabled
When omitted	Same as ACT

<status>	Application status
CURR	Executed and targeted for operation
IDLE	Loaded but not executed

Details

This function is used to switch the operation/control target application.

Example of Use

To switch the operation target application to the WCDMA BS Measurement Software.
INST:SYST WCDMA_BS,ACT
INST:SYST? WCDMA_BS
> CURR,ACT

3.2.2 Setting Basic Parameters

[:SENSe]:FREQuency:CENTer

Carrier Frequency

Function

This command sets the center frequency of the signal to be measured.

Command

```
[:SENSe]:FREQuency:CENTer <freq>
```

Query

```
[:SENSe]:FREQuency:CENTer?
```

Response

```
<freq>
```

Parameter

<freq>		Center frequency
	Range	400.000000 to 3800.000000 MHz
	Resolution	1 Hz
	Suffix Code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.
	Default	2110 MHz

Example of Use

To set the center frequency to 2.000 GHz.

FREQ:CENT 2.000GHZ

FREQ:CENT?

> 2000000000

[:SENSe]:POWer[:RF]:RANGe:ILEVel

Input Level

Function

This command sets the input level of RF signals.

Command

```
[:SENSe]:POWer[:RF]:RANGe:ILEVel <real>
```

Query

```
[:SENSe]:POWer[:RF]:RANGe:ILEVel?
```

Response

```
<real>
```

Parameter

<real>	Input level
Range	–65.0 to +35.0 dBm (Port 1/Port 2)
	–65.0 to +25.0 dBm (Port 3/Port 4)
Resolution	0.1
Unit	dBm
Suffix Code	DBM
	dBm is used when omitted.
Default	+35.0 dBm (Port 1/Port 2)
	+25.0 dBm (Port 3/Port 4)

Details

The maximum value applies if the set value exceeds the range due to change of Set Connect Port Direction.

Example of Use

To set the input level to 0 dBm.
POW:RANG:ILEV 0
POW:RANG:ILEV?
> 0.0

3.2.3 Setting System Parameters

[:SENSe]:EVM:CDETection[:BTS]

Channel Detection for Modulation Analysis

Function

This command sets the active channel detection method for modulation analysis measurement.

Command

```
[:SENSe]:EVM:CDETection[:BTS] <mode>
```

Query

```
[:SENSe]:EVM:CDETection[:BTS]?
```

Response

```
<mode>
```

Parameter

<mode>	Active channel detection method
AUTO	Detects active channels automatically. (Default)
T11	Detects Test Model1 16DPCH as an active channel.
T12	Detects Test Model1 32DPCH as an active channel.
T13	Detects Test Model1 64DPCH as an active channel.
T14	Detects Test Model1 4DPCH as an active channel.
T15	Detects Test Model1 8DPCH as an active channel.
T21	Detects Test Model2 as an active channel.
T31	Detects Test Model3 16DPCH as an active channel.
T32	Detects Test Model3 32DPCH as an active channel.
T33	Detects Test Model3 4DPCH as an active channel.
T34	Detects Test Model3 8DPCH as an active channel.
T41	Detects Test Model4 as an active channel.
T42	Detects Test Model4 include CPICH as an active channel.
T51	Detects Test Model5 6DPCH as an active channel.
T52	Detects Test Model5 14DPCH as an active channel.
T53	Detects Test Model5 30DPCH as an active channel.
T54	Detects Test Model5 4DPCH as an active channel.
T61	Detects Test Model6 30DPCH as an active channel.
T62	Detects Test Model6 4DPCH as an active channel.

Example of Use

To detect active channels automatically:

EVM:CDET AUTO

EVM:CDET?

> AUTO

[:SENSe]:EVM:DTX[:STATe]

DTX Setup for Modulation Analysis

Function

This command enables (On) or disables (Off) the PICH correction function for modulation analysis measurement.

Command

```
[:SENSe]:EVM:DTX[:STATe] <on_off>
```

Query

```
[:SENSe]:EVM:DTX[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	PICH correction function
OFF|0	Off
ON|1	On (Default)

Example of Use

To enable the PICH correction function.
EVM:DTX ON
EVM:DTX?
> 1

[:SENSe]:EVM:PICH:CCODe

PICH Channelization Code Number for Modulation Analysis

Function

This command sets the PICH Channelization Code Number for modulation analysis measurement.

Command

```
[:SENSe]:EVM:PICH:CCODe <integer>
```

Query

```
[:SENSe]:EVM:PICH:CCODe?
```

Response

```
<integer>
```

Parameter

<integer>	PICH Channelization Code Number
Range	0 to 255
Resolution	1
Suffix Code	None
Default	16

Example of Use

To set the PICH Channelization Code Number to 10.

EVM:PICH:CCOD 10

EVM:PICH:CCOD?

> 10

[:SENSe]:EVM:PICH:TOFFset

PICH Timing Offset for Modulation Analysis

Function

This command sets the PICH Timing Offset for modulation analysis measurement.

Command

```
[:SENSe]:EVM:PICH:TOFFset <integer>
```

Query

```
[:SENSe]:EVM:PICH:TOFFset?
```

Response

```
<integer>
```

Parameter

<integer>	PICH Timing Offset
Range	0 to 149
Resolution	1
Suffix Code	None
Default	120

Example of Use

To set the PICH Timing Offset to 10.

EVM:PICH:TOFF 10

EVM:PICH:TOFF?

> 10

[:SENSe]:EVM:SYNC:MODE

Scrambling Code Sync for Modulation Analysis

Function

This command sets the scrambling code synchronization method for the Modulation Analysis measurement.

Command

```
[:SENSe]:EVM:SYNC:MODE <mode>
```

Query

```
[:SENSe]:EVM:SYNC:MODE?
```

Response

```
<mode>
```

Parameter

<mode>		Scrambling code synchronization method
	AUTO	Automatically detects the scrambling code. (Default)
	USER	Uses the user-specific scrambling code.

Example of Use

To automatically detect the scrambling code.

EVM:SYNC:MODE AUTO

EVM:SYNC:MODE?

> AUTO

[:SENSe]:EVM:SYNC:SCRamble

Scrambling Code for Modulation Analysis

Function

For Modulation Analysis measurement, this command sets the Scrambling Code when Scrambling Code Sync is USER.

Command

```
[:SENSe]:EVM:SYNC:SCRamble <integer>
```

Query

```
[:SENSe]:EVM:SYNC:SCRamble?
```

Response

```
<integer>
```

Parameter

<integer>	Scrambling Code
Range	0 to 8191 (0x0 to 0x1FFF)
Resolution	1
Suffix Code	None
Default	0

Details

Scrambling Code consists of Primary Scrambling Code (PSC: 0 to 511) and Secondary Scrambling Code (SSC: 0 to 15). Use the following expression to set the Scrambling Code.

Scrambling Code = PSC × 16 + SSC

When specifying the Scrambling Code in hexadecimal format, prefix "#H" to the setting value.

Example of Use

To set the Scrambling Code to 8191 (0x1FFF).
EVM:SYNC:SCR #H1FFF
EVM:SYNC:SCR?
> 8191

[:SENSe]:EVM:SYNC:RSCRamble?

Scrambling Code Number for Modulation Analysis

Function

This command queries the Scrambling Code used in analysis during Modulation Analysis measurement.

Query

```
[:SENSe]:EVM:SYNC:RSCRamble?
```

Response

```
<integer>
```

Parameter

<integer>	Scrambling Code
Resolution	1
Suffix Code	None

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the Scrambling Code used in analysis.

EVM:SYNC:RSCR?

> 8191

[:SENSe]:SEMask:STANdard

Select Template Mode for Spectrum Emission Mask

Function

This command sets the template judgment mode of Spectrum Emission Mask measurement.

Command

```
[:SENSe]:SEMask:STANdard <mode>
```

Query

```
[:SENSe]:SEMask:STANdard?
```

Response

```
<mode>
```

Parameter

<mode>	Template judgment mode
AUTO	Automatically sets the template of the specified value to judge. (Default)
AUTOADD	Automatically sets the template of the specified value whose Additional is valid to judge.
DNLNK	Sets the template of P < 31 dBm to judge.
DNLNK1	Sets the template of P ≥ 43 dBm to judge
DNLNK2	Sets the template of 39 dBm ≤ P < 43 dBm to judge.
DNLNK3	Sets the template of 31 dBm ≤ P < 39 dBm to judge.

Example of Use

To set the template of P < 31 dBm manually.

SEM:STAN DNLNK

SEM:STAN?

> DNLNK

3.2.4 Common Measurement Function

:INITiate:MODE:SINGle

Single Measurement

Function

This command starts single measurement.

Command

```
:INITiate:MODE:SINGle
```

Example of Use

To start single measurement.

INIT:MODE:SING

:INITiate[:IMMediate]

Initiate

Function

This command starts measurement in the current measurement mode.

Command

```
:INITiate[:IMMediate]
```

Example of Use

To start measurement in the current measurement mode.

INIT

:INITiate:SWP

Single Sweep

Function

This command sets the sweep mode to Single and starts Single Sweep.

Command

```
:INITiate:SWP
```

Details

When starting sweep by this function, the next command is not processed until the sweep completes.

Example of Use

Starts Single Sweep.

INIT:SWP

:TRIGger[:SEQuence]:SOURce

Trigger Source

Function

This command selects the trigger signal source.

Command

```
:TRIGger[:SEQuence]:SOURce <mode>
```

Query

```
:TRIGger[:SEQuence]:SOURce?
```

Response

```
<mode>
```

Parameter

<mode>	Trigger signal source
EXTernal[1]	External input
IMMediate	Free run (Default)

Example of Use

To set the trigger signal source to external input.

TRIG:SOUR EXT

TRIG:SOUR?

> EXT

:TRIGger[:SEQuence]:SLOPe

Trigger Slope

Function

This command sets the trigger detection mode (rising or falling).

Command

```
:TRIGger[:SEQuence]:SLOPe <mode>
```

Query

```
:TRIGger[:SEQuence]:SLOPe?
```

Response

```
<mode>
```

Parameter

<mode>		Trigger detection mode
	POSitive	Triggers are detected at the rising edge (Default)
	NEGative	Triggers are detected at the falling edge.

Example of Use

To detect a trigger at the rising edge.

TRIG:SLOP POS

TRIG:SLOP?

> POS

:TRIGger[:SEQuence]:DELay

Trigger Delay

Function

This command sets the trigger delay time from generation of a trigger to start of a capture operation.

Command

```
:TRIGger[:SEQuence]:DELay <time>
```

Query

```
:TRIGger[:SEQuence]:DELay?
```

Response

```
<time>
```

Parameter

<time>		Trigger delay time
	Range	–1 to +1 s
	Resolution	1 us
	Suffix Code	NS, US, MS, S S is used when omitted.
	Default	0 s

Example of Use

To set the trigger delay time to 20 ms.

TRIG:DEL 20MS

TRIG:DEL?

> 0.020000

:TRIGger[:SEQuence]:DELay:CHIP

Trigger Delay

Function

This command sets the trigger delay (time difference from the trigger occurrence to start of measurement).

Command

```
:TRIGger[:SEQuence]:DELay:CHIP <chip>
```

Query

```
:TRIGger[:SEQuence]:DELay:CHIP?
```

Response

```
<chip>
```

Parameter

<chip>		Time difference from the trigger occurrence to start of measurement
	Range	–3840000 to 3840000
	Resolution	4
	Unit	chip
	Default	0

Details

When a parameter value cannot be divided evenly by 4, a plus value is rounded up and a minus value is rounded down.

Example of Use

To set the trigger delay to 50 chips.

TRIG:DEL:CHIP 50

TRIG:DEL:CHIP?

> 52

3.2.5 Measurement Function

:FETCh:ALL?

All Measure Query

Function

This command queries the results of the measurement.

Query

```
:FETCh:ALL?
```

Response

```
<res1_1>,<res1_2>,...<res1_41>,<res2_1>,<res2_2>,<res2_3>,
<res3_1>,<res3_2>,...<res3_21>,<res4_1>,<res4_2>,...<res4_12>
```

See Table 3.2.5-1.

Details

Relative Code Domain Error is measured for the channels whose modulation is 64QAM when Channel Detection is Test Model6 30DPCH or Test Model6 4DPCH.
Relative Code Domain Error is 999.99 when Channel Detection is other than the above.
An unmeasured value, for example 999.99, is returned if the measurement is not performed yet or its result is an error.
Unmeasured values are:
Measurement about Power [dB], [dBm]: 999.99
Frequency, Frequency Error [Hz]: 99999999999.9
Frequency Error [ppm]: 9999999.999999
EVM [%]: 999.99
Occupied Bandwidth [Hz]: 99999999999
Evaluation (Pass/Fail): - (hyphen)
Scrambling Code: -1
PCDE CH, PCDE SF, PCDE Slot: -1

Example of Use

To query the results of the measurement.
FETC:ALL?
> 0,1.23,,1.24,1.22,999999,...

Table 3.2.5-1 shows the responses. They are returned in the order below separated by commas (,).

Table 3.2.5-1 Responses to Measurement Results

Measurement Item	Response	
Modulation Analysis	res1_1	TX Power (Ave) [dBm]
	res1_2	TX Power (Max) [dBm]
	res1_3	TX Power (Min) [dBm]
	res1_4	999999
	res1_5	999999
	res1_6	999999
	res1_7	Carrier Frequency (Ave) [Hz]
	res1_8	Carrier Frequency (Max) [Hz]
	res1_9	Carrier Frequency (Min) [Hz]
	res1_10	Carrier Frequency Error (Ave) [Hz]
	res1_11	Carrier Frequency Error (Max) [Hz]
	res1_12	Carrier Frequency Error (Min) [Hz]
	res1_13	Carrier Frequency Error (Ave) [ppm]
	res1_14	Carrier Frequency Error (Max) [ppm]
	res1_15	Carrier Frequency Error (Min) [ppm]
	res1_16	RMS EVM (Ave) [%]
	res1_17	RMS EVM (Max) [%]
	res1_18	RMS EVM (Min) [%]
	res1_19	Peak Code Domain Error (Ave) [dB]
	res1_20	Peak Code Domain Error (Max) [dB]
	res1_21	Peak Code Domain Error (Min) [dB]
	res1_22	CPICH Power (Ave) [dB]
	res1_23	CPICH Power (Max) [dB]
	res1_24	CPICH Power (Min) [dB]
	res1_25	CPICH Power (Ave) [dBm]
	res1_26	CPICH Power (Max) [dBm]
	res1_27	CPICH Power (Min) [dBm]
	res1_28	Peak EVM (Ave) [%]
	res1_29	Peak EVM (Max) [%]
	res1_30	Peak EVM (Min) [%]
	res1_31	IQ Origin (Ave) [dB]
	res1_32	IQ Origin (Max) [dB]
	res1_33	IQ Origin (Min) [dB]

Table 3.2.5-1 Responses to Measurement Results (Cont'd)

Measurement Item	Response	
Modulation Analysis (Cont'd)	res1_34	Scrambling Code (Decimal)
	res1_35	PCDE CH
	res1_36	PCDE SF
	res1_37	PCDE Slot
	res1_38	Relative Code Domain Error (Ave) [dB]
	res1_39	Relative Code Domain Error (Max) [dB]
	res1_40	Relative Code Domain Error (Min) [dB]
	res1_41	TX Power(Unsync) (Current)[dBm]
Occupied Bandwidth	res2_1	Occupied Bandwidth (Ave) [Hz]
	res2_2	99999999999
	res2_3	99999999999
Spectrum Emission Mask	res3_1	RangeE (–Range) (Ave) [dBm]
	res3_2	RangeE (–Range) (Ave) [dB]
	res3_3	RangeD (–Range) (Ave) [dBm]
	res3_4	RangeD (–Range) (Ave) [dB]
	res3_5	RangeC (–Range) (Ave) [dBm]
	res3_6	RangeC (–Range) (Ave) [dB]
	res3_7	RangeB (–Range) (Ave) [dBm]
	res3_8	RangeB (–Range) (Ave) [dB]
	res3_9	RangeA (–Range) (Ave) [dBm]
	res3_10	RangeA (–Range) (Ave) [dB]
	res3_11	RangeA (+Range) (Ave) [dBm]
	res3_12	RangeA (+Range) (Ave) [dB]
	res3_13	RangeB (+Range) (Ave) [dBm]
	res3_14	RangeB (+Range) (Ave) [dB]
	res3_15	RangeC (+Range) (Ave) [dBm]
	res3_16	RangeC (+Range) (Ave) [dB]
	res3_17	RangeD (+Range) (Ave) [dBm]
	res3_18	RangeD (+Range) (Ave) [dB]
	res3_19	RangeE (+Range) (Ave) [dBm]
	res3_20	RangeE (+Range) (Ave) [dB]
	res3_21	PASS/FAIL

Table 3.2.5-1 Responses to Measurement Results (Cont'd)

Measurement Item	Response	
Adjacent Channel Leakage power Ratio	res4_1	–10 MHz (Ave) [dB]
	res4_2	–10 MHz (Max) [dB]
	res4_3	–10 MHz (Min) [dB]
	res4_4	–5 MHz (Ave) [dB]
	res4_5	–5 MHz (Max) [dB]
	res4_6	–5 MHz (Min) [dB]
	res4_7	5 MHz (Ave) [dB]
	res4_8	5 MHz (Max) [dB]
	res4_9	5 MHz (Min) [dB]
	res4_10	10 MHz (Ave) [dB]
	res4_11	10 MHz (Max) [dB]
	res4_12	10 MHz (Min) [dB]

:FETCh:EVM?

Modulation Analysis Query

Function

This command queries the measurement results of Modulation Analysis.

Query

```
:FETCh:EVM?
```

Response

```
<res1_1>,<res1_2>,...<res1_41>
```

For details, refer to Table 3.2.5-1.

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:EVM?

> 1.23,1.24,1.22,999999,...

:FETCh:ACP?

Adjacent Channel Power Query

Function

This command queries the measurement results of Adjacent Channel Leakage power Ratio.

Query

```
:FETCh:ACP?
```

Response

```
<res4_1>,<res4_2>,...<res4_12>
```

For details, refer to Table 3.2.5-1.

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:ACP?

> -61.23,-61.23,-61.23,-60.12,...

:FETCh:OBWidth?

Occupied Bandwidth Query

Function

This command queries the measurement results of Occupied Bandwidth.

Query

```
:FETCh:OBWidth?
```

Response

```
<res2_1>,<res2_2>,<res2_3>
```

For details, refer to Table 3.2.5-1.

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:OBW?

> 4000000,99999999999,99999999999

:FETCh:SEMask?

Spectrum Emission Mask Query

Function

This command queries the measurement results of Spectrum Emission Mask.

Query

```
:FETCh:SEMask?
```

Response

```
<res3_1>,<res3_2>,...<res3_21>
```

For details, refer to Table 3.2.5-1.

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:SEM?

> -13.00,0.00, -13.00,0.00,...

:FETCh:EVM:CDANalyis:ALL?

All Code Domain Power and Error Query

Function

This command queries the measurement results of Code Domain Power and Code Domain Error for Modulation Analysis measurement.

Query

```
:FETCh:EVM:CDANalyis:ALL?
```

Response

```
<sf_1>,<code_1>,<pwr_rel_1>,<err_1>,<pwr_abs_1>,<err_rel_1>,<sf_2>...
```

Parameter

<sf_n>	Spreading Factor
Range	4, 8, 16, 32, 64, 128, 256
<code_n>	Channelization Code Number
Range	0 to (sf – 1)
Resolution	1
<pwr_rel_n>	Code Domain Power relative values
Resolution	0.01
Unit	dB
<err_n>	Code Domain Error
Resolution	0.01
Unit	dB
<pwr_abs_n>	Code Domain Power absolute values
Resolution	0.01
Unit	dBm
<err_rel_n>	Relative Code Domain Error
Resolution	0.01
Unit	dB

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:EVM:CDAN:ALL?

> 256,0,-12.34,-45.67,-56.78,-34.67,256,1,..

:FETCh:EVM:EVM:SYMBol?

Symbol EVM Query

Function

For Modulation Analysis, this command returns the measurement result for Symbol EVM.

Query

```
:FETCh:EVM:EVM:SYMBol?
```

Response

```
<sf_1>,<code_1>,<evm_1>,<sf_2>...
```

Parameter

<sf_n>	Spreading Factor
Range	4, 8, 16, 32, 64, 128, 256
<code_n>	Channelization Code Number
Range	0 to (sf – 1)
Resolution	1
<evm>	Symbol EVM
Resolution	0.01
Unit	%

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:EVM:EVM:SYMB?

> 256,0,0.35,256,1,9.02,256,2,999.99,...

:FETCh:EVM:PCDE:ALL?

Parameters of Peak Code Domain Error Query

Function

For Modulation Analysis measurement, this command returns the Channelization Code, Spreading Factor, and slot number of the Peak Code Domain Error.

Query

```
:FETCh:EVM:PCDE:ALL?
```

Response

```
<code>,<sf>,<slot>
```

Parameter

<code>		Channelization Code of Peak Code Domain Error
	Range	1
	Unit	None
<sf>		Spreading Factor of Peak Code Domain Error
	Resolution	1
	Unit	None
<slot>		Slot number of Peak Code Domain Error
	Resolution	1
	Unit	None

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:EVM:PCDE:ALL?

> 254,256,14

:FETCh:SEMask:PEAK:ALL:AVERage:DB?

Spectrum Emission Mask Average Value Query

Function

This command detects the worst value in each frequency band of the selected template and queries the average of peak values and pass/fail results in Spectrum Emission Mask measurement.

Query

```
:FETCh:SEMask:PEAK:ALL:AVERage:DB?
```

Response

```
<pwr_rel_lower_5>,<template_rel_lower_5>,<judge_lower_5>,
<pwr_rel_lower_4>,<template_rel_lower_4>,<judge_lower_4>...
<pwr_rel_lower_1>,<template_rel_lower_1>,<judge_lower_1>,
<pwr_rel_upper_1>,<template_rel_upper_1>,<judge_upper_1>...
<pwr_rel_upper_5>,<template_rel_upper_5>,<judge_upper_5>
```

Parameter

<pwr_rel_lower_n>	Relative value against carrier transmission power in lower frequency band
<pwr_rel_upper_n>	Relative value against carrier transmission power in upper frequency band
Resolution	0.01
Unit	dB
<template_rel_lower_n>	Relative value against the pass/fail judgment template for the worst value of measurement results in lower frequency band
<template_rel_upper_n>	Relative value against the pass/fail judgment template for the worst value of measurement results in upper frequency band
Resolution	0.01
Unit	dB
<judge_lower_n>	Pass/fail judgment template results in lower frequency band
<judge_upper_n>	Pass/fail judgment template results in upper frequency band
PASS	Passed
FAIL	Failed
-	Not measured

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.

FETC:SEM:PEAK:ALL:AVER:DB?

> -1.00,0.00,FAIL,-1.00,0.00,FAIL,...

:FETCh:SEMask:PEAK:ALL:AVERage:DBM?

Spectrum Emission Mask Average Value Query

Function

This command detects the worst value in each frequency band of the selected template and queries the average of peak values and pass/fail results in Spectrum Emission Mask measurement.

Query

```
:FETCh:SEMask:PEAK:ALL:AVERage:DBM?
```

Response

```
<pwr_abs_lower_5>,<template_rel_lower_5>,<judge_lower_5>,
<pwr_abs_lower_4>,<template_rel_lower_4>,<judge_lower_4>...
<pwr_abs_lower_1>,<template_rel_lower_1>,<judge_lower_1>,
<pwr_abs_upper_1>,<template_rel_upper_1>,<judge_upper_1>...
<pwr_abs_upper_5>,<template_rel_upper_5>,<judge_upper_5>
```

Parameter

<pwr_abs_lower_n>	Absolute value of the worst value of the measurement results in lower frequency band
<pwr_abs_upper_n>	Absolute value of the worst value of the measurement results in upper frequency band
Resolution	0.01
Unit	dBm
<template_rel_lower_n>	Relative value against the pass/fail judgment template for the worst value of measurement results in lower frequency band
<template_rel_upper_n>	Relative value against the pass/fail judgment template for the worst value of measurement results in upper frequency band
Resolution	0.01
Unit	dB
<judge_lower_n>	Pass/fail judgment template results in lower frequency band
<judge_upper_n>	Pass/fail judgment template results in upper frequency band
PASS	Passed
FAIL	Failed
-	Not measured

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.
FETC:SEM:PEAK:ALL:AVER:DBM?
> -13.00,0.00,FAIL,-13.00,0.00,FAIL,...

:FETCh:SEMask:PEAK:PEAK:AVERage:DB?

Spectrum Emission Mask Average Value Query

Function

This command detects the worst value in all measured values of the selected template and queries the average of peak values and pass/fail results in Spectrum Emission Mask measurement.

Query

```
:FETCh:SEMask:PEAK:PEAK:AVERage:DB?
```

Response

```
<pwr_rel_peak>,<template_rel_peak>,<judge_peak>
```

Parameter

<pwr_rel_peak>	Relative value against carrier transmission power
Resolution	0.01
Unit	dB
<template_rel_peak>	Relative value against the pass/fail judgment template for the worst value of measurement results
Resolution	0.01
Unit	dB
<judge_peak>	Pass/fail judgment template results
PASS	Passed
FAIL	Failed
-	Not measured

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.
FETC:SEM:PEAK:PEAK:AVER:DB?
> -1.00,0.00,FAIL

:FETCh:SEMask:PEAK:PEAK:AVERage:DBM?

Spectrum Emission Mask Average Value Query

Function

This command detects the worst value in all measured values of the selected template and queries the average of peak values and pass/fail results in Spectrum Emission Mask measurement.

Query

```
:FETCh:SEMask:PEAK:PEAK:AVERage:DBM?
```

Response

```
<pwr_abs_peak>,<template_rel_peak>,<judge_peak>
```

Parameter

<pwr_abs_peak>	Absolute value of the worst value in measurement results
Resolution	0.01
Unit	dBm
<template_rel_peak>	Relative value against the pass/fail judgment template for the worst value of measurement results
Resolution	0.01
Unit	dB
<judge_peak>	Pass/fail judgment template results
PASS	Passed
FAIL	Failed
-	Not measured

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query the measurement results.
FETC:SEM:PEAK:PEAK:AVER:DBM?
> -13.00,0.00,FAIL

:TRACe[:DATA]:OBWidth?

Query Trace Data Occupied Bandwidth

Function

This command queries trace data in Occupied Bandwidth measurement.

Query

```
:TRACe[:DATA]:OBWidth? <start>,<length>
```

Response

```
<data_1>,<data_2>,...
```

Parameter

<start>	Start address for reading trace data
Range	0 to 1290
Resolution	1
<length>	Trace data reading number
Range	1 to (1291 – start)
Resolution	1
<data_n>	Trace data
Resolution	0.01
Unit	dBm

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query all trace data of measurement.

TRAC:OBW? 0,1291

> -7.00,-7.01 ...

:TRACe[:DATA]:SEMask?

Query Trace Data Spectrum Emission Mask

Function

This command queries trace data of Spectrum Emission Mask measurement.

Query

```
:TRACe[:DATA]:SEMask? <start>,<length>
```

Response

```
<data_1>,<data_2>,...
```

Parameter

<start>	Start address for reading trace data
Range	0 to 2560
Resolution	1
<length>	Trace data reading number
Range	1 to (2561 – start)
Resolution	1
<data_n>	Trace data
Resolution	0.01
Unit	dBm

Details

For unmeasured values, refer to the description of :FETCh:ALL? command.

Example of Use

To query all trace data of the measurement.

TRAC:SEM? 0,2561

> 7.30,7.31 ...

3.2.6 Setting Measurement Parameters

[:SENSe]:ALL[:STATe]

All Measurement Items On/Off

Function

This command sets collectively whether to measure all measurement items.

Command

```
[:SENSe]:ALL[:STATe] <on_off1>,<on_off2>,<on_off3>,<on_off4>
```

Query

```
[:SENSe]:ALL[:STATe]?
```

Response

```
<on_off1>,<on_off2>,<on_off3>,<on_off4>
```

Parameter

<on_off1>	Whether to perform Modulation Analysis measurement
OFF|0	Does not perform a measurement
ON|1	Performs a measurement (Default)
<on_off2>	Whether to perform Occupied Bandwidth measurement
OFF|0	Does not perform a measurement
ON|1	Performs a measurement (Default)
<on_off3>	Whether to perform Spectrum Emission Mask measurement
OFF|0	Does not perform a measurement
ON|1	Performs a measurement (Default)
<on_off4>	Whether to perform Adjacent Channel Leakage power Ratio measurement
OFF|0	Does not perform a measurement
ON|1	Performs a measurement (Default)

Example of Use

To measure all the measurement items.

ALL ON,ON,ON,ON

ALL?

> 1,1,1,1

[:SENSe]:ALL:AVERage:COUNt

Storage Count for All Measurement Items

Function

This command sets the storage count of all measurement items.

Command

```
[:SENSe]:ALL:AVERage:COUNt <integer1>,<integer2>,<integer3>,<integer4>
```

Query

```
[:SENSe]:ALL:AVERage:COUNt?
```

Response

```
<integer1>,<integer2>,<integer3>,<integer4>
```

Parameter

<integer1>	Modulation Analysis Storage Count
Range	1 to 200
Resolution	1
Default	10
<integer2>	Occupied Bandwidth Storage Count
Range	1 to 200
Resolution	1
Default	1
<integer3>	Spectrum Emission Mask Storage Count
Range	1 to 200
Resolution	1
Default	1
<integer4>	Adjacent Channel Leakage power Ratio Storage Count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the storage count of all measurement items to 10.

ALL:AVER:COUN 10,10,10,10

ALL:AVER:COUN?

> 10,10,10,10

[:SENSe]:EVM:AVERage:COUNt

Storage Count for Modulation Analysis

Function

This command sets the storage count for Modulation Analysis.

Command

```
[:SENSe]:EVM:AVERage:COUNt <integer>
```

Query

```
[:SENSe]:EVM:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>	Storage Count
Range	1 to 200
Resolution	1
Default	10

Example of Use

To set the storage count to 10.

EVM:AVER:COUN 10

EVM:AVER:COUN?

> 10

[:SENSe]:ACPower:AVERage:COUNt

Storage Count for Adjacent Channel Leakage power Ratio

Function

This command sets the storage count for adjacent Channel Leakage power Ratio measurement.

Command

```
[:SENSe]:ACPower:AVERage:COUNt <integer>
```

Query

```
[:SENSe]:ACPower:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>	Storage Count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the storage count to 10.
ACP:AVER:COUN 10
ACP:AVER:COUN?
> 10

[:SENSe]:OBWidth:AVERage:COUNt

Storage Count for Occupied Bandwidth

Function

This command sets the storage count for Occupied Bandwidth measurement.

Command

```
[:SENSe]:OBWidth:AVERage:COUNt <integer>
```

Query

```
[:SENSe]:OBWidth:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>	Storage Count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the storage count to 10.

OBW:AVER:COUN 10

OBW:AVER:COUN?

> 10

[:SENSe]:SEMask:AVERage:COUNt

Storage Count for Spectrum Emission Mask

Function

This command sets the storage count for Spectrum Emission Mask measurement.

Command

`[:SENSe]:SEMask:AVERage:COUNt <integer>`

Query

`[:SENSe]:SEMask:AVERage:COUNt?`

Response

`<integer>`

Parameter

<integer>	Storage Count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the storage count to 10.

SEM:AVER:COUN 10

SEM:AVER:COUN?

> 10

3.2.7 Measurement Status Query

:STATus:ERRor?

Measurement Status Query

Function

This command queries the measurement status.

Query

```
:STATus:ERRor?
```

Response

```
<status>
```

Parameter

<status>	Measurement status	
Value	= bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6	
	+ bit7 + bit8 + bit9 + bit10 + bit11 + bit12	
	+ bit13 + bit14 + bit15	
	bit0 : 2^0 = 1	Not measured
	bit1 : 2^1 = 2	Level over
	bit2 : 2^2 = 4	Signal abnormal
	bit3 : 2^3 = 8	(Reserved)
	bit4 : 2^4 = 16	Tx measurement Time out
	bit5 : 2^5 = 32	(Reserved)
	bit6 : 2^6 = 64	(Reserved)
	bit7 : 2^7 = 128	(Reserved)
	bit8 : 2^8 = 256	(Reserved)
	bit9 : 2^9 = 512	(Reserved)
	bit10 : 2^{10} = 1024	(Reserved)
	bit11 : 2^{11} = 2048	(Reserved)
	bit12 : 2^{12} = 4096	(Reserved)
	bit13 : 2^{13} = 8192	(Reserved)
	bit14 : 2^{14} = 16384	(Reserved)
	bit15 : 2^{15} = 32768	(Reserved)
Range	0 to 65535	

Details

If the measurement ends normally, 0 is returned.

Example of Use

To query the measurement status.

STAT:ERR?

> 0

3.2.8 Setting SG Frequency

[:SOURce]:FREQuency[:CW|:FIXed]

SG Frequency

Function

This command sets the SG frequency.

Command

```
[:SOURce]:FREQuency[:CW|:FIXed] <freq>
```

Query

```
[:SOURce]:FREQuency[:CW|:FIXed]?
```

Response

```
<freq>
```

Parameter

<freq>		Frequency
	Range	400.000000 to 3800.000000 MHz
	Resolution	1 Hz
	Suffix Code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.
	Default	1 GHz

Example of Use

To set the SG frequency to 2 GHz.

FREQ 2GHZ

FREQ?

> 2000000000

3.2.9 Setting SG Level

:OUTPut[:STATe]

SG RF Output

Function

This command enables or disables RF output from the SG.

Command

```
:OUTPut[:STATe] <on_off>
```

Query

```
:OUTPut[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	RF output On/Off
ON|1	On
OFF|0	Off (Default)

Example of Use

To enable the RF signal output from the SG.

OUTP ON

OUTP?

> 1

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]

SG Output Level

Function

This command sets the SG output level.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <level>
```

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? <unit>
```

Response

```
<level>
```

Parameter

<level>		Output level
	Range	–130.0 to –10.0 dBm (Port1/Port2)
		–120.0 to 0.0 dBm (Port3/Port4)
	Resolution	0.1 dBm
	Default	–130.0 dBm (Port1/Port2)
		–120.0 dBm (Port3/Port4)
	Unit	dBm
	Suffix Code	DBM
<unit>		Unit of output level (This parameter can be omitted.)
	DBM	dBm
	When omitted	dBm

Example of Use

To set the SG output level to –10 dBm.

POW -10DBM

POW?

> –10.0

3.2.10 Playing/Selecting/Loading SG Waveform Pattern

[:SOURce]:RADio:ARB:WAVeform

SG Select Waveform File

Function

This command selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

Command

```
[:SOURce]:RADio:ARB:WAVeform <file_name>,<group_number>
```

Query

```
[:SOURce]:RADio:ARB:WAVeform?
```

Response

```
<file_name>,<group_number>
```

Parameter

<file_name>	Waveform file name
<group_number>	Group No.

Example of Use

To set the waveform pattern of the group number 1 in the SG waveform file "MV887021A_WCDMA_0001.xml" to the play pattern.

```
RAD:ARB:WAV "MV887021A_WCDMA_0001",1
RAD:ARB:WAV?
> "MV887021A_WCDMA_0001",1
```

3.2.11 Setting SG Modulation and AWGN

:OUTPut:MODulation[:STATe]

SG Modulation

Function

This command enables or disables the SG modulation function.

Command

```
:OUTPut:MODulation[:STATe] <on_off>
```

Query

```
:OUTPut:MODulation[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	Modulation On/Off
ON|1	On
OFF|0	Off (Default)

Example of Use

To enable the SG modulation function.

OUTP:MOD ON

OUTP:MOD?

> 1

3.2.12 Setting Parameters for MT8870

:INSTrument[:SELect]

Application Select

Function

This command sets the type of application software executing on MU887000A

Command

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

Query

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

Response

```
<app>
```

Parameter

<app>		Type of application software
	SMALLCELL	Small Cell application MX887021A, MX887023A
	CELLULAR	Cellular application MX887010A, MX887011A, MX887012A, MX887013A, MX887014A, MX887015A, MX887016A, or MX887017A
	SRW	SRW application MX887030A, MX887031A, MX887040A, or MX887050A

Details

Set the parameter to SMALLCELL and send the command before using the MX887023A. Select SMALLCELL by INSTrument[:SELect] command, and then set WCDMA_BS or SG by :INSTrument:SYSTem command.

Example of Use

To set the application software to SMALLCELL.

INST SMALLCELL

INST?

> SMALLCELL

:ROUTe:PORT:CONNect:DIRection

Set Connect Port Direction

Function

Sets or queries connectors for inputting and outputting RF signals.

Command

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

Query

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

Response

<input>,<output>

Parameter

<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.

Example of Use

To set Test Port1 as RF signal input connector and Test Port2 as RF signal output connector:
:ROUT:PORT:CONN:DIR PORT1,PORT2
:ROUT:PORT:CONN:DIR?
> PORT1,PORT2

:SYSTem:LANGuage

Language Selection of Remote Command

Function

Switches language mode of remote control command.

Command

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

Query

```
:SYSTem:LANGuage?
```

Response

<mode>

Parameter

<mode>	Language mode
NATive	Native
SCPI	SCPI
Default	NATive

Example of Use

To switch the remote control command language mode to Native:

:SYST:LANG NAT

:SYST:LANG?

>NAT

Chapter 4 Native Command Reference

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

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 IEEE488.2 Common Device Messages

Table 4.1.1-1 IEEE488.2 common device messages

Function	Command	Query	Response
Operation Complete	*OPC	*OPC?	operation
Preset (All Applications)	*RST	---	---
Self Test	---	*TST?	result
Wait to Continue	*WAI	---	---
Clear Status	*CLS	---	---

Refer to Chapter 6 “Native Command Reference” in *the MU870000A TRX Test Module Operation Manual* for detailed specifications for each command.

4.1.2 SA Application Common Device Messages

Table 4.1.2-1 SA Application common device messages

Function	Command	Query	Response
Application Switch	SYS apl,window	SYS? apl	status,window
END Event Status Enable Register	ESE2 n	ESE2?	byte
END Event Status Register	---	ESR2?	byte

4.1.3 SA Common Command Settings

Table 4.1.3-1 Common command setting messages

Function		Command	Query	Response
Measure Status	Measure End	---	MSTAT?	0
	Level Over	---	MSTAT?	2
	Signal Abnormal	---	MSTAT?	4
	Not Measured	---	MSTAT?	9
	Measuring	---	MSTAT?	11
	Time out	---	MSTAT?	16
Single Measure	No Sync	SNGLS	---	---
		S2	---	---
	Sync	SWP	---	---
		TS	---	---
All Meas Items		ALLMEASITEMS s1,n1,s2,n2,s3,n3,s4,n4	ALLMEASITEMS?	s1,n1,s2,n2,s3,n3,s4,n4
All Meas	Reading all measurement results	---	ALLMEAS?	on_off1,res1_1,...res1_27,on_off2,res2_1,...res2_3,on_off3,res3_1,...res3_21,on_off4,res4_1,...res4_12,on_off1,res1_28,...res1_41
	Reading by specifying measurement target	---	ALLMEAS? meas	on_off,res1,res2,...resn
	Reading by specifiying measurement item	---	ALLMEAS? meas,item1,item2,...itemn	on_off,res1,res2,...resn

4.1.4 SA Common Parameter Settings

Table 4.1.4-1 SA Common parameter setting messages

Function		Command	Query	Response
Frequency		FREQ freq	FREQ?	freq
Trigger	Free Run	TRG FREE	TRG?	FREE
	External	TRG EXT	TRG?	EXT
Trigger Edge	Rise	TRGEDGE RISE	TRGEDGE?	RISE
	Fall	TRGEDGE FALL	TRGEDGE?	FALL
Trigger Delay		TRGDLY chip	TRGDLY?	chip
Input Level		INPUTLVL l	INPUTLVL?	l

4.1.5 SA Modulation Analysis Settings

Table 4.1.5-1 SA Modulation analysis setting messages

Function		Command	Query	Response
Measure Count		AVR_MOD count	AVR_MOD?	count
CH Detection	Auto	CHDET AUTO	CHDET?	AUTO
	Test Model1 16DPCH	CHDET T11		T11
	Test Model1 32DPCH	CHDET T12		T12
	Test Model1 64DPCH	CHDET T13		T13
	Test Model1 4DPCH	CHDET T14		T14
	Test Model1 8DPCH	CHDET T15		T15
	Test Model2	CHDET T21		T21
	Test Model3 16DPCH	CHDET T31		T31
	Test Model3 32DPCH	CHDET T32		T32
	Test Model3 4DPCH	CHDET T33		T33
	Test Model3 8DPCH	CHDET T34		T34
	Test Model4	CHDET T41		T41
	Test Model4 include CPICH	CHDET T42		T42
	Test Model5 6DPCH 2HS-PDSCH	CHDET T51		T51
	Test Model5 14DPCH 4HS-PDSCH	CHDET T52		T52
	Test Model5 30DPCH 8HS-PDSCH	CHDET T53		T53
	Test Model5 4DPCH 4HS-PDSCH	CHDET T54		T54
	Test Model6 30DPCH 8HS-PDSCH	CHDET T61		T61
	Test Model6 4DPCH 4HS-PDSCH	CHDET T62		T62

Table 4.1.5-1 SA Modulation analysis setting messages (Cont'd)

Function		Command	Query	Response
DTX setup	Off	DTXSETUP_MOD OFF	DTXSETUP_MOD?	OFF
	On	DTXSETUP_MOD ON	DTXSETUP_MOD?	ON
PICH Channelization Code		PICHNO_MOD n	PICHNO_MOD?	n
PICH Timing Offset		PICHTIMINGOFS_MOD n	PICHTIMINGOFS_MOD?	n
Scrambling Code Sync	AUTO	SCRSYNC AUTO	SCRSYNC?	AUTO
	User Define	SCRSYNC USER	SCRSYNC?	USER
Scrambling Code		SCRCODE n	SCRCODE?	n

Table 4.1.5-1 SA Modulation analysis setting messages (Cont'd)

Function			Command	Query	Response
Measure Result	Tx Power	AVG	---	AVG_TXPWR? DBM	l
		MAX	---	MAX_TXPWR? DBM	l
		MIN	---	MIN_TXPWR? DBM	l
	Carrier Frequency Error	AVG	---	AVG_CARRFERR?	f
			---	AVG_CARRFERR? HZ	f
			---	AVG_CARRFERR? PPM	r
		MAX	---	MAX_CARRFERR?	f
			---	MAX_CARRFERR? HZ	f
			---	MAX_CARRFERR? PPM	r
		MIN	---	MIN_CARRFERR?	f
			---	MIN_CARRFERR? HZ	f
			---	MIN_CARRFERR? PPM	r
	Carrier Frequency	AVG	---	AVG_CARRF?	f
		MAX	---	MAX_CARRF?	f
		MIN	---	MIN_CARRF?	f
	EVM	AVG	---	AVG_VECTERR?	r
		MAX	---	MAX_VECTERR?	r
		MIN	---	MIN_VECTERR?	r
	Peak Code Domain Error	AVG	---	AVG_PPCDPERR?	l
			---	AVG_PPCDPERR? ERR	l
		MAX	---	MAX_PPCDPERR?	l
			---	MAX_PPCDPERR? ERR	l
		MIN	---	MIN_PPCDPERR?	l
			---	MIN_PPCDPERR? ERR	l

Table 4.1.5-1 SA Modulation analysis setting messages (Cont'd)

Function			Command	Query	Response
Measure Result (Cont'd)	CPICH Power	AVG	---	AVG_CPICHPWR? REL	1
			---	AVG_CPICHPWR? ABS	1
		MAX	---	MAX_CPICHPWR? REL	1
			---	MAX_CPICHPWR? ABS	1
		MIN	---	MIN_CPICHPWR? REL	1
			---	MIN_CPICHPWR? ABS	1
	Relative Code Domain Error	AVG	---	AVG_RCDPERR? ERR	1
		MAX	---	MAX_RCDPERR? ERR	1
		MIN	---	MIN_RCDPERR? ERR	1
	Peak EVM	AVG	---	AVG_PKEVM?	1
		MAX	---	MAX_PKEVM?	1
		MIN	---	MIN_PKEVM?	1
	IQ Origin Offset	AVG	---	AVG_ORGOFS?	1
		MAX	---	MAX_ORGOFS?	1
		MIN	---	MIN_ORGOFS?	1
	Scrambling Code		---	RSCRCODE?	1
	Parameters of Peak Code Domain Error		---	PCDECODE?	ch,sf,slot
	Code Domain Power	PWR	---	CDANAL? PWR	sf1,code1,pwr_rel1,sf2,...
		ERR	---	CDANAL? ERR	sf1,code1,err1,sf2,...
		PWRABS	---	CDANAL? PWRABS	sf1,code1,pwr_abs1,sf2,...
		PWRCH	---	CDANAL? PWRCH,sf,code	pwr_rel,err,pwr_abs
		ALL	---	CDANAL? ALL	sf1,code1,pwr_abs1,err1,pwr_abs1,sf2,...
		ERRREL	---	CDANAL? ERRREL	sf1,code1,err_rel1,sf2,...
		EVM	---	SYMANAL? EVM	sf1,code1,evm1,sf2,...

4.1.6 SA Occupied Bandwidth Settings

Table 4.1.6-1 SA Occupied bandwidth setting messages

Function		Command	Query	Response
Measure Count		AVR_OBW count	AVR_OBW?	count
Measure Result	AVG	---	AVG_OBW?	freq
Wave Data		---	XME? na,nb	lc(1),lc(2),... lc(nb),

4.1.7 SA Spectrum Emission Mask Settings

Table 4.1.7-1 SA Spectrum emission mask setting messages

Function		Command	Query	Response
Measure Count		AVR_SMASK count	AVR_SMASK?	count
Template	Template Type Auto	TEMPMODE_SMASK AUTO	TEMPMODE_SMASK?	AUTO
	Template Type Auto(Additional)	TEMPMODE_SMASK AUTOADD	TEMPMODE_SMASK?	AUTOADD
	Template Type P<31 dBm	TEMPMODE_SMASK DNLNK	TEMPMODE_SMASK?	DNLNK
	Template Type P≥43 dBm	TEMPMODE_SMASK DNLNK1	TEMPMODE_SMASK?	DNLNK1
	Template Type 39 dBm≤P<43 dBm	TEMPMODE_SMASK DNLNK2	TEMPMODE_SMASK?	DNLNK2
	Template Type 31 dBm≤P<39 dBm	TEMPMODE_SMASK DNLNK3	TEMPMODE_SMASK?	DNLNK3
Measure Result	ALL	---	AVG_PEAK_SMASK? ALL,u	la(1),lb(1),ja(1),lb(2),...ja(10)
	PEAK	---	AVG_PEAK_SMASK? PEAK,u	la,lb,j
	Range E (– range)	---	AVG_PEAK_SMASK? L5,u	la,lb,j
	Range D (– range)	---	AVG_PEAK_SMASK? L4,u	la,lb,j
	Range C (– range)	---	AVG_PEAK_SMASK? L3,u	la,lb,j
	Range B (– range)	---	AVG_PEAK_SMASK? L2,u	la,lb,j
	Range A (– range)	---	AVG_PEAK_SMASK? L1,u	la,lb,j
	Range A (+ range)	---	AVG_PEAK_SMASK? U5,u	la,lb,j
	Range B (+ range)	---	AVG_PEAK_SMASK? U4,u	la,lb,j
	Range C (+ range)	---	AVG_PEAK_SMASK? U3,u	la,lb,j
	Range D (+ range)	---	AVG_PEAK_SMASK? U2,u	la,lb,j
	Range E (+ range)	---	AVG_PEAK_SMASK? U1,u	la,lb,j
Wave Data		---	XMFN? na,nb	lc(1),lc(2),... lc(nb),

4.1.8 SA Adjacent Channel Leakage Power Ratio Settings

Table 4.1.8-1 SA Adjacent channel leakage power ratio setting messages

Function			Command	Query	Response
Measure Count			AVR_ADJ count	AVR_ADJ?	count
Measure Result	AVG	–10 MHz	---	AVG_ACPRRC? LOW2,u	l
		–5 MHz	---	AVG_ACPRRC? LOW1,u	l
		5 MHz	---	AVG_ACPRRC? UP1,u	l
		10 MHz	---	AVG_ACPRRC? UP2,u	l
		All	---	AVG_ACPRRC? ALL,u	la,lb,lc,ld
	MIN	–10 MHz	---	MIN_ACPRRC? LOW2,u	l
		–5 MHz	---	MIN_ACPRRC? LOW1,u	l
		5 MHz	---	MIN_ACPRRC? UP1,u	l
		10 MHz	---	MIN_ACPRRC? UP2,u	l
		All	---	MIN_ACPRRC? ALL,u	la,lb,lc,ld
	MAX	–10 MHz	---	MAX_ACPRRC? LOW2,u	l
		–5 MHz	---	MAX_ACPRRC? LOW1,u	l
		5 MHz	---	MAX_ACPRRC? UP1,u	l
		10 MHz	---	MAX_ACPRRC? UP2,u	l
		All	---	MAX_ACPRRC? ALL,u	la,lb,lc,ld

4.1.9 SG Application Common Device Messages

Table 4.1.9-1 Application Common Device Messages

Function	Command	Query	Response
Application Switch	SYS apl,window	SYS? apl	status,window

4.1.10 Setting SG Frequency

Table 4.1.10-1 Setting SG Frequency

Function	Command	Query	Response
SG Frequency	FREQ freq	FREQ?	freq

4.1.11 Setting SG Level

Table 4.1.11-1 Setting SG Level

Function	Command	Query	Response
SG RF Output	LVL on_off	LVL?	on_off
SGOutput Level	OLVL level	OLVL? unit	level

4.1.12 Setting SG Modulation and AWGN

Table 4.1.12-1 Setting SG Modulation and AWGN

Function	Command	Query	Response
SG Modulation	MOD on_off	MOD?	on_off

4.1.13 Setting Parameters for MT8870

Table 4.1.13-1 Setting Parameters for MT8870

Function	Command	Query	Response
Application Select	SYSSEL app	SYSSEL?	app
Set Connect Port Direction	PORT input,output	PORT?	input,output
Language Selection of Remote Command	SYST:LANG mode	SYST:LANG?	mode
SG Select Waveform File	PAT file_name,group_number	PAT?	file_name,group_number
SG Select Waveform File	LOADEDFILESEL file_name,group_number	LOADEDFILESEL?	file_name,group_number

4.2 Details of Commands

Commands are detailed below in alphabetic 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
%	%	MHZ	MHz
DBM	dBm	MS	ms
GHZ	GHz	MZ	MHz
GZ	GHz	NS	ns
HZ	Hz	S	s
KHZ	kHz	US	µs
KZ	kHz		

ALLMEAS?

All Measure Results

Function

Queries the specified measurement result among all the measurement results.

Command

None

Query

Reading of all measurement results: `ALLMEAS?`

Reading by specifying measurement field: `ALLMEAS? meas`

Reading by specifying measurement item: `ALLMEAS? meas,item1,item2,...itemn`

Response

Reading of all measurement results:

```
on_off1,res1_1,res1_2,...res1_27,
on_off2,res2_1,...res2_3,
on_off3,res3_1,...res3_21,
on_off4,res4_1,...res4_12,
on_off1,res1_28,...res1_41
```

Reading by specifying measurement field:

```
on_off,res1,res2,...resn
```

Reading by specifying measurement field:

```
on_off,res1,res2,...resn
```

Parameter

on_off1	Whether to perform Modulation Analysis measurement
on_off2	Whether to perform Occupied Bandwidth measurement
on_off3	Whether to perform Spectrum Emission Mask measurement
on_off4	Whether to perform Adjacent Channel Power measurement
on_off	Whether to perform a measurement specified by meas of query.
ON	Performs a measurement
OFF	Does not perform a measurement
meas	
MODANA	Modulation Analysis
OBW	Occupied Bandwidth
SMASK	Spectrum Emission Mask
ACLR	Adjacent Channel Power
item	
1	ON
0	OFF
res	Measurement result of the corresponded measurement item. (When it is set to off, a value is not returned but omitted.)

The relationship between item and res are shown below.

Table 4.2-1 Relationship between item and res

Measurement item	All measurement items	Specifying measurement item	Response and measurement item	
MODANA	res1_1	item1	res1	TX Power (Ave) [dBm]
	res1_2	item2	res2	TX Power (Max) [dBm]
	res1_3	item3	res3	TX Power (Min) [dBm]
	res1_4	item4	res4	999999
	res1_5	item5	res5	999999
	res1_6	item6	res6	
	res1_7	item7	res7	Carrier Frequency (Ave) [Hz]
	res1_8	item8	res8	Carrier Frequency (Max) [Hz]
	res1_9	item9	res9	Carrier Frequency (Min) [Hz]
	res1_10	item10	res10	Carrier Frequency Error (Ave) [Hz]
	res1_11	item11	res11	Carrier Frequency Error (Max) [Hz]
	res1_12	item12	res12	Carrier Frequency Error (Min) [Hz]
	res1_13	item13	res13	Carrier Frequency Error (Ave) [ppm]
	res1_14	item14	res14	Carrier Frequency Error (Max) [ppm]
	res1_15	item15	res15	Carrier Frequency Error (Min) [ppm]
	res1_16	item16	res16	RMS EVM (Ave) [%]
	res1_17	item17	res17	RMS EVM (Max) [%]
	res1_18	item18	res18	RMS EVM (Min) [%]
	res1_19	item19	res19	Peak Code Domain Error (Ave) [dB]
	res1_20	item20	res20	Peak Code Domain Error (Max) [dB]
	res1_21	item21	res21	Peak Code Domain Error (Min) [dB]
	res1_22	item22	res22	CPICH Power (Ave) [dB]
	res1_23	item23	res23	CPICH Power (Max) [dB]
	res1_24	item24	res24	CPICH Power (Min) [dB]
	res1_25	item25	res25	CPICH Power (Ave) [dBm]
	res1_26	item26	res26	CPICH Power (Max) [dBm]
	res1_27	item27	res27	CPICH Power (Min) [dBm]
	res1_28	item28	res28	Peak EVM (Ave) [%]
	res1_29	item29	res29	Peak EVM (Max) [%]
	res1_30	item30	res30	Peak EVM (Min) [%]
	res1_31	item31	res31	IQ Origin (Ave) [dB]
	res1_32	item32	res32	IQ Origin (Max) [dB]

Table 4.2-1 Relationship between item and res (Cont'd)

Measurement item	All measurement items	Specifying measurement item	Response and measurement item	
MODANA (Cont')	res1_33	item33	res33	IQ Origin (Min) [dB]
	res1_34	item34	res34	Scrambling Code (Decimal)
	res1_35	item35	res35	PCDE CH
	res1_36	item36	res36	PCDE SF
	res1_37	item37	res37	PCDE Slot
	res1_38	item38	res38	Relative Code Domain Error(Ave)[dB]
	res1_39	item39	res39	Relative Code Domain Error(Max)[dB]
	res1_40	item40	res40	Relative Code Domain Error(Min)[dB]
	res1_41	item41	res41	TX Power (Unsync) (Current) [dBm]
OBW	res2_1	item1	res1	Occupied Bandwidth (Ave) [Hz]
	res2_2	item2	res2	99999999999
	res2_3	item3	res3	99999999999
SMASK	res3_1	item1	res1	RangeE (–Range) (Ave) [dBm]
	res3_2	item2	res2	RangeE (–Range) (Ave) [dB]
	res3_3	item3	res3	RangeD (–Range) (Ave) [dBm]
	res3_4	item4	res4	RangeD (–Range) (Ave) [dB]
	res3_5	item5	res5	RangeC (–Range) (Ave) [dBm]
	res3_6	item6	res6	RangeC (–Range) (Ave) [dB]
	res3_7	item7	res7	RangeB (–Range) (Ave) [dBm]
	res3_8	item8	res8	RangeB (–Range) (Ave) [dB]
	res3_9	item9	res9	RangeA (–Range) (Ave) [dBm]
	res3_10	item10	res10	RangeA (–Range) (Ave) [dB]
	res3_11	item11	res11	RangeA (+Range) (Ave) [dBm]
	res3_12	item12	res12	RangeA (+Range) (Ave) [dB]
	res3_13	item13	res13	RangeB (+Range) (Ave) [dBm]
	res3_14	item14	res14	RangeB (+Range) (Ave) [dB]
	res3_15	item15	res15	RangeC (+Range) (Ave) [dBm]
	res3_16	item16	res16	RangeC (+Range) (Ave) [dB]
	res3_17	item17	res17	RangeD (+Range) (Ave) [dBm]
	res3_18	item18	res18	RangeD (+Range) (Ave) [dB]
	res3_19	item19	res19	RangeE (+Range) (Ave) [dBm]
	res3_20	item20	res20	RangeE (+Range) (Ave) [dB]
	res3_21	Item21	res21	PASS/FAIL

Table 4.2-1 Relationship between item and res (Cont'd)

Measurement item	All measurement items	Specifying measurement item	Response and measurement item	
ACLR	res4_1	item1	res1	–10 MHz (Ave) [dB]
	res4_2	item2	res2	–10 MHz (Max) [dB]
	res4_3	item3	res3	–10 MHz (Min) [dB]
	res4_4	item4	res4	–5 MHz (Ave) [dB]
	res4_5	item5	res5	–5 MHz (Max) [dB]
	res4_6	item6	res6	–5 MHz (Min) [dB]
	res4_7	item7	res7	5 MHz (Ave) [dB]
	res4_8	item8	res8	5 MHz (Max) [dB]
	res4_9	item9	res9	5 MHz (Min) [dB]
	res4_10	item10	res10	10 MHz (Ave) [dB]
	res4_11	item11	res11	10 MHz (Max) [dB]
	res4_12	item12	res12	10 MHz (Min) [dB]

Details

Relative Code Domain Error is measured for the channels whose modulation is 64QAM when Channel Detection is Test Model6 30DPCH or Test Model6 4DPCH.
Relative Code Domain Error is 999.99 when Channel Detection is other than the above.

Example of Use

(1) To measure all the measurement items in order to query the measurement results.

```
ALLMEASITEMS ON,1,ON,1,ON,1,ON,1
SWP
ALLMEAS?
```

(2) To query all the measurement results of Occupied Bandwidth.

```
ALLMEASITEMS OFF,1,ON,1,OFF,1,OFF,1
SWP
ALLMEAS? OBW
> ON,4800000,4900000,4700000
```

(3) To query the average value of transmission power of Modulation Analysis in dBm unit.

```
ALLMEASITEMS ON,1,OFF,1,OFF,1,OFF,1
SWP
ALLMEAS?
MODANA,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
> ON,43.00
```

ALLMEASITEMS

Setup All Measure Items

Function

Sets all measurement items.

Command

```
ALLMEASITEMS s1,n1,s2,n2,s3,n3,s4,n4
```

Query

```
ALLMEASITEMS?
```

Response

```
s1,n1,s2,n2,s3,n3,s4,n4
```

Parameter

s1		Modulation analysis measurement ON/OFF
	ON	Executes measurement. (Default)
	OFF	Does not execute measurement.
n1		Modulation analysis measurement count
	Range	1 to 200
	Resolution	1
	Default	1
s2		Occupied bandwidth measurement ON/OFF
	ON	Executes measurement. (Default)
	OFF	Does not execute measurement.
n2		Occupied bandwidth measurement count
	Range	1 to 200
	Resolution	1
	Default	1
s3		Spectrum emission mask measurement ON/OFF
	ON	Executes measurement. (Default)
	OFF	Does not execute measurement.
n3		Spectrum emission mask measurement count
	Range	1 to 200
	Resolution	1
	Default	1
s4		Adjacent channel leakage power ratio measurement ON/OFF
	ON	Executes measurement. (Default)
	OFF	Does not execute measurement.
n4		Adjacent channel leakage power ratio measurement count
	Range	1 to 200
	Resolution	1

Default 1

Example of Use

To execute all measurement items 10 times:
ALLMEASITEMS ON,10,ON,10,ON,10,ON,10
ALLMEASITEMS?
>ON,10,ON,10,ON,10,ON,10

AVG_ACPRRC?

Adjacent Channel Leakage power Ratio with Root Raised Cosine Filtering – Average Value

Function

Queries the average value of adjacent channel leakage power ratio measurement results weighted by the RRC filter.

Query

`AVG_ACPRRC? a`	Queries the average value of measurement results at the specified frequency.
`AVG_ACPRRC? a,b`	Queries the average value of measurement results at the specified frequency in the specified output unit.
`AVG_ACPRRC? ALL`	Queries the average value of measurement results at all frequencies.
`AVG_ACPRRC? ALL,b`	Queries the average value of measurement results at all frequencies in the specified output unit.

Response

`c`	When the first parameter of query is a
`d,e,f,g`	When the first parameter of query is ALL

Parameter

a		Offset frequency
	LOW2	–10 MHz
	LOW1	–5 MHz
	UP1	5 MHz
	UP2	10 MHz
b		Output unit
	DB	dB
	When omitted	dB
c		Power at the frequency specified in a
	Resolution	0.01
	Unit	dB
d		Power at –10 MHz
	Resolution	0.01
	Unit	dB
e		Power at –5 MHz
	Resolution	0.01
	Unit	dB
f		Power at 10 MHz
	Resolution	0.01
	Unit	dB
g		Power at 5 MHz
	Resolution	0.01

Unit dB

Example of Use

To query the average power at each offset frequency:
AVG_ACPRRC? ALL,DB
>-50.00,-45.00,-50.00,-45.00

AVG_CARRF?

Carrier Frequency – Average Value

Function

Queries the average value of carrier frequency measurement results during modulation analysis measurement.

Query

```
AVG_CARRF?
```

Response

```
freq
```

Parameter

freq		Carrier frequency measurement result
	Resolution	0.1
	Unit	Hz

Example of Use

To query the average value of carrier frequency measurement results:
AVG_CARRF?
> 1922499857.2

AVG_CARRFERR?

Carrier Frequency Error – Average Value

Function

Queries the average value of carrier frequency error measurement results during modulation analysis measurement.

Query

```
AVG_CARRFERR? unit
```

Response

```
freq
```

Parameter

unit	Output unit
HZ	Hz
PPM	ppm
When omitted	Hz
freq	Carrier frequency error measurement result
Resolution	0.1 (unit = Hz)
	0.000001 (unit = ppm)

Example of Use

To query the average value of carrier frequency error measurement results in Hz units:
AVG_CARRFERR? Hz
> 17.2

AVG_CPICHPWR?

CPICH power – Average Value

Function

Queries the average value of CPICH code domain power measurement results during modulation analysis measurement.

Query

```
AVG_CPICHPWR? a
```

Response

pwr_rel	When the first parameter of query is REL
pwr_abs	When the first parameter of query is ABS

Parameter

a	Relative/Absolute
REL	Queries the average value of CPICH power relative values.
ABS	Queries the average value of CPICH power absolute values.
pwr_rel	CPICH power relative value
Resolution	0.01
Unit	dB
pwr_abs	CPICH power absolute value
Resolution	0.01
Unit	dBm

Example of Use

To query the average value of CPICH power absolute values:

AVG_CPICHPWR? ABS

> –30.00

AVG_OBW?

Occupied Bandwidth – Average Value

Function

Queries the average value of occupied bandwidth measurement results.

Query

```
AVG_OBW?
```

Response

```
freq
```

Parameter

freq		Average value of occupied bandwidth measurement results
	Resolution	1
	Unit	Hz

Example of Use

To query the average value of occupied bandwidth measurement results:

AVG_OBW?

> 4000000

AVG_ORGOFS?

IQ Origin Offset – Average Value

Function

Queries the average value of the IQ Origin Offset measurement results during Modulation Analysis measurement.

Query

```
AVG_ORGOFS?
```

Response

```
ofs
```

Parameter

ofs		IQ Origin Offset
	Resolution	0.01
	Units	dB

Example of Use

To query the average value of IQ Origin Offset.

AVG_ORGOFS?

> 1.61

AVG_PEAK_SMASK?

Spectrum Emission Mask – Average Value

Function

Queries the average value of peak values for the specified template and the pass/fail judgment result during spectrum emission mask measurement.

Query

```
AVG_PEAK_SMASK? a,b
```

Response

```
c,d,e
```

Parameter

a		Selection of data
	ALL	Queries the peak value at each frequency band.
	PEAK	Queries the peak value of all measurement values.
	L1,L2,L3,L4,L5,U1,U2,U3,U4,U5	Queries the peak value at the specified frequency band.
b		Unit of c
	DB	dB (Relative value to carrier transmitter power)
	DBM	dBm
c		Absolute peak value of measurement results, or relative peak value to carrier transmitter power
	Resolution	0.01
d		Relative peak value of measurement results to pass/fail judgment template
	Resolution	0.01
e		Pass/fail judgment template result
	PASS	Passed
	FAIL	Failed
	-	Not measured

Example of Use

To query the average peak value of all measurement values in dBm units:

AVG_PEAK_SMASK? PEAK,DBM

> -13.00,0.00,FAIL

AVG_PKEVM?

Peak EVM – Average Value

Function

For Modulation Analysis Measurement, this command returns the average measurement results of Peak EVM.

Query

```
AVG_PKEVM?
```

Response

```
evm
```

Parameter

evm	Peak EVM
Resolution	0.01
Units	%

Example of Use

To query the average value of Peak EVM.

AVG_PKEVM?

> 9.61

AVG_PPCDPERR?

Peak Code Domain Error – Average Value

Function

Queries the average value of Channelization Code Number, Spreading Factor and measurement result of Peak Code Domain Error during modulation analysis measurement.

Query

```
AVG_PPCDPERR? a
```

Response

`err`	When the first parameter of query is `ERR`

Parameter

a	Target
ERR	Queries the average Peak Code Domain Error value.
When omitted	Queries the average Peak Code Domain Error value.
err	Average Peak Code Domain Error value
Resolution	0.01
Unit	dB

Example of Use

To query the average Peak Code Domain Error value:

AVG_PPCDPERR?

> -56.78

AVG_RCDPERR?

Relative Code Domain Error – Average Value

Function

Queries the average Relative Code Domain Error value from the Modulation Analysis measurement results.

Query

```
AVG_RCDPERR? a
```

Response

err_rel	When the first parameter of query is ERR

Parameter

a	Target
ERR	Queries the average Relative Code Domain Error value
When omitted	Queries the average Relative Code Domain Error value
err_rel	Average Relative Code Domain Error value
Resolution	0.01
Unit	dB

Details

Relative Code Domain Error is measured for the channels whose modulation is 64QAM when Channel Detection is Test Model6 30DPCH or Test Model6 4DPCH.
Relative Code Domain Error is 999.99 when Channel Detection is other than the above.

Example of Use

To query the average Relative Code Domain Error.
AVG_RCDPERR?
> -56.78

AVG_TXPWR?

Transmitter Power – Average Value

Function

Queries the average carrier transmitter power (TX power) in 5-MHz frequency band during modulation analysis measurement.

Query

```
AVG_TXPWR? unit
```

Response

```
txpwr
```

Parameter

unit	Unit
DBM	dBm
txpwr	Average value of the carrier transmitter power
Resolution	0.01 (When unit is DBM)

Example of Use

To query the average TX power value in dBm units:

AVG_TXPWR? DBM

>30.00

AVG_VECTERR?

RMS EVM – Average Value

Function

Queries the average value of EVM's RMS measurement results during modulation analysis measurement.

Query

```
AVG_VECTERR?
```

Response

```
rms
```

Parameter

rms	RMS EVM
Resolution	0.01
Unit	%

Example of Use

To query the average value of RMS EVM:

AVG_VECTERR?

> 17.51

AVR_ADJ

Measure Count for Adjacent Channel Leakage power Ratio

Function

Sets the measurement count for adjacent channel leakage power ratio measurement.

Command

```
AVR_ADJ count
```

Query

```
AVR_ADJ?
```

Response

```
count
```

Parameter

count	Measurement count
Range	1 to 200
Resolution	1

Example of Use

To set the measurement count to 200:

AVR_ADJ 200

AVR_ADJ?

> 200

AVR_MOD

Measure Count for Modulation Analysis

Function

Sets the measurement count for modulation analysis measurement.

Command

```
AVR_MOD count
```

Query

```
AVR_MOD?
```

Response

```
count
```

Parameter

count	Measurement count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the measurement count to 200:
AVR_MOD 200
AVR_MOD?
> 200

AVR_OBW

Measure Count for Occupied Bandwidth

Function

Sets the measurement count for occupied bandwidth measurement.

Command

```
AVR_OBW count
```

Query

```
AVR_OBW?
```

Response

```
count
```

Parameter

count	Measurement count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the measurement count to 200:

AVR_OBW 200

AVR_OBW?

> 200

AVR_SMASK

Measure Count for Spectrum Emission Mask

Function

Sets the measurement count for spectrum emission mask measurement.

Command

```
AVR_SMASK count
```

Query

```
AVR_SMASK?
```

Response

```
count
```

Parameter

count	Measurement count
Range	1 to 200
Resolution	1
Default	1

Example of Use

To set the measurement count to 200:

AVR_SMASK 200

AVR_SMASK?

> 200

CDANAL?

All Code Domain Power and Error

Function

Queries the measurement results of Code Domain Power and Code Domain Error for Modulation Analysis measurement.

Query

```
CDANAL? a,sf,code
```

Response

`sf1,code1,pwr_rel1,sf2,...`	when `a` is `PWR`.
`sf1,code1,err1,sf2,...`	when `a` is `ERR`.
`sf1,code1,pwr_abs1,sf2,...`	when `a` is `PWRABS`.
`sf1,code1,err_rel1,sf2,...`	when `a` is `ERRREL`.
`pwr_rel1,err1,pwr_abs1,err_rel1,...`	when `a` is `PWRCH`.
`sf1,code1,pwr_rel1,err1,pwr_abs1,err_rel1,sf2...`	when `a` is `ALL`.

Parameter

a	Target
PWR	Queries Code Domain Power relative value
ERR	Queries Code Domain Error value
PWRABS	Queries Code Domain Power absolute value
ERRREL	Queries Code Domain Error relative value
PWRCH	Queries Code Domain Power of the specified Channelization Code Number
ALL	Queries all results
sf	Spreading Factor Specifies only when a is PWRCH
Range	4, 8, 16, 32, 64, 128, 256
code	Channelization Code Number Specifies only when a is PWRCH
Range	0 to (sf–1)
Resolution	1
pwr_rel	Code Domain Power relative value
Resolution	0.01
Unit	dB
err	Code Domain Error
Resolution	0.01
Unit	dB
pwr_abs	Code Domain Power absolute value
Resolution	0.01
Unit	dBm

err_rel	Relative Code Domain Error
Resolution	0.01
Unit	dB

Example of Use

To query Code Domain Error measurement result in each Spreading Factor and Channelization Code Number.

CDANAL? ERR

> 256,0,-42.45,256,1,-52.34,...

CHDET

Channel Detection for Modulation Analysis

Function

Sets the active channel detection method for modulation analysis measurement.

Command

```
CHDET a
```

Query

```
CHDET?
```

Response

```
a
```

Parameter

a		Active channel detection method
	AUTO	Detects active channels automatically. (Default)
	T11	Detects Test Model1 16DPCH as an active channel.
	T12	Detects Test Model1 32DPCH as an active channel.
	T13	Detects Test Model1 64DPCH as an active channel.
	T14	Detects Test Model1 4DPCH as an active channel.
	T15	Detects Test Model1 8DPCH as an active channel.
	T21	Detects Test Model2 as an active channel.
	T31	Detects Test Model3 16DPCH as an active channel.
	T32	Detects Test Model3 32DPCH as an active channel.
	T33	Detects Test Model3 4DPCH as an active channel.
	T34	Detects Test Model3 8DPCH as an active channel.
	T41	Detects Test Model4 as an active channel.
	T42	Detects Test Model4 include CPICH as an active channel.
	T51	Detects Test Model5 6DPCH as an active channel.
	T52	Detects Test Model5 14DPCH as an active channel.
	T53	Detects Test Model5 30DPCH as an active channel.
	T54	Detects Test Model5 4DPCH as an active channel.
	T61	Detects Test Model6 30DPCH as an active channel.
	T62	Detects Test Model6 4DPCH as an active channel.

Example of Use

To detect active channels automatically:

CHDET AUTO

CHDET?

> AUTO

DTXSETUP_MOD

DTX Setup

Function

Enables (On) or disables (Off) the PICH correction function for modulation analysis measurement.

Command

```
DTXSETUP_MOD on_off
```

Query

```
DTXSETUP_MOD?
```

Response

```
on_off
```

Parameter

on_off		PICH correction function
	ON	Enables the PICH correction function. (Default)
	OFF	Disables the PICH correction function.

Example of Use

To enable the PICH correction function:
DTXSETUP_MOD ON
DTXSETUP_MOD?
> ON

ESE2

End Event Status Enable Command/Query

Function

Sets the END event status enable register. The END event status enable register value is returned to a query.

Command

```
ESE2 n
```

Query

```
ESE2?
```

Response

```
n
```

Parameter

n		END event status enable register
Value		bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7
	bit0: $2^0 = 1$	(Not used)
	bit1: $2^1 = 2$	(Not used)
	bit2: $2^2 = 4$	(Not used)
	bit4: $2^4 = 16$	End of Average
	bit5: $2^5 = 32$	(Not used)
	bit6: $2^6 = 64$	End of Average
	bit7: $2^7 = 128$	(Not used)
Range		0 to 255
Default		0

Example of Use

To enable end of measurement:

ESE2 16

ESE2?

> 16

ESR2?

End Event Status Register Query

Function

Returns the END event status register value. Clears the END event status register after readout.

Query

```
ESR2?
```

Response

```
n
```

Parameter

n	END event status enable register	
Value	bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7	
	bit0: $2^0 = 1$	(Not used)
	bit1: $2^1 = 2$	(Not used)
	bit2: $2^2 = 4$	(Not used)
	bit4: $2^4 = 16$	End of Average
	bit5: $2^5 = 32$	(Not used)
	bit6: $2^6 = 64$	End of Average
	bit7: $2^7 = 128$	(Not used)
Range	0 to 255	
Default	0	

Example of Use

To query the END event status register value:

ESR2?

> 64

FREQ

Frequency

Function

Sets the carrier frequency of the measured signal.

Note:

A command with the same name is used to set the frequency transmitted from the SG.

This command is available in the status of “SYS WCDMA_BS,ACT”.

Command

```
FREQ freq
```

Query

```
FREQ?
```

Response

```
freq
```

Parameter

freq		Carrier frequency
	Range	400.000000 to 3800.000000 MHz
	Resolution	1
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.
	Default	2110000000

Example of Use

To set the carrier frequency to 1 GHz:

FREQ 1GHZ

FREQ?

> 1000000000

FREQ

SG Frequency

Function

Sets the SG frequency.

Note:

A command with the same name is used to set the carrier frequency for measuring the W-CDMA Downlink transmission.

This command is available in the status of "SYS SG,ACT".

Command

```
FREQ freq
```

Query

```
FREQ?
```

Response

```
freq
```

Parameter

freq		Frequency
	Range	400.000000 to 3800.000000 MHz
	Resolution	1 Hz
	Default	1 GHz
	Response unit	Hz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ

Example of Use

To set the SG frequency to 800 MHz:

FREQ 800MHZ

INPUTLVL

Input Level

Function

Sets the input level.

Command

```
INPUTLVL l
```

Query

```
INPUTLVL?
```

Response

```
l
```

Parameter

l		Input level
	Range	–65.0 to +35.0 dBm (Port 1/Port 2)
		–65.0 to +25.0 dBm (Port 3/Port 4)
	Resolution	0.01
	Unit	dBm
	Suffix code	DBM
		dBm is used even when omitted.
	Default	+35.0 dBm (Port 1/Port 2)
		+25.0 dBm (Port 3/Port 4)

Example of Use

To set the input level to 0 dBm:

INPUTLVL 0.0

INPUTLVL?

> 0.0

LOADEDFILESEL

SG Select Waveform File

Function

Selects a file to be played from the waveform pattern files loaded in the SG waveform memory.

Command

```
LOADEDFILESEL file_name,group_number
```

Query

```
LOADEDFILESEL?
```

Response

```
file_name,group_number
```

Parameter

file_name	Waveform file name
group_number	Group number

Example of Use

To set the waveform pattern of group number 1 in the SG waveform file "MV887021A_WCDMA_0001.xml" as a pattern to be played.

LOADEDFILESEL "MV887021A_WCDMA_0001",1

Related Commands

PAT	The same function as LOADEDFILESEL.

LVL

SG RF Output - On/Off

Function

Turns On/Off the SG RF output.

Command

```
LVL on_off
```

Query

```
LVL?
```

Response

```
on_off
```

Parameter

on_off	RF Output
ON	On
OFF	Off (Default)

Example of Use

To turn Off the SG RF signal output.

```
LVL OFF
```

MAX_ACPRRC?

Adjacent Channel Leakage power Ratio with Root Raised Cosine Filtering – Maximum Value

Function

Queries the maximum value of adjacent channel leakage power ratio measurement results weighted by the RRC filter.

Query

`MAX_ACPRRC? a`	Queries the maximum value of measurement results at the specified frequency.
`MAX_ACPRRC? a,b`	Queries the maximum value of measurement results at the specified frequency in the specified output unit.
`MAX_ACPRRC? ALL`	Queries the maximum value of measurement results at all frequencies.
`MAX_ACPRRC? ALL,b`	Queries the maximum value of measurement results at all frequencies in the specified output unit.

Response

`c`	When the first parameter of query is a
`d,e,f,g`	When the first parameter of query is ALL

Parameter

a		Offset frequency
	LOW2	–10 MHz
	LOW1	–5 MHz
	UP1	5 MHz
	UP2	10 MHz
b		Output unit
	DB	dB
	When omitted	dB
c		Power at the frequency specified in a
	Resolution	0.01
	Unit	dB
d		Power at –10 MHz
	Resolution	0.01
	Unit	dB
e		Power at –5 MHz
	Resolution	0.01
	Unit	dB
f		Power at 10 MHz
	Resolution	0.01
	Unit	dB
g		Power at 5 MHz

Resolution	0.01
Unit	dB

Example of Use

To query the maximum power at each offset frequency:

MAX_ACPRRC? ALL,DB

> -50.00,-45.00,-50.00,-45.00

MAX_CARRF?

Carrier Frequency – Maximum Value

Function

Queries the maximum value of carrier frequency measurement results during modulation analysis measurement.

Query

```
MAX_CARRF?
```

Response

```
freq
```

Parameter

freq	Carrier frequency measurement result
Resolution	0.1
Unit	Hz

Example of Use

To query the maximum value of carrier frequency measurement results:
MAX_CARRF?
> 1922499857.2

MAX_CARRFERR?

Carrier Frequency Error – Maximum Value

Function

Queries the maximum value of carrier frequency error measurement results during modulation analysis measurement.

Query

```
MAX_CARRFERR? unit
```

Response

```
freq
```

Parameter

unit	Output unit	
HZ	Hz	
PPM	ppm	
When omitted	Hz	
freq	Carrier frequency error measurement result	
Resolution	0.1	(unit = Hz)
	0.000001	(unit = ppm)

Example of Use

To query the maximum value of carrier frequency error measurement results in Hz units:
MAX_CARRFERR? Hz
> 17.2

MAX_CPICHPWR?

CPICH power – Maximum Value

Function

Queries the maximum value of CPICH code domain power measurement results during modulation analysis measurement.

Query

```
MAX_CPICHPWR? a
```

Response

pwr_rel	When the first parameter of query is REL
pwr_abs	When the first parameter of query is ABS

Parameter

a	Relative/Absolute
REL	Queries the maximum value of CPICH power relative values.
ABS	Queries the maximum value of CPICH power absolute values.
pwr_rel	
Resolution	0.01
Unit	dB
pwr_abs	
Resolution	0.01
Unit	dBm

Example of Use

To query the maximum value of CPICH power absolute values:

MAX_CPICHPWR? ABS

> -30.00

MAX_ORGOFS?

IQ Origin Offset – Maximum Value

Function

For Modulation Analysis Measurement, this command returns the maximum measurement result of IQ Origin Offset.

Query

```
MAX_ORGOFS?
```

Response

```
ofs
```

Parameter

ofs	IQ Origin Offset
Resolution	0.01
Units	dB

Example of Use

To query the maximum value of IQ Origin Offset.

MAX_ORGOFS?

> 2.92

MAX_PKEVM?

Peak EVM – Maximum Value

Function

For Modulation Analysis Measurement, this command returns the maximum measurement result of Peak EVM.

Query

```
MAX_PKEVM?
```

Response

```
evm
```

Parameter

evm	Peak EVM
Resolution	0.01
Units	%

Example of Use

To query the maximum value of Peak EVM.

MAX_PKEVM?

> 14.86

MAX_PPCDPERR?

Peak Code Domain Error – Maximum Value

Function

Queries the maximum value of Channelization Code Number, Spreading Factor and measurement result of Peak Code Domain Error during modulation analysis measurement.

Query

```
MAX_PPCDPERR? a
```

Response

`err`	When the first parameter of query is ERR

Parameter

a	Target
ERR	Queries the maximum Peak Code Domain Error value.
When omitted	Queries the maximum Peak Code Domain Error value.
err	Maximum Peak Code Domain Error value
Resolution	0.01
Unit	dB

Example of Use

To query the maximum Peak Code Domain Error value:

MAX_PPCDPERR?

> -56.78

MAX_RCDPERR?

Relative Code Domain Error – Maximum Value

Function

Queries the maximum Relative Code Domain Error value from the Modulation Analysis measurement results.

Query

```
MAX_RCDPERR? a
```

Response

`err`	When the first parameter of query is ERR

Parameter

a	Target
ERR	Queries the maximum Relative Code Domain Error value.
When omitted	Queries the maximum Relative Code Domain Error value.
err	Maximum Relative Code Domain Error value
Resolution	0.01
Unit	dB

Details

Relative Code Domain Error is measured for the channels whose modulation is 64QAM when Channel Detection is Test Model6 30DPCH or Test Model6 4DPCH.
Relative Code Domain Error is 999.99 when Channel Detection is other than the above.

Example of Use

To query the maximum Relative Code Domain Error value:
MAX_RCDPERR?
> -56.78

MAX_TXPWR?

Transmitter Power – Maximum Value

Function

Queries the maximum carrier transmitter power (TX power) in 5-MHz frequency band during modulation analysis measurement.

Query

```
MAX_TXPWR? unit
```

Response

```
txpwr
```

Parameter

unit	Unit
DBM	dBm
txpwr	Maximum value of the carrier transmitter power
Resolution	0.01 (When unit is DBM)

Example of Use

To query the maximum TX power value in dBm units:

MAX_TXPWR? DBM

> 30.00

MAX_VECTERR?

RMS EVM – Maximum Value

Function

Queries the maximum value of EVM's RMS measurement results during modulation analysis measurement.

Query

```
MAX_VECTERR?
```

Response

```
rms
```

Parameter

rms	RMS EVM
Resolution	0.01
Unit	%

Example of Use

To query the maximum value of RMS EVM:

MAX_VECTERR?

> 17.51

MIN_ACPRRC?

Adjacent Channel Leakage power Ratio with Root Raised Cosine Filtering – Minimum Value

Function

Queries the minimum value of adjacent channel leakage power ratio measurement results weighted by the RRC filter.

Query

`MIN_ACPRRC? a`	Queries the minimum value of measurement results at the specified frequency.
`MIN_ACPRRC? a,b`	Queries the minimum value of measurement results at the specified frequency in the specified output unit.
`MIN_ACPRRC? ALL`	Queries the minimum value of measurement results at all frequencies.
`MIN_ACPRRC? ALL,b`	Queries the minimum value of measurement results at all frequencies in the specified output unit.

Response

`c`	When the first parameter of query is a
`d,e,f,g`	When the first parameter of query is ALL

Parameter

a		Offset frequency
	LOW2	–10 MHz
	LOW1	–5 MHz
	UP1	5 MHz
	UP2	10 MHz
b		Output unit
	DB	dB
	When omitted	dB
c		Power at the frequency specified in a
	Resolution	0.01
	Unit	dB
d		Power at –10 MHz
	Resolution	0.01
	Unit	dB
e		Power at –5 MHz
	Resolution	0.01
	Unit	dB
f		Power at 10 MHz
	Resolution	0.01
	Unit	dB
g		Power at 5 MHz

Resolution	0.01
Unit	dB

Example of Use

To query the minimum power at each offset frequency:

MIN_ACPRRC? ALL,DB

> -50.00,-45.00,-50.00,-45.00

MIN_CARRF?

Carrier Frequency – Minimum Value

Function

Queries the minimum value of carrier frequency measurement results during modulation analysis measurement.

Query

```
MIN_CARRF?
```

Response

```
freq
```

Parameter

freq	Carrier frequency measurement result
Resolution	0.1
Unit	Hz

Example of Use

To query the minimum value of carrier frequency measurement results:
MIN_CARRF?
> 1922499857.2

MIN_CARRFERR?

Carrier Frequency Error – Minimum Value

Function

Queries the minimum value of carrier frequency error measurement results during modulation analysis measurement.

Query

```
MIN_CARRFERR? unit
```

Response

```
freq
```

Parameter

unit	Output unit
HZ	Hz
PPM	ppm
When omitted	Hz
freq	Carrier frequency error measurement result
Resolution	0.1 (unit = Hz) 0.000001 (unit = ppm)

Example of Use

To query the minimum value of carrier frequency error measurement results in Hz units:
MIN_CARRFERR? Hz
> 17.2

MIN_CPICHPWR?

CPICH power – Minimum Value

Function

Queries the minimum value of CPICH code domain power measurement results during modulation analysis measurement.

Query

```
MIN_CPICHPWR? a
```

Response

`pwr_rel`	When the first parameter of query is REL
`pwr_abs`	When the first parameter of query is ABS

Parameter

a

REL	Queries the minimum value of CPICH power relative values.
ABS	Queries the minimum value of CPICH power absolute values.

pwr_rel

Resolution	0.01
Unit	dB

pwr_abs

Resolution	0.01
Unit	dBm

Example of Use

To query the minimum value of CPICH power absolute values:

MIN_CPICHPWR? ABS

> -30.00

MIN_ORGOFS?

IQ Origin Offset – Minimum Value

Function

For Modulation Analysis measurement, this command returns the minimum measurement result of IQ Origin Offset.

Query

```
MIN_ORGOFS?
```

Response

```
ofs
```

Parameter

ofs	IQ Origin Offset
Resolution	0.01
Units	dB

Example of Use

To query the minimum value of IQ Origin Offset.

MIN_ORGOFS?

> 0.43

MIN_PKEVM?

Peak EVM –Minimum Value

Function

For Modulation Analysis measurement, this command returns the minimum measurement result of Peak EVM.

Query

```
MIN_PKEVM?
```

Response

```
evm
```

Parameter

evm	Peak EVM
Resolution	0.01
Units	%

Example of Use

To query the minimum value of Peak EVM.

MIN_PKEVM?

> 6.29

MIN_PPCDPERR?

Peak Code Domain Error – Minimum Value

Function

Queries the minimum value of Channelization Code Number, Spreading Factor and measurement result of Peak Code Domain Error during modulation analysis measurement.

Query

```
MIN_PPCDPERR? a
```

Response

err	When the first parameter of query is ERR

Parameter

a	Target
ERR	Queries the minimum Peak Code Domain Error value.
When omitted	Queries the minimum Peak Code Domain Error value.
err	Minimum Peak Code Domain Error value
Resolution	0.01
Unit	dB

Example of Use

To query the minimum Peak Code Domain Error value:

MIN_PPCDPERR?

> -56.78

MIN_RCDPERR?

Relative Code Domain Error – Minimum Value

Function

Queries the minimum Relative Code Domain Error value from the Modulation Analysis measurement results.

Query

```
MIN_RCDPERR? a
```

Response

`err`	When the first parameter of query is ERR

Parameter

a	Target
ERR	Queries the minimum Relative Code Domain Error value.
When omitted	Queries the minimum Relative Code Domain Error value.
err	Minimum Relative Code Domain Error value
Resolution	0.01
Unit	dB

Details

Relative Code Domain Error is measured for the channels whose modulation is 64QAM when Channel Detection is Test Model6 30DPCH or Test Model6 4DPCH.
Relative Code Domain Error is 999.99 when Channel Detection is other than the above.

Example of Use

To query the minimum Relative Code Domain Error value:
MIN_RCDPERR?
> -56.78

MIN_TXPWR?

Transmitter Power – Minimum Value

Function

Queries the minimum carrier transmitter power (TX power) in 5-MHz frequency band during modulation analysis measurement.

Query

```
MIN_TXPWR? unit
```

Response

```
txpwr
```

Parameter

unit	Unit
DBM	dBm
txpwr	Minimum value of the carrier transmitter power
Resolution	0.01 (When unit is DBM)

Example of Use

To query the minimum TX power value in dBm units:
MIN_TXPWR? DBM
> 30.00

MIN_VECTERR?

RMS EVM – Minimum Value

Function

Queries the minimum value of EVM's RMS measurement results during modulation analysis measurement.

Query

```
MIN_VECTERR?
```

Response

```
rms
```

Parameter

rms		RMS EVM
	Resolution	0.01
	Unit	%

Example of Use

To query the minimum value of RMS EVM:

MIN_VECTERR?

> 17.51

MOD

SG Modulation - On/Off

Function

Turns On/Off the SG modulation function.

Command

```
MOD on_off
```

Query

```
MOD?
```

Response

```
on_off
```

Parameter

on_off	Modulation On/Off
ON	On
OFF	Off (Default)

Details

Fixed to Off when no waveform pattern file is selected.

Example of Use

To set the SG modulation function to On.

MOD ON

MSTAT?

Measure Status

Function

Queries the current measurement status.

Query

```
MSTAT?
```

Response

```
status
```

Parameter

status	Measurement status
0	Normal end
2	Level over
4	Signal abnormal
9	Not measured (Default)
11	Measurement in progress
16	Tx Measurement Time out

Signal abnormal occurs in the situation where the measurement results show that the active channel number is 0 owing to the failure of signal synchronization when CH Detection is set to Auto.

Example of Use

To query the current measurement status.

MSTAT?

> 0

OLVL

SG Output Level

Function

Sets the SG output level.

Command

```
OLVL level
```

Query

```
OLVL?
```

Response

```
level
```

Parameter

level		Output Level
	Range	–130.0 to –10.0 dBm (Port1/Port2)
		–120.0 to 0.0 dBm (Port3/Port4)
	Resolution	0.1 dBm
	Default	–130.0 dBm (Port1/Port2)
		–120.0 dBm (Port3/Port4)
	Response unit	dBm or dBμV (depends on set value)
	Suffix code	DBM

Example of Use

To set the SG output level to –30.0 dBm.

OLVL -30.0DBM

PAT

SG Select Waveform File

Function

Selects a file to be played from the waveform pattern files loaded in the SG waveform memory. It has the same function as LOADEDFILESEL. Refer to the description of LOADEDFILESEL.

PCDECODE?

Parameters of Peak Code Domain Error

Function

For Modulation Analysis measurement, this command returns the Channelization Code, Spreading Factor, and slot number of the Peak Code Domain Error.

Query

```
PCDECODE?
```

Response

```
code,sf,slot
```

Parameter

code		Channelization Code of Peak Code Domain Error
	Resolution	1
	Units	None
sf		Spreading Factor of Peak Code Domain Error
	Resolution	1
	Units	None
slot		Slot number of Peak Code Domain Error
	Resolution	1
	Units	None

Example of Use

To query the Channelization Code, Spreading Factor, and slot number of the Peak Code Domain Error.

PCDECODE?

> 254,256,14

PICHNO_MOD

PICH Channelization Code Number for Modulation Analysis

Function

Sets the PICH Channelization Code Number for modulation analysis measurement.

Command

```
PICHNO_MOD n
```

Query

```
PICHNO_MOD?
```

Response

```
n
```

Parameter

n		PICH Channelization Code Number
	Range	0 to 255
	Resolution	1
	Default	16

Example of Use

To set the PICH Channelization Code Number to 10:

PICHNO_MOD 10

PICHNO_MOD?

> 10

PICHTIMINGOFS_MOD

PICH Timing Offset for Modulation Analysis

Function

Sets the PICH Timing Offset for modulation analysis measurement.

Command

```
PICHTIMINGOFS_MOD n
```

Query

```
PICHTIMINGOFS_MOD?
```

Response

```
n
```

Parameter

n		PICH Timing Offset
	Range	0 to 149
	Resolution	1
	Default	120

Example of Use

To set the PICH Timing Offset to 10:
PICHTIMINGOFS_MOD 10
PICHTIMINGOFS_MOD?
> 10

PORT

Set Connect Port Direction

Function

Sets or queries connector settings for inputting and outputting RF signals.

Command

```
PORT input,output
```

Query

```
PORT?
```

Response

```
input,output
```

Parameter

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.

Example of Use

To set Test Port1 as RF signal input connector and Test Port2 as RF signal output connector:
PORT PORT1,PORT2
PORT?
> PORT1,PORT2

RSCRCODE?

Scrambling Code Number for Modulation Analysis

Function

Queries the Scrambling Code used in analysis during Modulation Analysis measurement.

Query

```
RSCRCODE?
```

Response

code	Decimal

Parameter

code	Scrambling Code
Resolution	1
Units	None

Example of Use

Queries the Scrambling Code used in analysis.

RSCRCODE?

> 8191

S2

Single Measure/Sweep

Function

Performs measurement and sweep once (single measurement/sweep). Other commands can be received even during measurement. This command functions the same as the SNGLS command.
When a measurement execution command, such as this command, is received during measurement started by this command, the current measurement is stopped temporarily and a new measurement is started.
When a command not related to measurement, such as a query message, is received during measurement started by this command, the received command is executed while the current measurement continues.

Command

S2

Example of Use

To perform single measurement/sweep:
S2

SCRCODE

Scrambling Code for Modulation Analysis

Function

For Modulation Analysis measurement, this command sets the Scrambling Code when Scrambling Code Sync is USER.

Command

```
SCRCODE n
```

Query

```
SCRCODE?
```

Response

n	Decimal

Parameter

n	Scrambling Code
Range	0 to 8191 (0x0 to 0x1FFF)
Resolution	1
Default	0

Details

Scrambling Code consists of Primary Scrambling Code (PSC: 0 to 511) and Secondary Scrambling Code (SSC: 0 to 15). Use the following expression to set the Scrambling Code.

Scrambling Code = PSC × 16 + SSC

When specifying the Scrambling Code in hexadecimal format, prefix "#H" to the setting value.

Example of Use

To set the Scrambling Code to 8191 (0x1FFF).

```
SCRCODE #H1FFF
SCRCODE?
> 8191
```

SCRSYNC

Scrambling Code Sync for Modulation Analysis

Function

Sets the scrambling code synchronization method for the Modulation Analysis measurement.

Command

```
SCRSYNC a
```

Query

```
SCRSYNC?
```

Response

```
a
```

Parameter

a		Scrambling code synchronization method
	AUTO	Automatically detects the scrambling code. (Default)
	USER	Uses the user-specific scrambling code.

Details

To automatically detect the scrambling code.
SCRSYNC AUTO
SCRSYNC?
> AUTO

SNGLS

Single Measure/Sweep

Function

Performs measurement and sweep once (single measurement/sweep). Other commands can be received even during measurement. This command functions the same as the S2 command.
When a measurement execution command, such as this command, is received during measurement started by this command, the current measurement is stopped temporarily and a new measurement is started.
When a command not related to measurement, such as a query message, is received during measurement started by this command, the received command is executed while the current measurement continues.

Command

SNGLS

Example of Use

To perform single measurement/sweep:
SNGLS

SWP

Single Measure/Sweep

Function

Performs measurement and sweep once (single measurement/sweep). This command functions the same as the TS command.
Unlike the SNGLS command, when another command is received during measurement started by this command, the received command is not executed until the current measurement completes. In other words, commands following the SWP command are processed after the measurement completes, and the measuring instrument operation and the program that transmits the command are thus synchronized.

Command

SWP

Example of Use

To perform single measurement/sweep:
SWP

SYMANAL?

Symbol EVM

Function

For Modulation Analysis, this command returns the measurement result for Symbol EVM.

Query

```
SYMANAL? a
```

Response

```
sf1,code1,evm1,sf2, ...
```

When a is EVM.

Parameter

a	Target
EVM	Returns the Symbol EVM value.
sf	Spreading Factor
Range	4, 8, 16, 32, 64, 128, 256
code	Channelization Code Number
Range	0 to (sf–1)
Resolution	1
evm	Symbol EVM
Resolution	0.01
Units	%

Details

The Symbol EVM value of Inactive channel is 999.99.

Example of Use

To query the Symbol EVM measurement result.

SYMANAL? EVM

> 256,0,0.35,256,1,9.02,256,2,-999.0,...

SYS

Application Switch/Status

Function

Switches the target application for operation/control. Also queries the status of the specified application.

Command

```
SYS apl,window
```

Query

```
SYS? apl
```

Response

```
status,window
```

Parameter

apl	Target application name
WCDMA_BS	W-CDMA BS Measurement Software
SG	SG

Any optional installed software other than those above can be specified. Refer to the operation manual (remote control) for each application for details.

window	Application status
ACT	Operation enabled
When omitted	Same as ACT

status	Application status
CURRENT	Executed and targeted for operation
IDLE	Loaded but not executed

Details

This function is used to switch the operation/control target application.

Example of Use

To switch the operation target application to the W-CDMA BS Measurement Software:
SYS WCDMA_BS,ACT
SYS? WCDMA_BS
> CURRENT,ACT

SYSSEL

Application Select

Function

Sets or queries type of application software executing on MU887000A

Command

```
SYSSEL app
```

Query

```
SYSSEL?
```

Response

```
app
```

Parameter

app		Application software
	SMALLCELL	Small Cell Application MX887021A, MX887023A
	CELLULAR	Cellular Application MX887010A, MX887011A, MX887012A, MX887013A, MX887014A, MX887015A, MX887016A, or MX887017A
	SRW	SRW Application MX887030A, MX887031A, MX887040A, or MX887050A

Details

Set the parameter to SMALLCELL and send the command before using the MX887021A.
When using the MX887021A, set the application to SMALLCELL using the SYSSEL command, and then set the target application to WCDMA_BS or SG using the SYS command.

Example of Use

To set the application software to Small Cell Application:
SYSSEL SMALLCELL
SYSSEL?
> SMALLCELL

SYST:LANG

Language Selection of Remote Command

Function

Switches language mode of remote control command.

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 remote control command language mode to Native：

SYST:LANG NAT

SYST:LANG?

>NAT

TEMPMODE_SMASK

Select Template Mode for Spectrum Emission Mask

Function

Sets the template judgment mode of Spectrum Emission Mask measurement.

Command

```
TEMPMODE_SMASK a
```

Query

```
TEMPMODE_SMASK?
```

Response

```
a
```

Parameter

a		Template judgment mode
	AUTO	Automatically sets the template of the specified value to judge. (Default)
	AUTOADD	Automatically sets the template of the specified value whose Additional is valid to judge.
	DNLNK	Sets the template of P < 31 dBm to judge.
	DNLNK1	Sets the template of P ≥ 43 dBm to judge
	DNLNK2	Sets the template of 39 dBm ≤ P < 43 dBm to judge.
	DNLNK3	Sets the template of 31 dBm ≤ P < 39 dBm to judge.

Example of Use

To set the template of P < 31 dBm manually.

TEMPMODE_SMASK DNLNK

TEMPMODE_SMASK?

> DNLNK

TRG

Trigger

Function

Sets the measurement start trigger type.

Command

```
TRG trg
```

Query

```
TRG?
```

Response

```
trg
```

Parameter

trg	Trigger type	
FREE	Free Run:	Does not use a trigger. (Default)
EXT	External:	Uses an external trigger.

Example of Use

To use an external trigger:

TRG EXT

TRG?

> EXT

TRGDLY

Trigger Delay

Function

Sets the trigger delay (time difference from the trigger occurrence to start of measurement).

Command

```
TRGDLY chip
```

Query

```
TRGDLY?
```

Response

```
chip
```

Parameter

chip	Trigger delay
Range	–3840000 to 3840000
Resolution	4
Unit	chip
Default	0

Details

When a parameter value cannot be divided evenly by 4, a plus value is rounded up and a minus value is rounded down.

Example of Use

To set the trigger delay to 50 chips:

TRGDLY 50

TRGDLY?

> 52

TRGEDGE

Trigger Edge

Function

Sets the trigger edge.

Command

```
TRGEDGE edge
```

Query

```
TRGEDGE?
```

Response

```
edge
```

Parameter

edge	Trigger edge
RISE	Sets the rising edge as a trigger. (Default)
FALL	Sets the falling edge as a trigger.

Example of Use

To set the trigger edge to RISE:

TRGEDGE RISE

TRGEDGE?

> RISE

TS

Single Measure/Sweep

Function

Performs measurement and sweep once (single measurement/sweep). This command functions the same as the SWP command.
Unlike the SNGLS command, when another command is received during measurement started by this command, the received command is not executed until the current measurement completes. In other words, commands following the TS command are processed after the measurement completes, and the measuring instrument operation and the program that transmits the command are thus synchronized.

Command

TS

Example of Use

To perform single measurement/sweep:
TS

XME?

Occupied Bandwidth Waveform

Function

Queries a spectrum waveform during occupied bandwidth measurement.

Query

```
XME? addr,n
```

Response

```
data(addr),data(addr+1),...data(addr+n-1)
```

Parameter

addr	Waveform data read start address
Range	0 to 1290
Resolution	1
n	Number of waveform data to be read
Range	1 to (1291 – addr)
Resolution	1
data(addr)	Waveform data saved in addr
Resolution	0.01
Unit	dBm

Example of Use

To query a spectrum waveform of occupied bandwidth:

XME? 0,1291

> -7.00,-7.01 ...

XMFN?

Spectrum Emission Mask Waveform

Function

Queries a spectrum waveform during spectrum emission mask measurement.

Query

```
XMFN? addr,n
```

Response

```
data(addr),data(addr+1),...data(addr+n-1)
```

Parameter

addr	Waveform data read start address
Range	0 to 2560
Resolution	1
n	Number of waveform data to be read
Range	1 to (2561 – addr)
Resolution	1
data(addr)	Waveform data saved in addr
Resolution	0.01
Unit	dBm

Example of Use

To query a spectrum waveform of spectrum emission mask:

XMFN? 0,2561

> 7.30,7.31 ...

Chapter 5 Performance Test

This chapter explains how to setup the measuring instruments required for the MX887021A performance tests as well as the test procedures.

5.1 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 (MOD)
- Frequency/Modulation measurement Carrier frequency accuracy
  Residual EVM
- Adjacent Channel Leakage Power Ratio measurement

We recommend testing the performance periodically once or twice a year. If the test results do not meet the specifications, contact the Anritsu Customer Service Center at the address listed in the back of this manual or in the separate file on the accessory DVD.

⚠ 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.

5.2 Instruments for Testing Performance

The following table lists the measuring instruments required for testing the MU887000A performance and the specifications for each instrument.

Table 5.2-1 Measuring Instruments for Performance Test

Performance Test Item	Instrument Required Specifications*1	Recommended Instrument (Anritsu Model)
Tx Power Measurements ● Measurement Accuracy	Signal Generator ● Frequency Range: 600 to 2700 MHz ● 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)
	Power Meter ● Main Frame Accuracy: ±0.02 dB ● Frequency Range: 600 to 2700 MHz ● Resolution: 0.01 dB	Power Meter (ML2437A)
	Power sensor ● Frequency Range: 600 to 2700 MHz ● Measured Power Range: –40 to +20 dBm ● Input Connector: N type	Power Sensor (MA2442D)
Frequency/Modulation Measurements ● Carrier Frequency Accuracy ● Residual EVM ● Adjacent Channel Leakage Power Ratio	Signal generator supporting output of 3GPP W-CDMA modulation signals Same as above	Same as above
	Power Meter Same as above	Same as above
	Power sensor ● Frequency Range: 600 to 2700 MHz ● Measured Power Range: –30 to +20 dBm ● Input Connector: N type	Power Sensor (MA24002A)
Common	3-dB Attenuator	3-dB Attenuator (AT-103)

*1: The performance covers the test item measurement range.

5.3 Performance Test for Each Measurement

Common test items

The following list shows the common settings for each measurement at the MU8870000A.

Application Select : Small Cell
Standard Select : W-CDMA BS

5.3.1 Calibrating signal generator (MOD)

This procedure captures the calibration value for measurement using a modulated waveform.

(1) Measuring instruments

- Vector signal generator: MG3700A
- Power meter: ML2437A
- Power sensor: MA24002A
- 3-dB Attenuator: AT-103 (2 sets)

(2) Setup

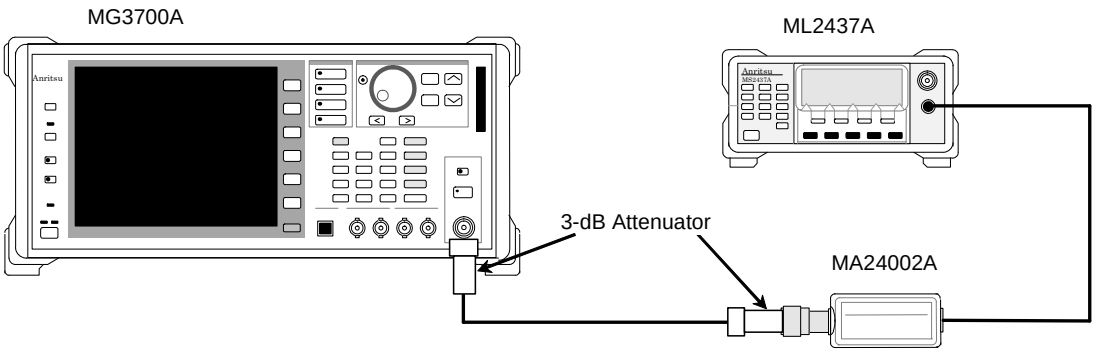

Figure 5.3.1-1 Signal Generator Calibration Setup (MOD)

(3) Procedure

1. Setup the instruments as shown in Figure 5.3.1-1.
2. Output the modulation signal of 600 MHz,–4 dBm from the Vector Signal Generator (hereafter SG).

   Waveform pattern TEST_MODEL_4
   (for Frequency error, EVM measurement)
   TEST_MODEL_1_64DPCH
   (for Tx power measurement, ACLR measurement)
3. Measure the level with the ML2437A Power Meter and adjust the SG so that the output level is –10 dBm.

4. Change the frequency as shown in Table 5.3.1-1 “Measurement Point and Frequency” and perform the same measurements to obtain the calibration value.

Table 5.3.1-1 Measurement Point and Frequency

Meas. Point	Frequency (MHz)	Meas. Point	Frequency (MHz)
1	600	7	2200
2	880	8	2700
3	940		
4	1000		
5	1800		
6	2000		

5.3.2 Tx power measurement accuracy (MOD)

This test is related to the accuracy of Tx power measurements.

(1) Test specifications

Test Port1/2

Measurement Accuracy	Input Level	Temperature
±0.5 dB	–15 dBm ≤, ≤ +35 dBm	10 to 40℃

Test Port3/4

Measurement Accuracy	**Input Level**	**Temperature**
±0.7 dB	–15 dBm ≤, ≤ +25 dBm	0 to 40℃

(2) Measuring instruments

- Vector signal generator: MG3700A
- 3-dB Attenuator: AT-103 (2 sets)

(3) Setup

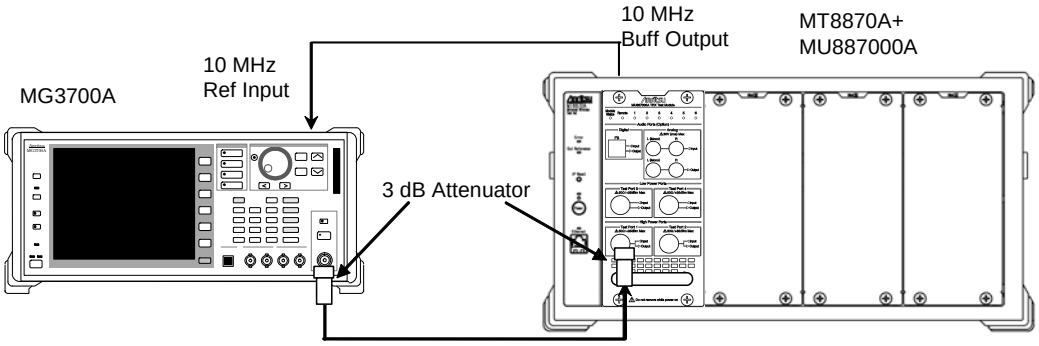

Figure 5.3.2-1 Setup for Measuring Amplitude Measurement Accuracy

(4) Test procedure

1. Setup the instruments as shown in Figure 5.3.2-1.
2. Set the MU887000A as follows:

   Connect port: Test Port1
   Output level ON/OFF: OFF
   (After setting the system to SG)
   Input level: –10 dBm
   Downlink frequency: 600 MHz
   Channel Detection : Test Model1 64DPCH
   Modulation Analysis Measurement : ON, 10 times

3. Set the Vector signal generator (SG) as follows:

   Output: ON
   Modulation: ON
   Waveform pattern: TEST_MODEL_1_64DPCH
   Output frequency: 600 MHz
   Output level: –10 dBm (This output level reflects the calibration value for item 5.3.1.)

4. Change the frequency of the MU887000A and SG according to Table 5.3.1-1 “Measurement Point and Frequency” and measure the Tx power.

   Result of Tx Power Measurement : Average value

5. Change the Connect Port setting for the connection with the MU887000A to Test Port2/3/4 successively, and repeat steps 2 to 4 over.

5.3.3 Frequency/Modulation measurement

This test is related to the following modulation analyses.

- Carrier frequency accuracy
- Residual EVM

(1) Test specifications

Test Port1/2

Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy + 10 Hz)
Residual EVM	≤1% (rms)

Input frequency: 600 to 2700 MHz
Input level: –30 dBm ≤, ≤+35 dBm

Test Port3/4

Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy + 10 Hz)
Residual EVM	≤1% (rms)

Input frequency: 600 to 2700 MHz
Input level: –30 dBm ≤, ≤+25 dBm

(2) Measuring instruments

- Vector signal generator: MG3700A
- 3-dB Attenuator: AT-103 (2 sets)

(3) Setup

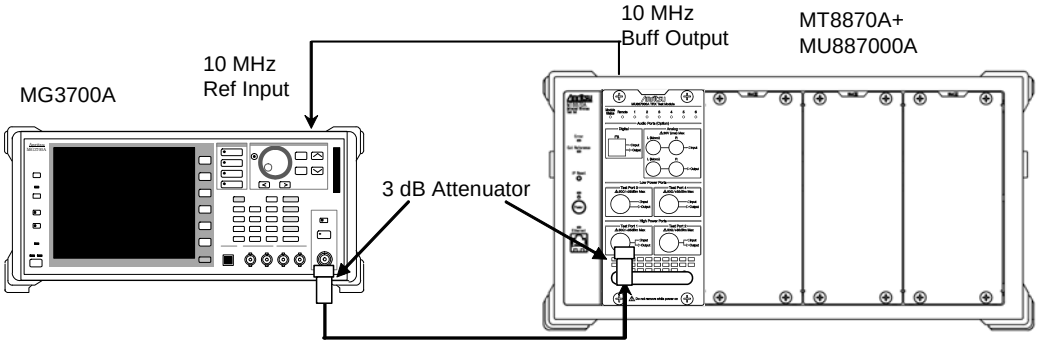

Figure 5.3.3-1 Setup for Measuring Frequency/Modulation

(4) Test procedure

1. Setup the instruments as shown in Figure 5.3.3-1.
2. Set the MU887000A as follows:

Connect port:	Test Port1
Output level ON/OFF:	OFF (After setting the system to SG)
Input level:	–10 dBm
Downlink frequency:	600 MHz
Channel Detection :	Test Model4
Modulation Analysis measurement:	ON, 10 times

3. Set the Vector signal generator (SG) as follows:

Output:	ON
Modulation:	ON
Waveform pattern:	TEST_MODEL_4
Output frequency:	600 MHz
Output level:	–10 dBm (This output level reflects the calibration value for item 5.3.1.)

4. Measure the frequency error and EVM.

Carrier Frequency Error Result:	Average value
EVM Result:	Average value

5. Change the MU887000A and SG frequencies according to Table 5.3.1-1 “Measurement Point and Frequency” and repeat steps 2 to 4 over.
6. Change the SG output level and the MU887000A input level to –30 dBm and measure by repeating steps 2 to 5 over. (–20 dB level of the output that reflects the calibration value at –10 dBm in Section 5.3.1.)
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.

5.3.4 Adjacent Channel Leakage Power Ratio

This test is related to Adjacent Channel Leakage Power Ratio measurements.

(1) Testing specifications

Test Port1/2

Adjacent Channel Leakage Power Ratio	Measurement Point
≥55 dB	5 MHz detuning 10 MHz detuning

Input frequency: 600 to 2700 MHz

Input level range: –10 dBm ≤, ≤+35 dBm

Test Port3/4

Adjacent Channel Leakage Power Ratio	Measurement Point
≥55 dB	5 MHz detuning 10 MHz detuning

Input frequency: 600 to 2700 MHz

Input level range: –10 dBm≤, ≤+25 dBm

(2) Measuring instruments

- Vector signal Generator: MG3700A
- 3-dB Attenuator: AT-103 (2 sets)

(3) Setup

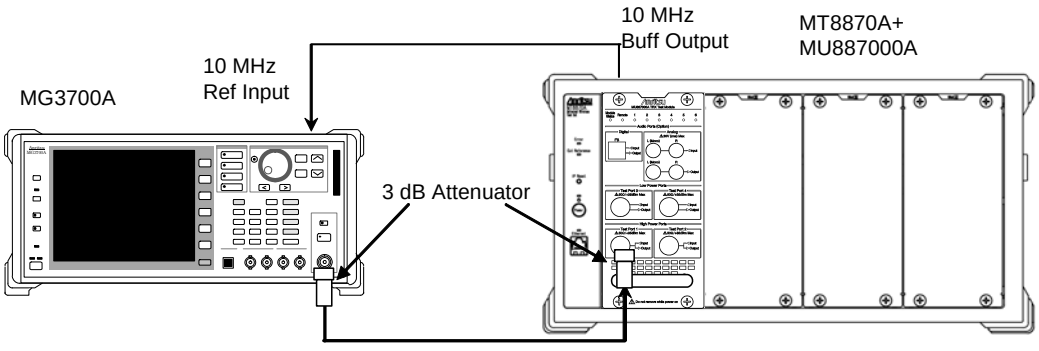

Figure 5.3.4-1 Setup for Measuring Adjacent Channel Leakage Power Ratio

(4) Test procedure

1. Setup the instruments as shown in Figure 5.3.4-1.
2. Set the MU887000A as follows:

   Connect port: Test Port1

Output level ON/OFF: OFF
(After setting the system to SG)
Input level: –10 dBm
Downlink frequency: 600 MHz
Channel Detection : Test Model1 64DPCH
ACLR measurement: ON, 10 times

3. Set the Vector signal generator (SG) as follows:

   Output: ON
   Modulation: ON
   Waveform pattern: TEST_MODEL_1_64DPCH
   Output frequency: 600 MHz
   Output level: –10 dBm (This output level reflects the calibration value for item 5.3.1.)

4. Measure the Adjacent Channel Leakage Power Ratio for ±5 MHz and ±10 MHz.

   ACLR result: Average value

5. Change the MU887000A and SG frequencies according to Table 5.3.1-1 “Measurement Point and Frequency” 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.

5.3.5 About evaluation signals

The evaluation signals (Waveform pattern) described in the performance test items 5.3.3, 5.3.4, 5.3.5 are set as follows. When the user is executing performance tests, set the SG actually used based on the following setting contents.

Install the MG3700A-002 Mechanical Attenuator option in the MG3700A. In addition, the MG3700A-011 High Frequency 6 GHz option is required to support Opt-015/016.

Outline of Evaluation Signals

The evaluation signals comply with Table 6.1 Test Model 1 Active Channels in 3GPP TS 25.141 Chapter 6.1.1.1 and Table 6.4 Test Model 4 Active Channels in Chapter 6.1.1.4.

5.3.6 Sample format for performance test result sheets

Use the following test result sheets when testing the MX887021A performance. Duplicate these sheets as necessary for tests.

Test location _____ Report No. _____

_____ Date _____

_____ Person-in-charge _____

Model:

Serial No. _____ Ambient temperature _____ °C

Power source frequency _____ Hz Relative humidity _____ %

Remarks _____

_____

_____

SG Calibration (MOD)

SG Calibration (MOD)

MG3700A Modulation Wave

Frequency (MHz)	SG Setting (dBm)
	–10 dBm
600	
880	
940	
1000	
1800	
2000	
2200	
2700	

Tx Power Measurement Accuracy (MOD)

Tx Power Measurement Accuracy Port1/2

MU887000A Input Level: –10 dBm (Item 5.3.1 Calibration Value)

Frequency (MHz)	MX887021A Measured Value (P) (dBm)	Measurement Accuracy (dB)(dB)			
		Lo Limit	Measurement Accuracy –10 – (P)	Hi Limit	Measurement uncertainty
600		–0.5		+0.5	±0.15
880					
940					
1000					
1800					
2000					
2200					
2700					

Tx Power Measurement Accuracy Port3/4

MU887000A Input Level: –10 dBm (Item 5.3.1 Calibration Value)

Frequency (MHz)	MX887021A Measured Value (P) (dBm)	Measurement Accuracy (dB)			
		Lo Limit	Measurement Accuracy –10 – (P)	Hi Limit	Measurement uncertainty
600		–0.7		+0.7	±0.16
880					
940					
1000					
1800					
2000					
2200					
2700					

Frequency/Modulation Measurement

Residual EVM/Carrier Frequency Accuracy

MU887000A Input Level: –10 dBm

Frequency (MHz)	Residual EVM (%)			Carrier Frequency Accuracy (Hz)		
	Measured Value	Spec.	Measurement uncertainty	Measured Value	Spec.	Measurement uncertainty
600		≤1	±0.1		±10.0	±2.0
880						
940						
1000						
1800						
2000						
2200						
2700						

MU887000A Input Level: –30 dBm

Frequency (MHz)	Residual EVM (%)			Carrier Frequency Accuracy (Hz)		
	Measured Value	Spec.	Measurement uncertainty	Measured Value	Spec.	Measurement uncertainty
600		≤0	±0.1		±10.0	±2.0
880						
940						
1000						
1800						
2000						
2200						
2700						

Adjacent Channel Leakage Power Ratio Measurement

Adjacent Channel Leakage Power Ratio

Frequency (MHz)	Adjacent Channel Leakage Power Ratio (dB)			
	MU887000A Input Level: –10 dBm			
	Detuning Frequency (MHz)			
	–10	–5	+5	+10
600				
880				
940				
1000				
1800				
2000				
2200				
2700				
Spec. (dB)	**≥55**	**≥55**	**≥55**	**≥55**
Measurement uncertainty	**1 dB**			

5.4 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 is listed on the last page of this manual, and in the separate file on the DVD version.

When requesting repair, supply the following information:

(a) Model name and serial number marked on rear panel

(b) Failure symptoms

(c) Person to contact about nature of failure and repair completion notification

(d) Software version

Appendix A Specifications

This appendix lists the specifications of the MX887021A W-CDMA/HSPA Downlink TX Measurement. Refer to section 1.3 “Composition” for details of the product configuration.

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 MX887021A Specifications

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Common Items
Frequency
Measurement Target</td><td>600 to 2700 MHz
W-CDMA/HSPA Downlink signals</td></tr>
<tr><td>Tx Power Measurement
Input Level Range
Measurement Accuracy</td><td>Port1, Port2: –65.0 to +35.0 dBm
Port3, Port4: –65.0 to +25.0 dBm
Port1, Port2: After calibration, 10 to 40°C
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–15 to +35 dBm</td><td>±0.3 dB (typ.)
±0.5 dB</td></tr>
</table>
Port3, Port4: After calibration, 10 to 40°C
<table>
<tr><th>Input Level</th><th>Measurement Accuracy</th></tr>
<tr><td>–15 to +25 dBm</td><td>±0.7 dB</td></tr>
</table></td></tr>
</table>

Table A-1 MX887021A Specifications (continued)

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Modulation Analysis
Input Level Range
Carrier Frequency Accuracy
Modulation Accuracy</td><td>
Port1, Port2: –30.0 to +35.0 dBm
Port3, Port4: –30.0 to +25.0 dBm
For Test Model 4 signal, average of 10 times
±(Set frequency × Reference oscillator accuracy + 10 Hz)

Residual vector error (for Test Model 4, average of 10 times)
≤1 %</td></tr>
<tr><td>Adjacent Channel Leakage Power Ratio
Input Level Range
Measurement Point
Measurement Range</td><td>

Port1, Port2: –10.0 to +35.0 dBm
Port3, Port4: –10.0 to +25.0 dBm
±5 MHz, ±10 MHz

<table><tr><th>Measurement Point</th><th>Measurement Range</th></tr><tr><td>±5 MHz, ±10 MHz</td><td>≥ 55 dB</td></tr></table></td></tr>
</table>

Index

References are page numbers.