MX268130A/330A/730A/ MX860830A/930A

Wireless LAN Measurement Software (for MS2681A/MS2683A/MS2687A/ MS2687B/MS8608A/MS8609A)

Operation Manual

Eighth Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W2080AE-8.0

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

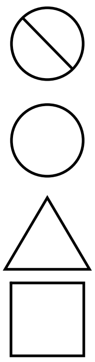
DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

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.

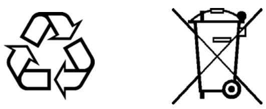


This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

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.

MX268130A/330A/730A/MX860830A/930A
Wireless LAN Measurement Software (for MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A)
Operation Manual

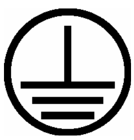
13 August 2002 (First Edition)
22 April 2009 (Eighth Edition)

For Safety

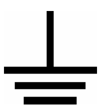
WARNING

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

2. Measurement Categories
   This instrument is designed for Measurement category I (CAT I). Do not use this instrument at the location of measurement categories from CAT II to CAT IV.
   In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV. The category outline is as follows:
   Measurement category I (CAT I):
   Secondary circuits of a device connected to an outlet via a power transformer etc.
   Measurement category II (CAT II):
   Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.
   Measurement category IV (CAT IV):
   All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).



or



3. When supplying power to this equipment, connect the accessory 3-pin power cord to a grounded outlet. If a grounded outlet is not available, before supplying power to the equipment, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

For Safety

Repair

WARNING ⚠

4. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.

Falling Over

5. This equipment should be used in the correct position. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.
   And also DO NOT use this equipment in the position where the power switch operation is difficult.

Battery Fluid

6. DO NOT short the battery terminals and never attempt to disassemble it or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak.
   This fluid is poisonous.
   DO NOT touch it, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, irrigate them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

LCD

7. This instrument uses a Liquid Crystal Display (LCD); DO NOT subject the instrument to excessive force or drop it. If the LCD is subjected to strong mechanical shock, it may break and liquid may leak.
   This liquid is very caustic and poisonous.
   DO NOT touch it, ingest it, or get in your eyes. If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, irrigate them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

For Safety

CAUTION ⚠

Changing Fuse

CAUTION ⚠

1. Before changing the fuses, ALWAYS remove the power cord from the poweroutlet and replace the blown fuses. ALWAYS use new fuses of the type and rating specified on the fuse marking on the rear panel of the cabinet.

   T6.3A indicates a time-lag fuse.

   There is risk of receiving a fatal electric shock if the fuses are replaced with the power cord connected.

Cleaning

2. Keep the power supply and cooling fan free of dust.
   - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
   - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

Input Level

3. Maximum DC voltage ratings:
   RF Input connector: ±DC 0 V
   Maximum AC power (continuous wave) ratings:
   For MS2681A/MS2683A/MS2687A/MS2687B
   +30 dBm
   For MS8608A
   High Power Input
   +40 dBm
   Low Power Input
   +20 dBm
   For MS8609A
   +20 dBm
   NEVER input a over maximum ratings to RF Input, excessive power may damage the internal circuits.

For Safety

CAUTION ⚠

Replacing memory back-up battery

This equipment uses a Poly-carbomonofluoride lithium battery to back-up the memory. This battery must be replaced by a service engineer when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.

Note: The battery used in this equipment has a maximum useful life of 7 years. It should be replaced before this period has elapsed.

External storage media

This equipment uses memory cards as external storage media for storing data and programs.

If this media is mishandled or becomes faulty, important data may be lost. To prevent this chance occurrence, all important data and programs should be backed-up.

Anritsu will not be held responsible for lost data.

Pay careful attention to the following points.

- Do not remove the memory card from equipment being accessed.
- Isolate the card from static electricity.

Equipment Certificate

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

Anritsu Warranty

- During the warranty period, Anritsu will repair or exchange this software free-of-charge at the company's own discretion if it proves defective when used as described in the operation manual.
- The warranty period is 1 year from the purchase date.
- The warranty period after repair or exchange will remain 1 year 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 will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Corporation or its representatives at the address at the end of paper-edition manual or the separate file of CD-edition manual.

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 are needed to be broken/shredded so as not to be unlawfully used for military purpose.

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Front Panel Power Switch

To prevent malfunction caused by accidental touching, the front power switch of this equipment turns on the power if it is pressed continuously for about one second in the standby state. If the switch is pressed continuously for one second in the power-on state, the equipment enters the standby state.

In the power-on state, if the power plug is removed from the outlet, then reinserted into it, the power will not be turned on. Also, if the lines is disconnected due to momentary power supply interruption or power failure, the power will not be turned on (enters the standby state) even if the line is recovered.

This is because this equipment enters the standby state and prevents incorrect data from being acquired when the line has to be disconnected and reconnected.

For example, if the sweep time is 1,000 seconds and data acquisition requires a long time, momentary power supply interruption (power failure) might occur during measurement and the line could be recovered automatically to power-on. In such a case, the equipment may mistake incorrect data for correct data without recognizing the momentary power supply interruption.

If this equipment enters the standby state due to momentary power supply interruption or power failure, check the state of the measuring system and press the front power switch to restore power to this equipment.

Further, if this equipment is built into a system and the system power has to be disconnected then reconnected, the power for this equipment must also be restored by pressing the front power switch.

Consequently, if this equipment is built into remote monitoring systems that use MODEMs, please install option MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A-46 “Auto Power Recovery” to equipment.

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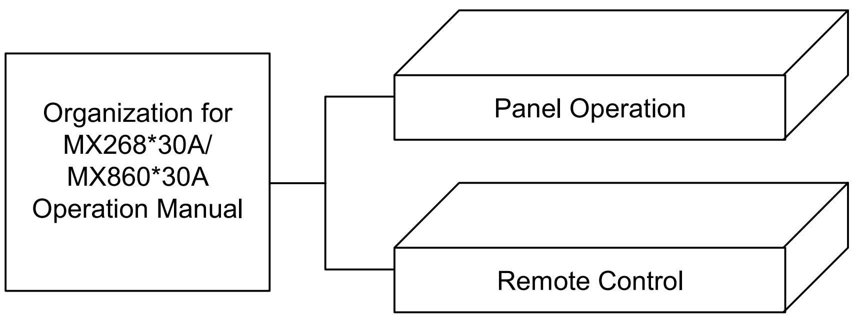
About This Manual

1. This operation manual provides the explanation of the Measurement Software when it is installed in the MS2681A/MS2683A/ MS2687A/MS2687B Spectrum Analyzer or MS8608A/MS8609A Digital Mobile Radio Transmitter Tester. Front and rear panels shown in this manual are of MS2683A.

   MX268x30A and MS268xA represent MX268130A/MX268330A/ MX268730A and MS2681A/MS2683A/MS2687A/MS2687B, respectively. MX268130A/MX268330A/MX268730A is Wireless LAN Measurement Software for MS2681A/MS2683A/MS2687A/MS2687B, respectively.

   MX860x30A and MS860xA represent MX860830A/MX860930A and MS8608A/MS8609A, respectively.
   MX860830A/MX860930A is Wireless LAN Measurement Software for MS8608A/MS8609A, respectively.

2. Organization of this Manual
   The MX268x30A/MX860x30A Wireless LAN Measurement Software operation manual is made up of the two parts shown below.



Panel Operation:

Describes the overview, panel explanations, operations and performance test for the MX268130A/MX268330A/MX268730A/MX860830A/ MX860930A.

Remote Control:

Describes the RS-232C (standard) and GPIB (standard) remote control for the MX268130A/MX268330A/MX268730A/MX860830A/MX860930A.

MX268130A/330A/730A/
MX860830A/930A
Wireless LAN Measurement Software
(for MS2681A/MS2683A/MS2687A/
MS2687B/MS8608A/MS8609A)
Operation Manual
(Panel Operation)

Table of Contents

Section 1 Outline

This section describes the overview, product configuration, and specifications of the MX268130A/330A/730A Wireless LAN Measurement Software for the MS2681A/MS2683A/MS2687A/MS2687B Spectrum Analyzer.

1.1 Product Overview

The MS2681A/MS2683A/MS2687A/MS2687B Spectrum Analyzer and MS8608A/MS8609A Digital Mobile Radio Transmitter Tester (hereafter, “this analyzer”) enable high-speed, high-accuracy and also easy measurement of base-station and mobile-station transmitter characteristics for various mobile communications.
The Analyzer can be used for device evaluation, and more, as it supports both IQ (baseband) and RF-IF signal evaluation.
Furthermore, with the installation of measurement software, the Analyzer can perform modulation analysis for a variety of digital modulation systems. Using high-speed digital signal processing technology also makes fast, accurate measuring possible.

By installing the MX268130A/MX268330A/MX268730A/MX860830A/MX860930A Wireless LAN Measurement Software (hereafter, “Wireless LAN software”), this analyzer can function as a comprehensive measuring instrument, enabling easy measurement of functions and performance of radio equipment for Wireless LAN digital mobile radio.

Measurement functions of the Wireless LAN software equipped spectrum analyzer are as follows:

- Modulation Analysis
- Carrier Frequency Measurement
- RF Power Measurement
- Occupied Bandwidth
- Adjacent Channel Leakage Power
- Spectrum Mask
- Spurious Emission
- CCDF
- Symbol Rate Error Measurement
- Chip Clock Error Measurement
- IQ Level
- Power Meter
- Batch Measurement

1.2 Product Composition

Combination of the Analyzer with Wireless LAN software as well as product composition are shown in the tables below.

- When the analyzer main body is MS2681A

	Item	Qty	Model/ Ordering No.	Remarks
Main Unit	Wireless LAN measurement software	1	MX268130A	Provided by Memory card
Accessories	Operation manual	1	W2080AE	

- When the analyzer main body is MS2683A

	Item	Qty	Model/ Ordering No.	Remarks
Main Unit	Wireless LAN measurement software	1	MX268330A	Provided by Memory card
Accessories	Operation manual	1	W2080AE	

- When the analyzer main body is MS2687A/MS2687B

	Item	Qty	Model/ Ordering No.	Remarks
Main Unit	Wireless LAN measurement software	1	MX268730A	Provided by Memory card
Accessories	Operation manual	1	W2080AE	

- When the analyzer main body is MS8608A

	Item	Qty	Model/ Ordering No.	Remarks
Main Unit	Wireless LAN measurement software	1	MX860830A	Provided by Memory card
Accessories	Operation manual	1	W2080AE	

- When the analyzer main body is MS8609A

	Item	Qty	Model/ Ordering No.	Remarks
Main Unit	Wireless LAN measurement software	1	MX860930A	Provided by Memory card
Accessories	Operation manual	1	W2080AE	

1.3 Product Specifications

Specified values are obtained after warming up the equipment for 30 minutes at a constant ambient temperature and then performing calibration.

Guaranteed specifications after Adjust Range and Level Calibration keys pressed.

Pre-amp On can be set when MS2681A-08 and MS2683A-08 are installed in the main frame.

IQ-input can be set when MS2681A-17/18, MS2683A-17/18 and MS2687B-18 are installed in the main frame.

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 1/6

*1: HiSWANa measurement function cannot carry out the following measurement.

1) Measurement for every MAC frame

2) Measurement of a signal whose cyclic prefix duration is not 800 ns

3) Measurement of a continuous signal whose modulation type is not constant.

*2: HiperLAN2 measurement function cannot carry out the following measurement.

1) The same measurement as '*1'.

2) Measurement of a burst signal whose modulation type on payload is not constant.

3) Measurement of power time mask.

*3: When burst interval is 20 us or less, the Wireless LAN software cannot measure the following item rightly:

1) Carrier off power, 2) On/Off ratio

*4: "Batch measurement" function cannot carry out when "Target system: HiSWANa" and "Data rate: Auto" are set.

Model		MX268130A	MX268330A	MX268730A
Modulation type		OFDM-64QAM, OFDM-16QAM, OFDM-QPSK,OFDM-BPSK		
Data rate		[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 54, 48, 36, 24, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiSWANa] 54, 36, 27, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiperLAN2] 54, 36, 27, 18, 12, 9, 6 Mbps		
Modulation analysis	Measurement items	Frequency (carrier frequency, carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, phase error-RMS), OFDM-spectrum (carrier leak, spectrum flatness)		
	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] 100 MHz to 6 GHz 100 MHz to 3 GHz (Pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 100 MHz to 3GHz

■ **IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 2/6**

Model		MX268130A	MX268330A	MX268730A
Modulation analysis	Measurement frequency intake range	[IEEE802.11a, HiSWANa, HiperLAN2] Temperature: +18 to +35°C, setting frequency ±120 kHz (3 to 6 GHz, MS2681A is object outside.), setting frequency ±80 kHz (100 MHz to 3 GHz) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Temperature: +18 to +35 °C, setting frequency ±80 kHz		
	Measurement level range	−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)		−26 to +24 dBm
	Carrier frequency accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: −10 dBm, averaging 30 times, Temperature: +18 to +35°C, ± (reference frequency accuracy × setting frequency +500 Hz)		
	Modulation accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: −10 dBm, Averaging 30 times, Temperature: +18 to +35°C, 1.5 %rms (typ.)		
	Display waveform	Constellation, EVM vs symbol number, EVM vs Sub-carrier number Phase error vs symbol number, spectrum flatness		
	Constellation	Display format: 1) All, 2) First Symbol, 3) Last Symbol, 4) Pilot Only, 5) One Sub-Carrier, 6) Outside Pair (When “Target system: HiSWANa” and “Data rate: Auto” are set, 2) and 3) are not selectable) Error scale: 5%, 10%, 20%, 35%, OFF ("Error scale" is available when "Data rate" is not set to "Auto" and “Modulation type” is set to “OFDM-BPSK” or “OFDM-QPSK”)		
	EVM vs symbol	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Symbol number, 1 to 1367 symbol		
	EVM vs sub-carrier	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Sub-carrier number –26 to +26		
	Phase error vs symbol	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Symbol number, 1 to 1367 symbol		
	Spectrum flatness	Vertical line (full scale): 5 dB, 10 dB, 20 dB, 50 dB, 100 dB Horizontal line: Sub-carrier number –26 to +26		
	Analysis length	Setting range: 1 to 1367 OFDM symbol Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set to “Auto”. HiperLAN2 is not supported.)		
	Analysis Start Position (HiSWANa only)	Setting range: 1 to [1367 − (“Analysis length” setting value) + 1] OFDM symbol Setting resolution: 1 OFDM symbol		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 3/6

<table>
<tr><th colspan="2">Model</th><th>MX268130A</th><th>MX268330A</th><th>MX268730A</th></tr>
<tr><td rowspan="10">RF Power</td><td>Measurement frequency range</td><td>100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz,
100 MHz to 3 GHz
(Pre-amp On)
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td></tr>
<tr><td>Measurement level range</td><td colspan="2">−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)</td><td>−26 to +24 dBm</td></tr>
<tr><td>Measurement items(*3)</td><td colspan="3">Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal)</td></tr>
<tr><td>Burst average power accuracy</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
Frequency: 2 to 2.5 GHz
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
Frequency: 2.4 to 2.5 GHz

Averaging 30 times
≤±1.7 dB
(Input level: −18 to 0 dBm)
≤±2.0 dB
(Pre-amp On,
Input level: −38 to 0 dBm)</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
Frequency: 4.9 to 6 GHz,
Input level: −18 to 0 dBm,
Averaging 30 times
≤±2.7 dB
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
Frequency: 2.4 to 2.5 GHz,
Input level: −18 to 0 dBm,
−38 to 0dBm (Pre-amp On),
Averaging 30 times
≤±1.7 dB,
≤±2.0dB (Pre-amp On)</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
Frequency: 4.9 to 6 GHz,
Input level: −26 to 0 dBm,
Averaging 30 times
≤±2.9 dB
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
Frequency: 2.4 to 2.5 GHz,
Input level: −26 to 0 dBm,
Averaging 30 times ≤±1.9 dB</td></tr>
<tr><td>Burst rising detection method</td><td colspan="3">Selects from (1) and (2).
(1) The rising edge is detected from change of a signal level.
(2) The rising edge is detected from preamble signal (Preamble Search).</td></tr>
<tr><td>Burst signal length detection method</td><td colspan="3">Selects from (1) and (2).
(1) Input data length
(2) The falling edge is detected from change of a signal level (Ramp-down Detection).</td></tr>
<tr><td>Slot display</td><td colspan="3">A time domain waveform is displayed.
Vertical line: Unit = dBm, dB, %
Horizontal line
At burst signal: −20.0 us (fixed) to 5680.0 us (based on burst length)
At continuous signal: 0.0 us to 5660.0 us (fixed)</td></tr>
<tr><td>Transient display</td><td colspan="3">Displays zoom of the rising and falling edges of a slot.
Vertical line: Unit = dBm, dB, %
Horizontal line: 8.0 us to 40.0 us (setting resolution: 0.1 us)</td></tr>
<tr><td>Analysis length</td><td colspan="3">Setting range: 1 to 1367 OFDM symbol (DSSS-OFDM: 1 to 1300 OFDM symbol)
Setting resolution: 1 OFDM symbol
Setting method: Manual setting, Auto setting (at burst signal only.)</td></tr>
<tr><td>Storage mode</td><td colspan="3">Normal: Refresh waveform/data for each measurement.
Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.
Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.</td></tr>
</table>

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 4/6

<table>
<tr><th colspan="2">Model</th><th>MX268130A</th><th>MX268330A</th><th>MX268730A</th></tr>
<tr><td rowspan="4">Occupied frequency bandwidth</td><td>Frequency range</td><td>100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz,
100 MHz to 3 GHz
(Pre-amp On)
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td></tr>
<tr><td>Reference level range</td><td colspan="2">−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)</td><td>−26 to +24 dBm</td></tr>
<tr><td>Measurement method.</td><td colspan="3">BW (99%): 99% of the total radiation power is defined as the contained frequency width.</td></tr>
<tr><td>Storage mode</td><td colspan="3">Normal: Displays the measured result value and waveform after every measurement.
Average: Data display averages the result for the designated number of measurements.
Averaging count: 2 to 999. Waveform display is same as “Normal” mode.</td></tr>
<tr><td rowspan="5">Adjacent channel leakage power</td><td>Target system</td><td colspan="3">IEEE802.11a, HiSWANa, HiperLAN2</td></tr>
<tr><td>Frequency range</td><td>100 MHz to 3 GHz</td><td>100 MHz to 6 GHz,
100 MHz to 3 GHz
(Pre-amp On)</td><td>100 MHz to 6 GHz</td></tr>
<tr><td>Reference level range</td><td colspan="2">−16 to +26 dBm, −36 to +26 dBm (Pre-amp On)</td><td>−16 to +24 dBm</td></tr>
<tr><td>Measurement method</td><td colspan="3">Sweep method (All):
After measuring the signal range including upper/lower second adjacent channels at a time with the sweep type spectrum analyzer, performs calculation of adjacent/second adjacent channels and displays the result.
Sweep method (Separate):
After measuring adjacent channel and the channel next to the adjacent channel with the sweep type spectrum analyzer performs calculation and displays the result.</td></tr>
<tr><td>Storage mode</td><td colspan="3">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.</td></tr>
</table>

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 5/6

<table>
<tr><th colspan="2">Model</th><th>MX268130A</th><th>MX268330A</th><th>MX268730A</th></tr>
<tr><td rowspan="4">Spectrum mask</td><td>Frequency range</td><td>100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz,
100 MHz to 3 GHz
(Pre-amp On)
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td><td>[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz
[IEEE802.11g
(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td></tr>
<tr><td>Reference level range</td><td colspan="2">−16 to +26 dBm, −36 to +26 dBm (Pre-amp On)</td><td>−16 to +24 dBm</td></tr>
<tr><td>Template</td><td colspan="3">Corresponds to the spectrum mask defined in IEEE std 802.11a-1999 17.3.9.2 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.</td></tr>
<tr><td>Storage mode</td><td colspan="3">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.</td></tr>
<tr><td rowspan="4">Spurious</td><td>Frequency range</td><td>9 kHz to 3 GHz</td><td>9 kHz to 7.8 GHz</td><td>9 kHz to 30 GHz</td></tr>
<tr><td>Reference level range</td><td colspan="2">−6 to +26 dBm</td><td>−6 to +24 dBm</td></tr>
<tr><td>Measurement method</td><td colspan="3">Sweep method:
Detects and displays the peak value after sweeping the designated frequency range with the spectrun analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive peak.
Spot method:
Displays the average value after measuring the designated frequency in time domein of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.
Search method:
Measures the frequency in time domein and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.</td></tr>
<tr><td>Storage mode</td><td colspan="3">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.</td></tr>
</table>

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa[*1], HiperLAN2[*2] 6/6

Model		MX268130A	MX268330A	MX268730A
CCDF	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)	100 MHz to 6 GHz
	Reference level range	−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)		−26 to +24 dBm
	Measurement method	CCDF: Displays cumulative distribution of difference between instantaneous power and average power. APD: Displays distribution of difference between instantaneous power and average power.		
	Data count	10,000 to 2,000,000,000		
	Analysis time	0.001 to 100 ms		
	Filter Selection	22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α= 0.22, RC: α= 0.22		
	Trigger	Free run: Regardless of the state of an input signal, a signal is taken in continuously. Wide IF: A signals is taken in synchronizing with a video signal. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us Trigger level: High, Middle, Low External: A signals is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us		
Batch measure-ment[*4]	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Carrier leak, Spectrum flatness (at burst signal), TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Occupied frequency bandwidth, Adjacent channel leakage power, Spectrum mask, Spurious (Two tables can be chosen) *”Adjacent channel leakage power” can be measued complying with “IEEE802.11a, HiSWANa, HiperLAN2”.		
	Judgement	According to the judgement value set per measurement item, PASS or FAIL judgement is automatically performed for each measurement item.		
Symbol rate error measure-ment	Target System	IEEE802.11a, IEEE802.11g(ERP-OFDM, DSSS-OFDM)		
	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz	
	Measurement level range	−26 to +26 dBm		−26 to +24 dBm
	Analysis length	250 to 1000 OFDM symbol (Setting resolution : 1 OFDM symbol)		
	Measurement range	0.0 to 50.0 ppm		
	Measurement resolution	0.1 ppm		
	Measurement accuracy	[IEEE802.11a] Frequency: 2 to 2.5 GHz [IEEE802.11g(ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a] Frequency: 4.9 to 6 GHz [IEEE802.11g(ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		± (reference oscillator × 10^6 + 1.0) ppm per OFDM symbol rate(250 kHz[= $(4\ \mathrm{us})^{-1}$]).		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)　1/4

*1: When burst interval is 20 us or less, the Wireless LAN software cannot measure the following item rightly:

1) Carrier off power, 2) On/Off ratio and 3) Burst rising/falling time.

Model		MX268130A	MX268330A	MX268730A
Modulation type		CCK, DQPSK, DBPSK		
Data rate		11, 5.5, 2, 1 Mbps, Auto (at burst signal only)		
Filter		No Filter Gaussian BT= 0.3 to 1.0 (setting resolution: 0.1) Rectangular Root Raised Cosine α= 0.30 to 1.00 (setting resolution: 0.01)		
Modulation analysis	Measurement items	Frequency (Carrier frequency, Carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)		
	Frequency range	100 MHz to 3 GHz		
	Measurement frequency intake range	Temperature:+18° to +35°C, setting frequency ±80 kHz		
	Measurement level range	−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)		−26 to +24 dBm
	Carrier frequency accuracy	Frequency: 2.4 to 2.5 GHz, Input level: −10 dBm, Averaging: 30 times, Temperature: +18 to +35°C ± (reference frequency accuracy × setting frequency +200 Hz)		
	Modulation accuracy	Frequency: 2.4 to 2.5 GHz, Input level: –10 dBm, Averaging: 30 times, Temperature: +18 to +35°C 2.3 %rms (typ.)		
	Display waveform	Constellation, EVM vs chip number, Phase error vs chip number, Eye-diagram		
	Constellation	Error scale: 5%, 10%, 20%, 35%, OFF (It is available when "Data rate" is not set to "Auto")		
	EVM vs chip	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Chip number 256 to 4096 chip		
	Phase error vs. chip	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Chip number 256 to 4096 chip		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: manual setting, auto setting (at burst signal only. When “Data rate” is set as “Auto.”)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 2/4

Model		MX268130A	MX268330A	MX268730A
RF Power	Frequency range	100 MHz to 3 GHz		
	Measurement level range	−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)		−26 to +24 dBm
	Measurement items(*1)	Average power, Maximum Power, carrier off power (at burst signal), burst on/off ratio (at burst signal), burst rising/falling time (at burst signal)		
	Burst average power accuracy	Frequency: 2.4 to 2.5 GHz, Averaging 30 times ≤±1.7 dB (Input level: −18 to 0 dBm), ≤±2.0 dB (Pre-amp On, Input level: −38 to 0 dBm)		Frequency: 2.4 to 2.5 GHz, Input level: −26 to 0 dBm, Averaging 30 times ≤±1.9 dB
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from preamble signal (Preamble Search).		
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level (Ramp-down Detection).		
	Slot display	A time domain waveform is displayed. Vertical line: Unit = dBm, dB, % Horizontal line At burst signal: −20.0 us (fixed) to 5680.0 us (based on burst length) At continuous signal: 0.0 us to 5660.0 us (fixed)		
	Transient display	Displays zoom of the rising and falling edges of a slot. Vertical line: Unit = dBm, dB, % Horizontal line: 8.0 us to 40.0 us (setting resolution: 0.1 us)		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only.)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz		
	Reference level range	−26 to +26 dBm, −46 to +26 dBm (Pre-amp On)		−26 to +24 dBm
	Measurement method	BW (99%) : 99% of the total radiation power is defined as the contained frequency width. BW (90%) : Frequency bandwidth containing 90% of the total radiation power. This value is called “spreading bandwidth” in TELEC’s Technical Regulations Conformity Certification.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 3/4

Model		MX268130A	MX268330A	MX268730A
Spectrum mask	Frequency range	100 MHz to 3 GHz		
	Reference level range	−16 to +26 dBm, −36 to +26 dBm (Pre-amp On)		−16 to +24 dBm
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11b-1999 18.4.7.3 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spurious	Frequency range	9 kHz to 3 GHz	9 kHz to 7.8 GHz	9 kHz to 30 GHz
	Reference level range	−6 to +26 dBm		−6 to + 24 dBm
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrun analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive peak. Spot method: Displays the average value after measuring the designated frequency in time domein of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domein and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
CCDF	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)	100 MHz to 6 GHz
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (Pre-amp On)		–26 to +24 dBm
	Measurement method	CCDF: Displays cumulative distribution of difference between instantaneous power and average power. APD: Displays distribution of difference between instantaneous power and average power.		
	Data count	10,000 to 2,000,000,000		
	Analysis time	0.001 to 100 ms		
	Filter Selection	22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α= 0.22, RC: α= 0.22		
	Trigger	Free run: Regardless of the state of an input signal, a signal is taken in continuously. Wide IF: A signals is taken in synchronizing with a video signal. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us Trigger level: High, Middle, Low External: A signals is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us		

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 4/4

Model		MX268130A	MX268330A	MX268730A
Batch measure-ment	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset, TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Burst signal rising/falling time (at burst signal), Occupied frequency bandwidth, Spectrum mask, Spurious (Two tables can be chosen)		
	Judgement	According to the judgement value set per measurement item, PASS or FAIL judgement is automatically performed for each measurement item.		
Chip clock error measure-ment	Frequency range	100 MHz to 3 GHz		
	Measurement level range	−26 to +26 dBm		−26 to +24 dBm
	Analysis length	11,000 to 44,000 chip (setting resolution: 1 chip)		
	Measurement range	0.0 to ±50.0 ppm		
	Measurement resolution	0.1 ppm		
	Measurement accuracy	Carrier frequency: 2.4 to 2.5 GHz, ±(reference frequency accracy × 10^6 + 1.0) ppm per chip rate(11 MHz).		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

■ Electric performance (IQ input)

Model	MX268130A	MX268330A	MX268730A
Input impedance	1 MΩ (parallel capacitance <100 pF), 50Ω		
Balance input	With MS2681A-17/MS2683A-17 Differential voltage: 0.1 to 1 Vpp (input terminals) In-phase voltage: ±2.5 V (input terminals)		
Unbalance input	With MS2681A-18/MS2683A-18 0.1 to 1 Vpp (input terminals) DC/AC coupling Changeable		With MS2687B-18 0.1 to 1 Vpp (input terminals) DC/AC coupling Changeable
Measurement items	[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Symbol rate error measurement [HiSWANa, HiperLAN2] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Chip clock error measurement		
I/Q level measurement	Measures input level of I and Q (rms, p-p)		
I/Q phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.		

Specified values are obtained after warming up the equipment for 30 minutes at a constant ambient temperature and then performing calibration.

Guaranteed specifications after Adjust Range and Level Calibration keys pressed.

Pre-amp On can be set when MS8608A-08 and MS8609A-08 are installed in the main frame.

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 1/6

*1: HiSWANa cannot carry out the following measurement.

1) Measurement for every MAC frame

2) Measurement of a signal whose cyclic prefix duration is not 800 ns

3) Measurement of a continuous signal whose modulation type is not constant.

*2: HiperLAN2 cannot carry out the following measurement.

1) The same measurement as '*1'.

2) Measurement of a burst signal whose modulation type on payload is not constant.

3) Measurement of power time mask.

*3: When burst interval is 20 us or less, the Wireless LAN software cannot measure the following item rightly:

1) Carrier off power, 2) On/Off ratio.

*4: "Batch measurement" function cannot carry out when "Target system: HiSWANa" and "Data rate: Auto" are set.

Model		MX860830A	MX860930A
Modulation type		OFDM-64QAM, OFDM-16QAM, OFDM-QPSK,OFDM-BPSK	
Data rate		[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 54, 48, 36, 24, 18, 12, 9, 6 Mbps, Auto(at burst signal only) [HiSWANa] 54, 36, 27, 18, 12, 9, 6 Mbps, Auto(at burst signal only) [HiperLAN2] 54, 36, 27, 18, 12, 9, 6 Mbps	
Modulation analysis	Measurement items	Frequency (carrier frequency, carrier frequency error), Modulation characteristic (EVM-RMS, EVM-Peak, phase error-RMS),OFDM-spectrum (carrier leak, spectrum flatness)	
	Frequency range	[IEEE802.11a, HiSWANa, HiperLAN2] 100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 100MHz to 3GHz	
	Measurement frequency intake range	[IEEE802.11a, HiSWANa, HiperLAN2] Temperature: +18 to +35°C, setting frequency ±120kHz (3 to 6GHz), ±80 kHz (100 MHz to 3 GHz) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Temperature: +18 to +35°C, setting frequency ±80 kHz	
	Measurement level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −26 to +26 dBm (With Opt. 32), −46 to +18 dBm (Pre-amp On)

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 2/6

Model		MX860830A	MX860930A
Modulation analysis	Carrier frequency accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g(ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz Input level: −10 dBm, (MS8608A:Low Input) Averaging 30 times, Temperature: +18 to +35°C, ± (reference frequency accuracy × setting frequency +500 Hz)	
	Modulation accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz Input level: −10 dBm (MS8608A: Low Input), Averaging 30 times, Temperature: +18 to +35°C 1.5 %rms (typ.)	
	Display waveform	Constellation, EVM vs symbol number, EVM vs Sub-carrier number Phase error vs symbol number, spectrum flatness	
	Constellation	Display format: 1) All, 2) First Symbol, 3) Last Symbol, 4) Pilot Only, 5) One Sub-Carrier, 6) Outside Pair (When “Target system: HiSWANa” and “Data rate: Auto” are set, 2) and 3) are not selectable) Error scale: 5%, 10%, 20%, 35%, OFF ("Error scale" is available when "Data rate" is not set to "Auto" and “Modulation type” is set to “OFDM-BPSK” or “OFDM-QPSK”)	
	EVM vs symbol	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Symbol number, 1 to 1367 symbol	
	EVM vs sub-carrier	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Sub-carrier number −26 to +26	
	Phase error vs symbol	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Symbol number, 1 to 1367 symbol	
	Spectrum flatness	Vertical line (full scale): 5 dB, 10 dB, 20 dB , 50 dB , 100 dB Horizontal line: Sub-carrier number −26 to +26	
	Analysis length	Setting range: 1 to 1367OFDM symbol Setting resolution: 1OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set to “Auto”. HiperLAN2 is not supported.)	
	Analysis start position (HiSWANa only)	Setting range: 1 to [1367 − (“Analysis length” setting value) + 1] OFDM symbol Setting resolution: 1 OFDM symbol	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.	

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 3/6

Model		MX860830A	MX860930A
RF Power	Measurement frequency range	[IEEE802.11a, HiSWANa, HiperLAN2] 100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] 100 MHz to 3 GHz	
	Measurement level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −26 to +26 dBm (With Opt.32), −46 to +18 dBm (Pre-amp On)
	Measurement items(*3)	Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal)	
	Burst average power accuracy	(MS8608A: Low Input) [IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz, Input level: −18 to 0 dBm, Averaging 30 times ≤±2.7 dB [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz, Input level: −18 to 0 dBm, −38 to 0dBm (Pre-amp On), Averaging 30 times ≤±1.7 dB, ≤±2.0 dB (Pre-amp On)	
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from preamble signal (Preamble Search).	
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level (Ramp-down Detection).	
	Slot display	A time domain waveform is displayed. Vertical line: Unit = dBm, dB, % Horizontal line At burst signal: −20.0 us (fixed) to 5680.0 us (based on burst length) At continuous signal: 0.0 us to 5660.0 us (fixed)	
	Transient display	Displays zoom of the rising and falling edges of a slot. Vertical line: Unit = dBm, dB, % Horizontal line: 8.0 us to 40.0 us (setting resolution: 0.1 us)	
	Analysis length	Setting range: 1 to 1367 OFDM symbol (DSSS-OFDM: 1 to 1300 OFDM symbol) Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only.)	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.	

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa[*1], HiperLAN2[*2] 4/6

<table>
<tr><th colspan="2">Model</th><th>MX860830A</th><th>MX860930A</th></tr>
<tr><td rowspan="5">Occupied frequency bandwidth</td><td>Frequency range</td><td colspan="2">[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)
[IEEE802.11g(ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td></tr>
<tr><td>Reference level range</td><td>High Input:
−6 to +38 dBm,
−26 to +38 dBm (Pre-amp On)
Low Input:
−26 to +18 dBm,
−46 to +18 dBm (Pre-amp On)</td><td>−26 to +18 dBm,
−26 to +26 dBm (With Opt.32),
−46 to +18 dBm (Pre-amp On)</td></tr>
<tr><td>Measurement method</td><td colspan="2">BW (99%): 99% of the total radiation power is defined as the contained frequency width.</td></tr>
<tr><td>Storage mode</td><td colspan="2">Normal: Displays the measured result value and waveform after every measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as Normal mode.</td></tr>
<tr style="display:none"></tr>
<tr><td rowspan="5">Adjacent channel leakage power</td><td>Target system</td><td colspan="2">IEEE802.11a, HiSWANa, HiperLAN2</td></tr>
<tr><td>Frequency range</td><td colspan="2">100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)</td></tr>
<tr><td>Reference level range</td><td>High Input:
+4 to +38 dBm,
−16 to +38 dBm (Pre-amp On)
Low Input:
−16 to +18 dBm,
−36 to +18 dBm (Pre-amp On)</td><td>−16 to +18 dBm,
−16 to +26 dBm (With Opt. 32),
−36 to +18 dBm (Pre-amp On)</td></tr>
<tr><td>Measurement method</td><td colspan="2">Sweep method (All):
After measuring the signal range including upper/lower second adjacent channels at a time with the sweep type spectrum analyzer, performs calculation of adjacent/second adjacent channels and displays the result.
Sweep method (Separate):
After measuring adjacent channel and the channel next to the adjacent channel with the sweep type spectrum analyzer performs calculation and displays the result.</td></tr>
<tr><td>Storage mode</td><td colspan="2">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as Normal mode.</td></tr>
<tr><td rowspan="4">Spectrum mask</td><td>Frequency range</td><td colspan="2">[IEEE802.11a, HiSWANa, HiperLAN2]
100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)
[IEEE802.11g (ERP-OFDM, DSSS-OFDM)]
100 MHz to 3 GHz</td></tr>
<tr><td>Reference level range</td><td>High Input:
+4 to +38 dBm,
−16 to +38 dBm (Pre-amp On)
Low Input:
−16 to +18 dBm,
−36 to +18 dBm (Pre-amp On)</td><td>−16 to +18 dBm,
0 to +26 dBm (With Opt. 32),
−36 to +18 dBm (Pre-amp On)</td></tr>
<tr><td>Template</td><td colspan="2">Corresponds to the spectrum mask defined in IEEE std 802.11a-1999 17.3.9.2 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.</td></tr>
<tr><td>Storage mode</td><td colspan="2">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as Normal mode.</td></tr>
</table>

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 5/6

<table>
<tr><th colspan="2">Model</th><th>MX860830A</th><th>MX860930A</th></tr>
<tr><td rowspan="4">Spurious</td><td>Frequency range</td><td>9 kHz to 7.8 GHz</td><td>9 kHz to 13.2 GHz</td></tr>
<tr><td>Reference level range</td><td>High Input: +14 to +38 dBm,
Low Input: −6 to +18 dBm</td><td>−6 to +18 dBm,
0 to +26 dBm (With Opt. 32)</td></tr>
<tr><td>Measurement method</td><td colspan="2">Sweep method:
Detects and displays the peak value after sweeping the designated frequency range with the spectrun analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive peak.
Spot method:
Displays the average value after measuring the designated frequency in time domein of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.
Search method:
Measures the frequency in time domein and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.</td></tr>
<tr><td>Storage mode</td><td colspan="2">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as Normal mode.</td></tr>
<tr><td rowspan="7">CCDF</td><td>Frequency range</td><td colspan="2">100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)</td></tr>
<tr><td>Reference level range</td><td>High Input:
−6 to +38 dBm,
−26 to +38 dBm (Pre-amp On)
Low Input:
−26 to +18 dBm,
−46 to +18 dBm (Pre-amp On)</td><td>−26 to +18 dBm,
−18 to +26 dBm (With Opt. 32),
−46 to +18 dBm (Pre-amp On)</td></tr>
<tr><td>Measurement method</td><td colspan="2">CCDF: Displays cumulative distribution of difference between instantaneous power and average power.
APD: Displays distribution of difference between instantaneous power and average power.</td></tr>
<tr><td>Data count</td><td colspan="2">10,000 to 2,000,000,000</td></tr>
<tr><td>Analysis time</td><td colspan="2">0.001 to 100 ms</td></tr>
<tr><td>Filter Selection</td><td colspan="2">22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α= 0.22, RC: α= 0.22</td></tr>
<tr><td>Trigger</td><td colspan="2">Free run: Regardless of the state of an input signal, a signal is taken in continuously.
Wide IF: A signals is taken in synchronizing with a video signal.
Trigger edge: Rise, Fall
Trigger delay: −10000 to +10000 us
Trigger level: High, Middle, Low
External: A signals is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back.
Trigger edge: Rise, Fall
Trigger delay: −10000 to +10000 us</td></tr>
<tr><td rowspan="2">Batch measurement(*4)</td><td>Measurement items</td><td colspan="2">Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Carrier leak, Spectrum flatness (at burst signal), TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Occupied frequency bandwidth, Adjacent channel leakage power, Spectrum mask, Spurious (Two tables can be chosen)
*”Adjacent channel leakage power” can be measued complying with “IEEE802.11a, HiSWANa, HiperLAN2”.</td></tr>
<tr><td>Judgement</td><td colspan="2">According to the judgement value set per measurement item, PASS or FAIL judgement is automatically performed for each measurement item.</td></tr>
</table>

■ IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 6/6

<table>
<tr><th colspan="2">Model</th><th>MX860830A</th><th>MX860930A</th></tr>
<tr><td rowspan="9">Symbol rate erroer measure-ment</td><td>Target System</td><td colspan="2">IEEE802.11a, IEEE802.11g(ERP-OFDM, DSSS-OFDM)</td></tr>
<tr><td>Frequency range</td><td colspan="2">100 MHz to 6 GHz</td></tr>
<tr><td>Measurement level range</td><td>High Input: −6 to +38 dBm,
Low Input: −26 to +18 dBm</td><td>−26 to +18 dBm,
−26 to +26 dBm (With Opt.32)</td></tr>
<tr><td>Analysis length</td><td colspan="2">250 to 1000 OFDM symbol (Setting resolution : 1 OFDM sysmbol)</td></tr>
<tr><td>Measurement range</td><td colspan="2">0.0 to 50.0 ppm</td></tr>
<tr><td>Measurement resolution</td><td colspan="2">0.1 ppm</td></tr>
<tr><td rowspan="2">Measurement accuracy</td><td colspan="2">[IEEE802.11a]
Frequency: 4.9 to 6 GHz
[IEEE802.11g(ERP-OFDM, DSSS-OFDM)]
Frequency: 2.4 to 2.5 GHz</td></tr>
<tr><td colspan="2">(MS8608A: Low Input)
± (reference frequency accuracy× 10^6 + 1.0) ppm
per OFDM symbol rate(250 kHz[= $(4\ \mathrm{us})^{-1}$]).</td></tr>
<tr><td>Storage mode</td><td colspan="2">Normal: Refresh waveform/data for each measurement.
Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as Normal mode.</td></tr>
</table>

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 1/4

*1: When burst interval is 20 us or less, the Wireless LAN software cannot measure the following item rightly:

1) Carrier off power, 2) On/Off ratio and 3) Burst rising/falling time.

Model		MX860830A	MX860930A
Modulation type		CCK, DQPSK, DBPSK	
Data rate		11, 5.5, 2, 1 Mbps, Auto (at burst signal only)	
Filter		No Filter Gaussian BT= 0.3 to 1.0 (setting resolution: 0.1) Rectangular Root Raised Cosine α= 0.30 to 1.00 (setting resolution: 0.01)	
Modulation analysis	Measurement items	Frequency (Carrier frequency, Carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)	
	Frequency range	100 MHz to 3 GHz	
	Measurement frequency intake range	Temperature: +18 to +35°C, setting frequency ±80 kHz	
	Measurement level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −26 to +26 dBm (With Opt. 32), −46 to +18 dBm (Pre-amp On)
	Carrier frequency accuracy	Frequency: 2.4 to 2.5 GHz, Input level: −10 dBm (MS8608A: Low Input), Averaging: 30 times, Temperature: +18 to +35°C ± (reference frequency accuracy × setting frequency +200 Hz)	
	Modulation accuracy	Frequency: 2.4 to 2.5 GHz, Input level: −10 dBm (MS8608A: Low Input), Averaging: 30 times, Temperature: +18 to +35°C 2.3%rms (typ.)	
	Display waveform	Constellation, EVM vs chip number, Phase error vs chip number, Eye-diagram	
	Constellation	Error scale: 5%, 10%, 20%, 35%, OFF (It is available when "Data rate" is not set to "Auto")	
	EVM vs chip	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Chip number 256 to 4096 chip	
	Phase error vs. Chip	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Chip number 256 to 4096 chip	
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: manual setting, auto setting (at burst signal only. When “Data rate” is set to “Auto”.)	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.	

■ **IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 2/4**

Model		MX860830A	MX860930A
RF Power	Frequency range	100 MHz to 3 GHz	
	Measurement level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −26 to +26 dBm (With Opt.32), −46 to +18 dBm (Pre-amp On)
	Measurement items[*1]	Average power, Maximum Power, carrier off power (at burst signal), burst on/off ratio (at burst signal), burst rising/falling time (at burst signal)	
	Burst average power accuracy	(MS8608A: Low Input) Frequency: 2.4 to 2.5 GHz, Averaging 30 times ≤±1.7 dB (Input level: −18 to 0 dBm), ≤±2.0 dB (Pre-amp On, Input level: −38 to 0 dBm)	
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from preamble signal (Preamble Search).	
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level (Ramp-down Detection).	
	Slot display	A time domain waveform is displayed. Vertical line: Unit = dBm, dB, % Horizontal line At burst signal: −20.0 us (fixed) to 5680.0 us (based on burst length) At continuous signal: 0.0 us to 5660.0 us (fixed)	
	Transient display	Displays zoom of the rising and falling edges of a slot. Vertical line: Unit = dBm, dB, % Horizontal line: 8.0 us to 40.0 us (setting resolution: 0.1 us)	
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only.)	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.	
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz	
	Reference level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −26 to +26 dBm (With Opt. 32), −46 to +18 dBm (Pre-amp On)
	Measurement method	BW (99%): 99% of the total radiation power is defined as the contained frequency width. BW (90%): Frequency bandwidth containing 90% of the total radiation power. This value is called “spreading bandwidth” in TELEC’s Technical Regulations Conformity Certification.	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.	

■ IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 3/4

Model		MX860830A	MX860930A
Spectrum mask	Frequency range	100 MHz to 3 GHz	
	Reference level range	High Input: +4 to +38 dBm, −16 to +38 dBm (Pre-amp On) Low Input: −16 to +18 dBm, −36 to +18 dBm (Pre-amp On)	−16 to +18 dBm, 0 to +26 dBm (With Opt. 32), −36 to +18 dBm (Pre-amp On)
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11b-1999 18.4.7.3 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.	
Spurious	Frequency range	9 kHz to 7.8 GHz	9 kHz to 13.2 GHz
	Reference level range	High Input: +14 to +38 dBm, Low Input: −6 to +18 dBm	−6 to +18 dBm, 0 to +26 dBm (With Opt. 32)
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrun analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive peak. Spot method: Displays the average value after measuring the designated frequency in time domein of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domein and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.	

■ **IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 4/4**

Model		MX860830A	MX860930A
CCDF	Frequency range	100 MHz to 6 GHz, 100 MHz to 3 GHz (Pre-amp On)	
	Reference level range	High Input: −6 to +38 dBm, −26 to +38 dBm (Pre-amp On) Low Input: −26 to +18 dBm, −46 to +18 dBm (Pre-amp On)	−26 to +18 dBm, −18 to +26 dBm (With Opt.32), −46 to +18 dBm (Pre-amp On)
	Measurement method	CCDF: Displays cumulative distribution of difference between instantaneous power and average power. APD: Displays distribution of difference between instantaneous power and average power.	
	Data count	10,000 to 2,000,000,000	
	Analysis time	0.001 to 100 ms	
	Filter Selection	22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α= 0.22, RC: α= 0.22	
	Trigger	Free run: Regardless of the state of an input signal, a signal is taken in continuously. Wide IF: A signals is taken in synchronizing with a video signal. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us Trigger level: High, Middle, Low External: A signals is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back. Trigger edge: Rise, Fall Trigger delay: −10000 to +10000 us	
Batch measurement	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset, TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Burst signal rising/falling time (at burst signal), Occupied frequency bandwidth, Spectrum mask, Spurious (Two tables can be chosen)	
	Judgement	According to the judgement value set per measurement item, PASS or FAIL judgement is automatically performed for each measurement item.	
Chip clock error measurement	Frequency range	100 MHz to 3 GHz	
	Measurement level range	High Input: −6 to +38 dBm, Low Input: −26 to +18 dBm	−26 to +18 dBm, −26 to +26 dBm (With Opt.32)
	Analysis length	11,000 to 44,000 chip (setting resolution: 1 chip)	
	Measurement range	0.0 to ±50.0 ppm	
	Measurement resolution	0.1 ppm	
	Measurement accuracy	(MS8608A: Low Input) Carrier frequency: 2.4 to 2.5 GHz, ±(reference frequency accracy × 10^6 + 1.0) ppm per chip rate(11 MHz).	
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.	

■ Electric performance (IQ input)

Model	MS8608A	MS8609A
Input impedance	1 MΩ (parallel capacitance <100 pF), 50Ω	
Balance input	Differential voltage: 0.1 to 1 Vpp (input terminals) In-phase voltage: ±2.5 V (input terminals)	
Unbalance input	0.1 to 1 Vpp (input terminals) DC/AC coupling Changeable	
Measurement items	[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Symbol rate error measurement [HiSWANa, HiperLAN2] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Chip clock error measurement.	
I/Q level measurement	Measures input level of I and Q (rms, p-p)	
I/Q phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.	

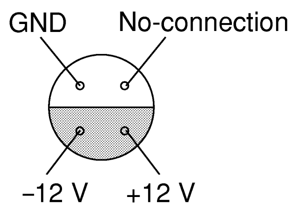
Section 2 Panel Layout and Operation Overview

This section provides the explanations of the front and rear panels, basic operation procedures, instructions on installing the measurement software and changing the measurement system, and setting the screen display colors.

2.1 Table of Front and Rear Panel Features

No.	Panel Marking	Explanation of Function
1	(LCD)	This is a 6.5" Type color TFT liquid crystal display (LCD). It displays the trace waveforms, the parameter settings, the values of marker, and the soft menu keys, etc.
2	Spectrum	This sets the MS268*A/MS860*A to the Spectrum Analyzer mode.
3	Signal Analysis Tx Tester	This sets the MS268*A/MS860*A to the Signal Analysis mode in which the measurement software operates.
4	Config	This displays the setup menu for GPIB interface or printer, etc.
5	F1 - F6	These are the soft keys for selecting the soft-key menus linked to the panel key operation. [More] This displays the next page of soft-key menus.
6	Freq/Ampl	This is the frequency and level parameter data input section. [Freq/Channel] Sets frequency. [Span] Sets frequency span. [Amplitude] Sets reference level. [–> CF] Sets peak level signal frequency on screen to center frequency. [–> RLV] Sets peak level on screen to reference level.
7	Marker	This section is related to operation of marker functions. [Marker] Sets marker. [Multi Mkr] Sets multimarkers. Press this key after pressing the [Shift] key. [Peak Search] Moves marker to currently-displayed peak level. [Marker –>] Sets parameter according to marker value. Press this key after pressing the [Shift] key.
8	System	This switches the measurement system in Signal Analysis mode.
9	Single	This sets the sweep mode. [Single] Executes single sweep. [Continuous] Executes continuous sweeping. Press this key after pressing the [Shift] key. The initial default is continuous sweeping.
10	Recall	This executes recall/save. [Recall] Reads measurement parameters and waveform data from internal memory or memory card. [Save] Saves measurement parameters and waveform data to internal memory or memory card.

No.	Panel Marking	Explanation of Function
11	Measure	This menu is for performing the various application measurements including frequency measurement, noise measurement, adjacent-channel leakage power measurement, etc.
12	Display	This section is for selecting the trace waveform. Normally, in the frequency domain, up to two trace waveforms can be displayed. The zero-span (Time Domain) mode is selected simply by pressing the [Time] key. [A, B] Displays trace A or B waveform in frequency domain. [A/B, A/BG] Displays trace A and B waveforms simultaneously, or displays trace A and BG (background frequency spectrum including trace A) simultaneously. [Time] Switches to zero span (Time domain) mode to display time domain waveforms. [A/Time] Displays trace A and the time domain waveform simultaneously.
13	Trig/Gate	This sets the trigger/gate functions. [Trig/Gate] Sets the sweep-start trigger and gate (to control waveform-data write timing) functions.
14	Coupled Function	This sets the RBW, VBW, sweep time and input attenuator. [BW] Sets RBW and VBW. [SWP Time] Sets sweep time. [Atten] Sets input attenuater
15	Entry	These keys set the numeric data, units and special functions. [Rotary knob] Used for moving marker and inputting data. [∨, ∧] Increments and decrements input data. [Shift] To execute panel functions indicated by blue letters, press this key and then press the blue-lettered key. [BS] Backspace key for correcting input mistakes. [0-9, . , +/–] Numeric-data setting keys. [GHz, MHz, kHz, Hz] Units keys for frequency, level, time, etc. [set] Key for setting parameters. [Cancel] This cancels the entry that be able to set with key.
16	Preset	This sets the measurement parameters to the default values.
17	Local	This changes the remote status to the local status.
18	Disp On/Off	This sets the liquid crystal display On/Off.
19	Copy	This outputs a hard copy of the screen to a printer or memory Card.

No.	Panel Marking	Explanation of Function
20	Stby/On	This is the power switch. It can be used when the back-panel power switch is on. The power-on condition is fetched from the Stby condition when the key is pressed for about 1 second. The equipment is returned to the Stby condition from the power-on condition when the key is pressed again for about 1 seconds.
21	RF Input High Power Input	This is the RF input connector. For MS8608A, This is the High Power input connector.
22	I/Q Input	This is the I/Q Input connector. (Input I and Q for Unbalance, and I/$\overline{I}$ and Q/$\overline{Q}$ for Balance.) These connectors are mounted when MS2681A/MS2683A-17 or 18, or MS2687A/MS2687B-18 option is installed.
23	Probe Power	This is the connector that supplies ±12 V for a FET probe. Pin allocation is shown below. 
24	Memory Card	This is the slot to set memory cards which save/load the wave-form data and measurement parameters etc.
25	Hi power	This is the setting key of on input connector. It is the function of only MS8608A. [Hi Power] The High power input connector is used. [Low Power] The Low power input connector is used.
26	Low Power Input	This is the Low power input connector. For MS8608A.
50	(Fan)	This is the cooling fan for ventilating internally-generated heat. Leave a clearance of at least 10 cm around the fan.
51	10 MHz STD	They are the input connector for an external reference crystal oscillator and the output connector of the 10 MHz Reference signal. When an external reference signal is input, the equipment switches automatically from the internal signal to the external signal. If an external signal is input, the heater of the internal OCXO is switched off.
52	IF Output	This is the IF output connector. This signal is bandwidth controlled by the RBW setting.
53	Wideband IF OUTPUT	This is the wideband IF output connector. This signal is not bandwidth controlled by the RBW setting.

No.	Panel Marking	Explanation of Function
54	Sweep (X)	This is a output connector for sweep signal (X).
55	Video (Y)	This connector output a Y-axis signal that is proportional to the video detection signal output and is logarithmically compressed at log scale.
56	SWP Status (Z)	This is a output connector for sweep status signal (Z).
57	Trig/Gate In (±10 V)	This is an input connector for external trigger/gate signal.
58	Off/On	This is the AC line power switch.
59	(Inlet)	This is the fused AC power inlet to which the supplied power cord is connected. It contains a time-lag fuse.
60	(Ground Terminal)	Connect this frame ground terminal to ground to prevent risk of an accidental electric shock.
61	Parallel	This is the Parallel connector. Connect it to a printer.
62	VGA Out	This is the VGA signal output connector.
63	GPIB	This connector is for use with a GPIB interface. It is connected to an external system controller.
64	RS-232C	This is the RS-232C connector. Connect it to an external system controller.
65	Ethernet	This is the 10 Base-T connector for Ethernet. Connect this to the external system controller.
66	Name plate	This shows a production number and options.

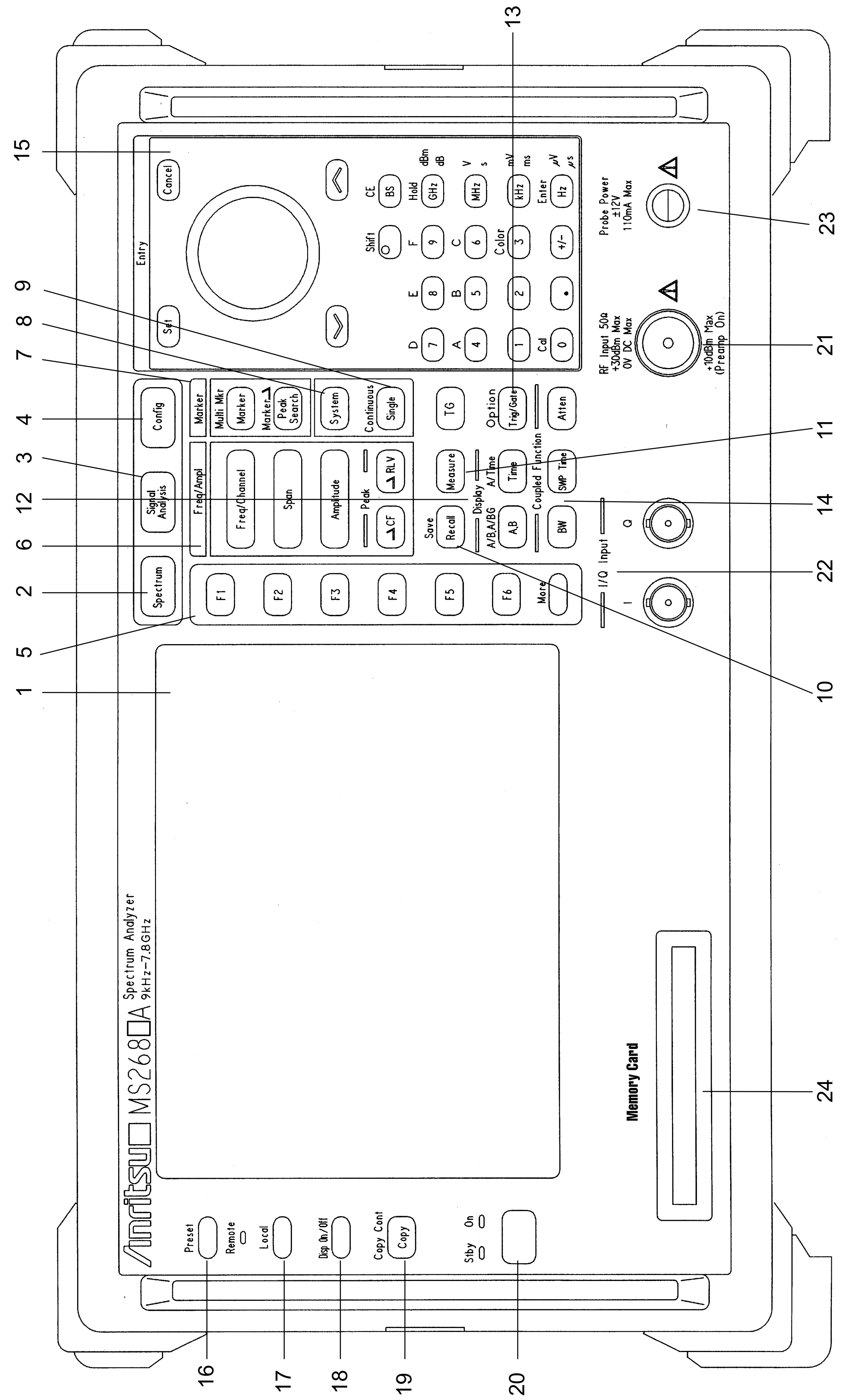


Fig. 2-1 Front Panel of MS2681A/MS2683A/MS2687A/ MS2687B

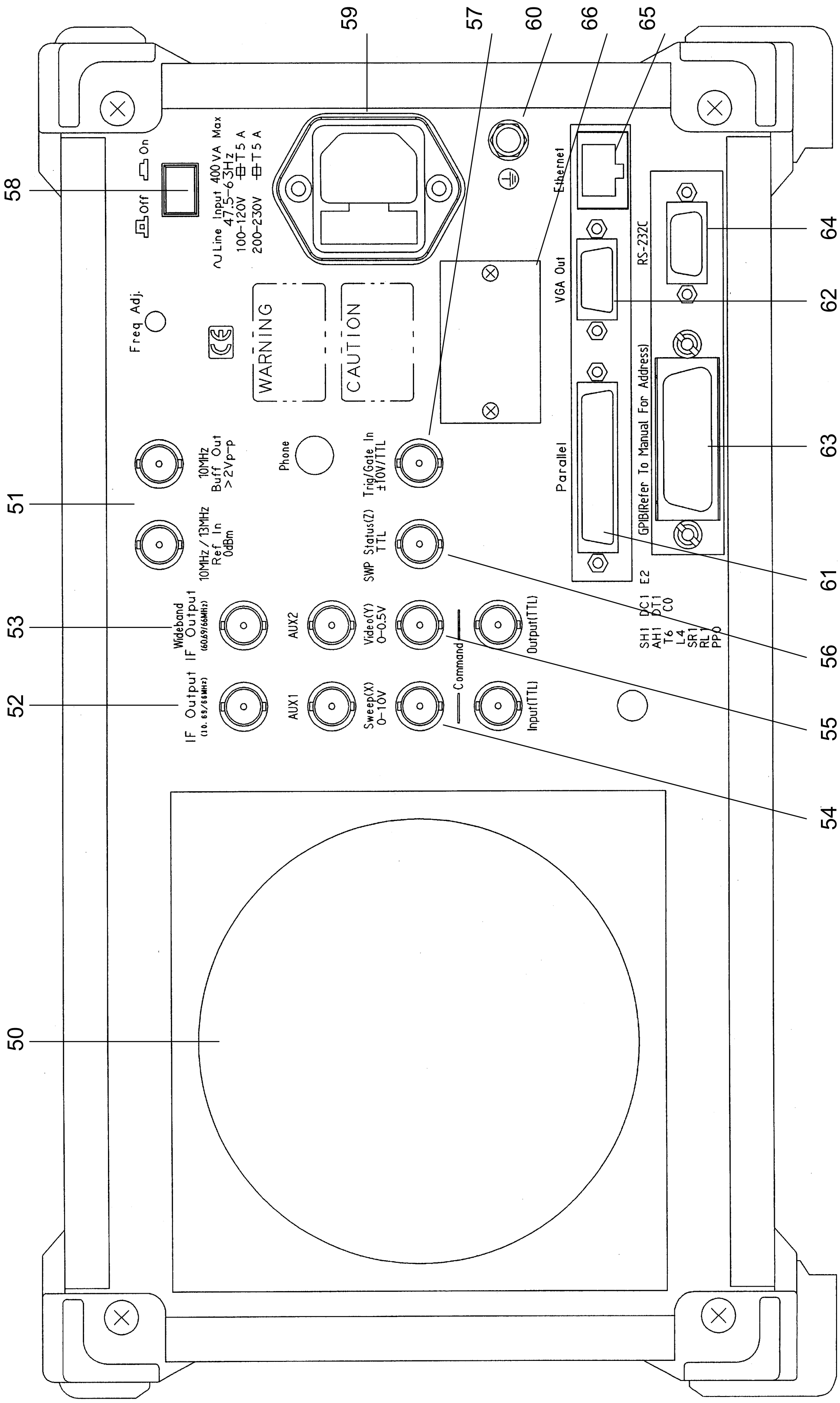


Fig. 2-2 Rear Panel of MS2681A/MS2683A/MS2687A/MS2687B

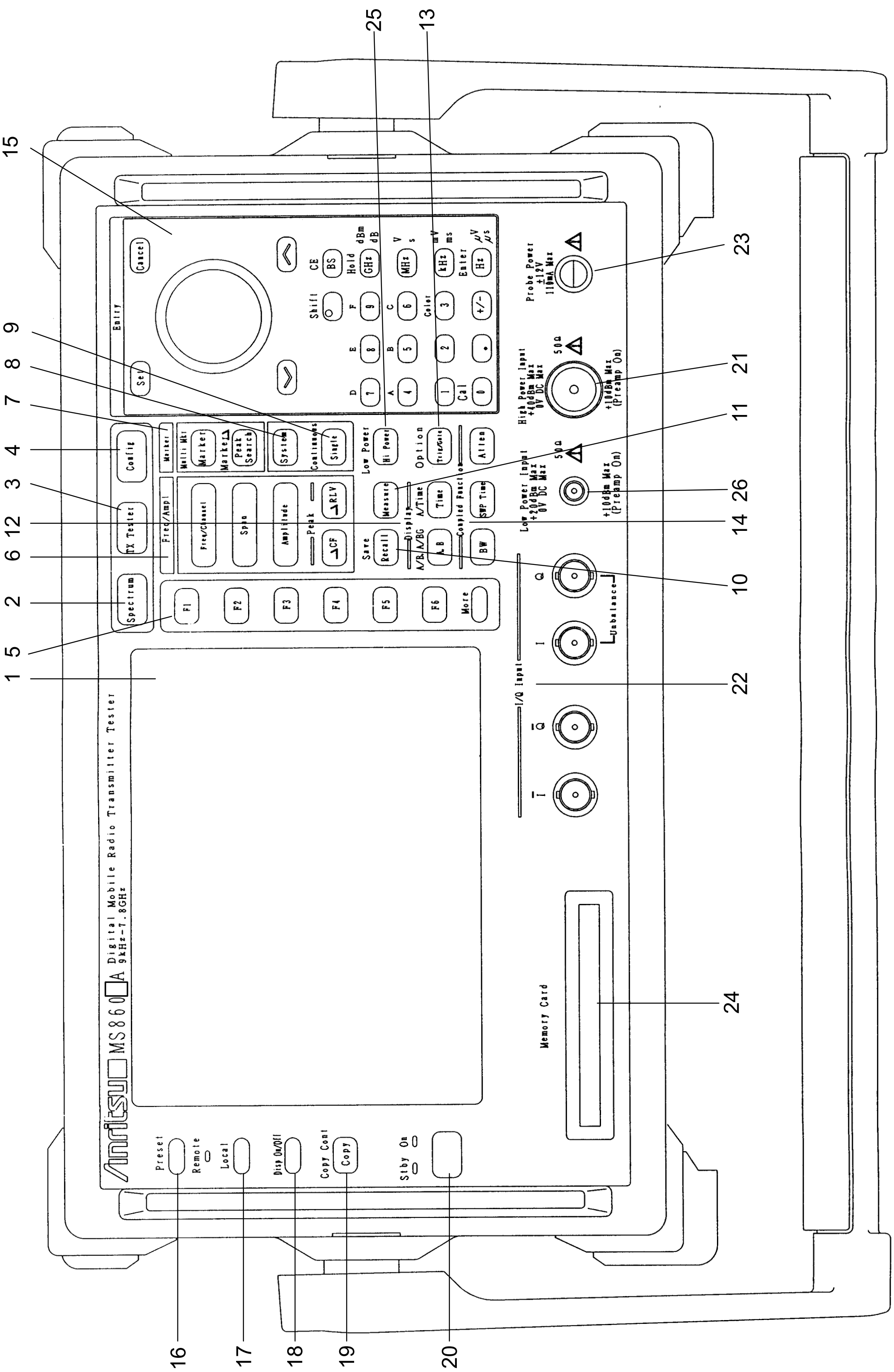


Fig. 2-3 Front Panel of MS8608A/MS8609A

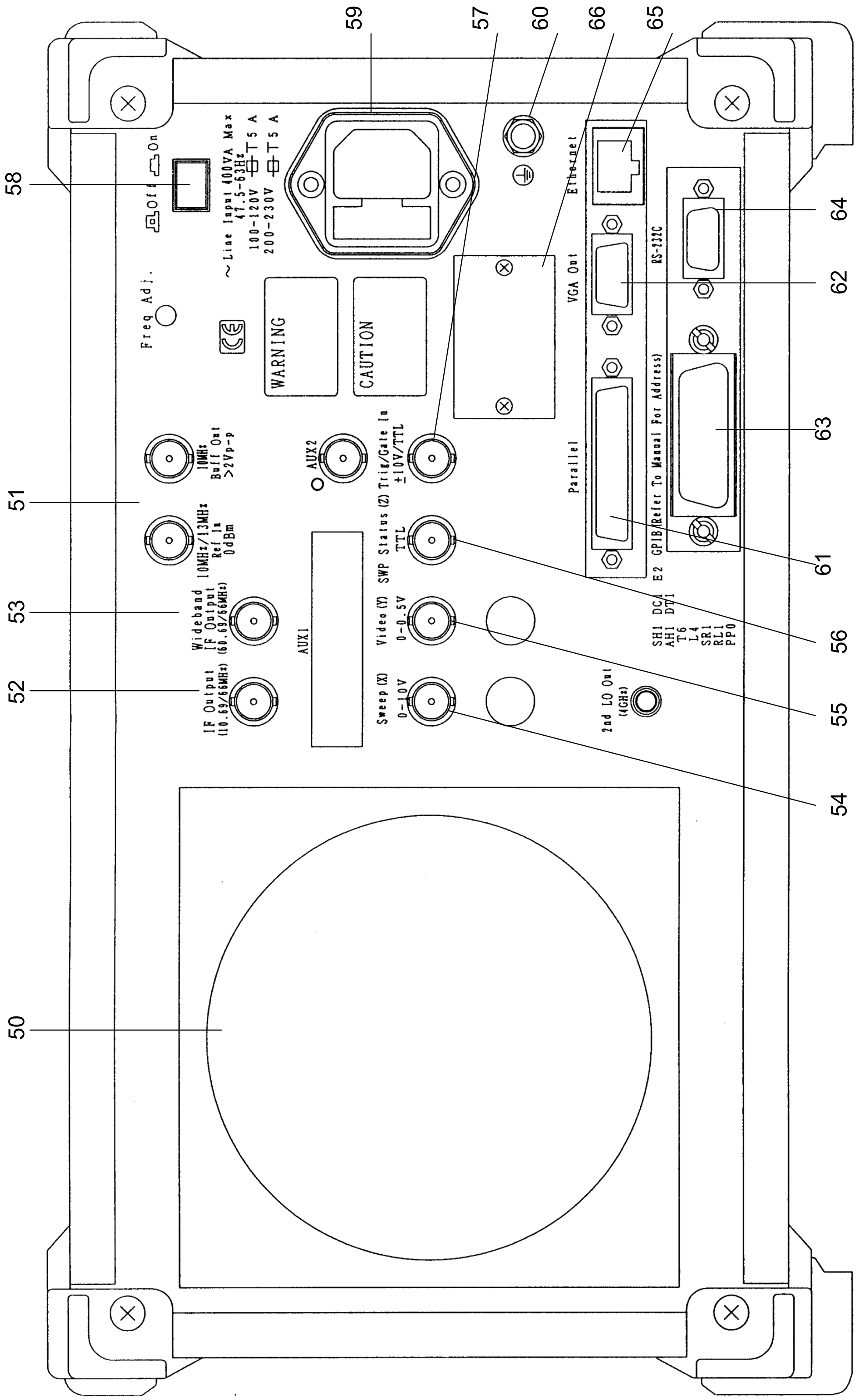


Fig. 2-4 Rear Panel of MS8608A/MS8609A

2.2 Basic Operation

This section describes the basic operation and typical parameter setting method.

2.2.1 Turn the power on

Press the standby button on the rear panel, then press the power switch on the front panel. In this case, continue pressing the power switch on the front panel for one second or more.

Note:

The power is turned on/off only when the power switch on the front panel is pressed for one second or more. This prevents the power from being turned on/off easily by mistake.

To make full use of this equipment, turn the Line Input power switch to On (this turns on the Stby (power) lamp on the front panel) at least 30 minutes before use. The internal reference frequency oscillator is pre-heated and results in stable operation.

2.2.2 Selecting item

The item with a cursor on the screen indicates that the parameter can be changed, as below.
Some parameters can be set after pressing the corresponding function key, as below.

Setting item with cursor

Move the cursor at the item to be selected using [∧] and [∨] (Entry keys) and the rotary knob.
Then, press [Set] (Entry key) to confirm the item, and the parameter setting window is open.

Setting item with function key

Press the function key (any of [F1] to [F6] key) to open the parameter setting window.
Some parameters are set or screen shifted only by pressing a function key.
Those differences can be distinguished with the sign currently displayed on the upper right of a function key.

The meaning of the sign at the upper right of function key

→ : Shifts to another screen.

: Open parameter setting window.

$: Some values are changed in order.

None : When pressed, it immediately is executed. change of ON/OFF of Marker etc.

2.2.3 Setting parameter on parameter setting window

Setting parameter on the parameter setting window has two types of procedures.

(1) Select one of the parameters shown in the window.

(2) Input a value.

Selecting one of the parameters shown in the window

Move the cursor at the parameter to be selected using ∧ and ∨ (Entry keys) or the rotary knob.

Then, press Set (Entry key) to confirm the parameter.

The window closes.

Inputting value

Input a value using the ten-key pad or the rotary knob.

Then, press a unit key or Set (Entry key) to confirm the parameter.

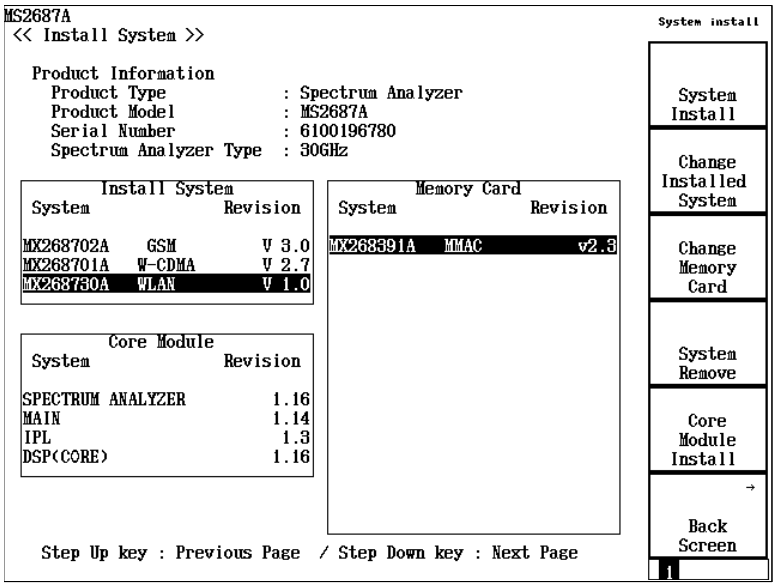
The window closes.

2.3 Installing Measurement Software

Install the desired measurement software (sold separately) of the MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A in the Signal Analysis mode, as follows:

To install a new measurement software on the MS2681A/MS2683A/ MS2687A/ MS2687B/ MS8608A/ MS8609A,an installation key for the system must be registered. Refer to the separate "MS268*A Spectrum Analyzer operation manual Vol.1 Main Unit" or "MS860*A Digital Mobile Radio Transmitter Tester operation manual vol.1 Main Unit" about the method of registering an installation key.

Step	Procedure
1	Insert a memory card on which the measurement software is saved into the memory card slot on the panel.
2	Press [Config] to display the Config screen.
3	Press [F4] (System Install) to display the Install System screen (shown below).



Step	Procedure
4	Press [F2] (Change Installed System) to make the Install System box active.
5	Select the install destination for the new measurement system using the rotary knob.
6	Press [F3] (Change Memory Card) to make the Memory Card box active.
7	Select the new measurement system using the rotary knob.
8	Press [F1] (System Install) to install the new system.

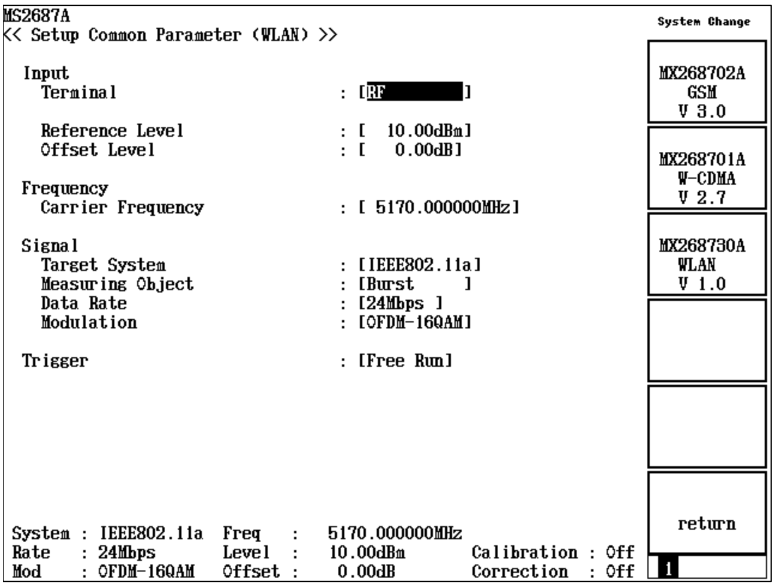
Step	Procedure
9	The confirmation window opens. Move the cursor to “Yes” using the rotary knob.
10	Press Set (Entry key) to start installation.
11	After installation is completed, the new measurement system screen appears.

2.4 Changing Measurement System

To use the MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A with multiple measurement software (sold separately) installed, in the Signal Analysis mode; change the measurement system to the desired system, as follows:

When measurement software registered is only one , changing measurement system cannot do.

Step	Procedure
1	Press [Signal Analysis] to display the measurement system screen.
2	Press [System] to display the System Change function label (shown below).



Step	Procedure
3	All the installed measurement systems are displayed at function labels.
4	Press the function key for the measurement system to be set.
5	The measurement system is changed over.
6	After the setting is completed, a new system screen appears.

A measurement system not displayed in the function labels cannot be set. Refer to Section 2.3 "Installing Measurement Software" to install a new measurement system.

2.5 Setting Screen Colors

The method for setting the screen display colors are explained here.
The screen colors are selectable from four preset color patterns and one user-defined color pattern.

- Pressing [Shift] + [3] (Color) displays the function labels shown below. Select one to be used:
  - [F1] (Color Pattern 1): Sets the Color Pattern 1 (default at shipment)
  - [F2] (Color Pattern 2): Sets the Color Pattern 2
  - [F3] (Color Pattern 3): Sets the Color Pattern 3
  - [F4] (Color Pattern 4): Sets the Color Pattern 4
  - [F5] (Define User Color): Sets the user-defined color pattern

Setting the user-defined color pattern

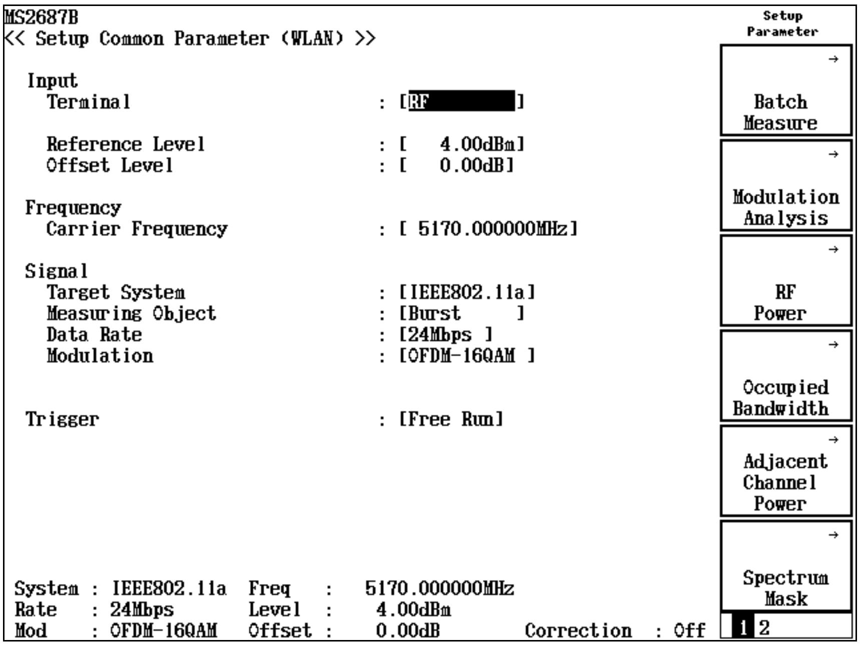
- Pressing [F5] (Define User Color) changes the display color pattern to the userdefined one and displays the function labels shown below:
  - [F1] (Copy Color Ptn from): Displays the function labels to select from Color Pattern 1 to 4 as the base color for setting the user-defined color pattern.
  - [F2] (Select Item): Selects item for which the display color is to be set.
  - [F3] (Red): Sets the intensity of red for the item selected by Select Item.
  - [F4] (Green): Sets the intensity of green for the item selected by Select Item.
  - [F5] (Blue): Sets the intensity of blue for the item selected by Select Item.

Section 3 Measurement

This section provides an explanation of the parameters to be set on each screen, and instructions on setting them.

3.1 Setting Measurement Parameters

To set parameters for measurement, such as input connector and frequency; use the Setup Common Parameter screen.
In MX268*30A,Press Signal Analysis to display the Setup Common Parameter screen. In MX860*30A,Press Tx Tester to display the Setup Common Parameter screen. Then, press Preset to move to the measurement screen.
The Setup Common Parameter screen is shown below.



3.1.1 Setting signal input connector (Terminal)

Select a connector to input signals from the DUT (Device Under Test) to be measured as shown below.

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to "Terminal" item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the terminal type to select.
5. Press [Set].

When the setting is completed, the selected terminal is displayed in square brackets [ ] at the right of "Terminal" item.
The following connector (terminal) settings are available.

- RF: Selects the RF input connector.
  In MS8608A, High Power input or Low Power input is chosen.
  Change of High Power input and Low Power input is performed as follows.
  Setting High Power input : Press [Hi Power].
  Setting Low Power input : Press [Shift] and Press [Hi Power].
- IQ-DC: Selects the IQ input connector.
  One of the IQ input connectors identified as "Unbalance" is used.
  In this case, the DC connection is used to connect the internal circuit.
- IQ-AC: Selects the IQ input connector.
  One of the IQ input connectors identified as "Unbalance" is used.
  In this case, the AC connection is used to connect the internal circuit.
- IQ-Balance: Selects the IQ input connector.
  A differential signal is input using I and $\bar{I}$ or Q and $\bar{Q}$.

If the IQ input is selected, the "Impedance" item is displayed in the bottom and the input impedance of 50 Ω or 1 MΩ can be selected. Select either of them according to the output impedance of the DUT.

The IQ-DC, IQ-AC, and IQ-Balance input are enabled only if main unit options 17 and 18 are installed.
IQ-Balance input cannot be used by MS2687A/MS2687B.

3.1.2 Setting RF input level (Reference Level)

Set the input level for the RF signal from the DUT to be measured as shown below.

1. Press ∧ ∨ (Entry keys) or turn the rotary knob to move the cursor to "Reference Level" item.
2. Press Set or input a value to set using the numeric keypad.
3. The setting window opens.
4. Press ∧ ∨ (Entry keys), turn the rotary knob, or use the numeric keypad to input a value to set.
5. Press Set.

When the setting is completed, the set level appears in the square brackets [ ] at the right of the "Reference Level" item.

This item does not appear as long as the IQ input connector is selected. This setting can be changed to an optimal value by using the Adjust Range function on the measurement screen.

3.1.3 Setting level correction factor (Offset Level)

Set the user-defined level correction factor as shown below.

1. Press ∧ ∨ (Entry keys) or turn the rotary knob to move the cursor to “Offset Level” item.
2. Press Set or input a value you wish to set using the numeric keypad.
3. The setting window opens.
4. Press ∧ ∨ (Entry keys) or turn the rotary knob, or use the numeric keypad to input a value you wish to set.
5. Press Set.

When setting is completed, the level correction factor is shown in square brackets [ ] at the right of the “Offset Level” item.
The value obtained from the following formula is displayed as the measured result for the level.
RF level displayed as measured result = Measured value + Offset Level

Examples:
1. The correction factor is set at −20 dB to obtain the measured result at the DUT output connector when a 20-dB amplifier is inserted between the DUT and this Spectrum Analyzer.
2. The correction factor is set at +10 dB to obtain the measured result at the DUT output connector when a 10-dB attenuator is inserted between the DUT and this Spectrum Analyzer.

Offset Level is not displayed when the IQ input connector is selected.

3.1.4 Setting frequency (Carrier Frequency)

Set the frequency for the signal from the DUT to be measured as shown below.

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to Carrier Frequency.
2. Press [Set] or input a value you wish to set using the numeric keypad.
3. The setting window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input a value you wish to set.
5. Press [Set].

When setting is completed, the set frequency appears in square brackets [ ] for the Carrier Frequency.
Carrier Frequency is not displayed when the IQ input connector is selected.

3.1.5 Setting system to be measured (Target System)

Set the communications standards for the system to be measured.

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to “Target System” item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item to select.
5. Press [Set].

When the setting is completed, the set communication standards appear in the square brackets [ ] at the right of the “Target System” item.
The following settings are available.

- IEEE802.11a:
  IEEE Std 802.11a, a 5 GHz band communications standard formulated by the Institute of Electrical and Electronic Engineers (IEEE)
- HiperLAN2:
  ETSI TS 101 475, a 5 GHz band communications standard formulated by the European Telecommunications Standard Institute (ETSI)
- HiSWANa:
  ARIB STD-T70, a 5 GHz band communications standard formulated by the Association of Radio Industries and Businesses
- IEEE802.11b:
  IEEE Std 802.11b, a 2.4 GHz band communications standard formulated by the IEEE
- IEEE802.11g (ERP-DSSS/CCK):
  IEEE Std 802.11g, a 2.4 GHz band communications standard formulated by the IEEE, with the DSSS modulation or CCK modulation method.
- IEEE802.11g (ERP-OFDM):
  IEEE Std 802.11g, a 2.4 GHz band communications standard formulated by the IEEE, with the OFDM modulation method.
- IEEE802.11g (DSSS-OFDM):
  IEEE Std 802.11g, a 2.4 GHz band communications standard formulated by the IEEE, with the DSSS-OFDM modulation method.

CAUTION ⚠

When Target System is HiperLAN2, note that the following measurements cannot be performed:

1. **Measurement in MAC frame units**
2. **Measurement of signals for which the modulation mode changes in the middle of measurement, including:**
   a. **Burst signals for the which modulation mode changes within a burst**
   b. **Continuous signals for which the modulation mode changes in the middle of measurement (except for constant modulation)**
3. **Power time mask measurement**

3.1.6 Setting signal to be measured (Measuring Object)

Set the type of signal to be measured.

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to "Measuring Object" item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item to select.
5. Press [Set].

When the setting is completed, the set target signal appears in the square brackets [ ] at the right of the "Measuring Object" item.
The following setting is available.

- Burst: Measures the burst signals conforming to the communications standard.
- BC-Burst: Measures the Broadcast burst signals conforming to the communications standard HiSWANa.
- DL-Burst: Measures the Downlink burst signals conforming to the communications standard HiSWANa.
- UL-Burst: Measures the Uplink burst signals conforming to the communications standard HiSWANa.
- Burst(ALL): Measures the all burst signals conforming to the communications standard HiSWANa.

- Continuous: Measures the continuous signals conforming to the communications standard.

When chosen except the communications standard HiSWANa,it does not display BC_Burst, DL_Burst, UL_Burst, and Burst(All) . When each burst interval is 3.2 or more msec, it may be unable to measure correctly.

3.1.7 Setting signal transmission rate (Data Rate)

Set the transmission rate for the signal to be measured.

1. Press (∧) (∨) (Entry keys) or turn the rotary knob to move the cursor to "Data Rate" item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press (∧) (∨) (Entry keys) or turn the rotary knob to move the cursor to the item to select.
5. Press [Set].

When the setting is completed, the set transmission rate appears in the square brackets [ ] at the right of the "Data Rate" item.
According to the set transmission rate, the modulation method is automatically set to conform to the communications standard.
When "Auto" is set for the Data Rate, the transmission rate, modulation method and signal length are automatically recognized within the measuring instrument, and are set to the recognized values. Note that the modulation method and signal length cannot be set when "Auto" is set for the Data Rate.
In a communications standard HiSWANa, when the preamble interval of ACH and Uplink is 0 μ sec, it cannot measure.
The transmission rate that can be set and the modulation method that is automatically set according to the rate are shown below:

IEEE802.11a communication standard:

Transmission rate	Modulation method
6 Mbps	OFDM-BPSK
9 Mbps	OFDM-BPSK
12 Mbps	OFDM-QPSK
18 Mbps	OFDM-QPSK
24 Mbps	OFDM-16QAM
36 Mbps	OFDM-16QAM
48 Mbps	OFDM-64QAM
54 Mbps	OFDM-64QAM
Auto	

HiperLAN2 communication standard:

Transmission rate	Modulation method
6 Mbps	OFDM-BPSK
9 Mbps	OFDM-BPSK
12 Mbps	OFDM-QPSK
18 Mbps	OFDM-QPSK
27 Mbps	OFDM-16QAM
36 Mbps	OFDM-16QAM
54 Mbps	OFDM-64QAM

HiSWANa communication standard:

Transmission rate	Modulation method
6 Mbps	OFDM-BPSK
9 Mbps	OFDM-BPSK
12 Mbps	OFDM-QPSK
18 Mbps	OFDM-QPSK
27 Mbps	OFDM-16QAM
36 Mbps	OFDM-16QAM
54 Mbps	OFDM-64QAM
Auto	

IEEE802.11b communication standard:

Transmission rate	Modulation method
1 Mbps	DBPSK
2 Mbps	DQPSK
5.5 Mbps	CCK-5.5 Mbps
11 Mbps	CCK-11 Mbps
Auto	

IEEE802.11g (ERP-DSSS/CCK) communication standard:

Transmission rate	Modulation method
1 Mbps	DBPSK
2 Mbps	DQPSK
5.5 Mbps	CCK-5.5 Mbps
11 Mbps	CCK-11 Mbps
Auto	

IEEE802.11g (ERP-OFDM) communication standard:

Transmission rate	Modulation method
6 Mbps	OFDM-BPSK
9 Mbps	OFDM-BPSK
12 Mbps	OFDM-QPSK
18 Mbps	OFDM-QPSK
24 Mbps	OFDM-16QAM
36 Mbps	OFDM-16QAM
48 Mbps	OFDM-64QAM
54 Mbps	OFDM-64QAM
Auto	

IEEE802.11g (DSSS-OFDM) communication standard:

Transmission rate	Modulation method
6 Mbps	OFDM-BPSK
9 Mbps	OFDM-BPSK
12 Mbps	OFDM-QPSK
18 Mbps	OFDM-QPSK
24 Mbps	OFDM-16QAM
36 Mbps	OFDM-16QAM
48 Mbps	OFDM-64QAM
54 Mbps	OFDM-64QAM
Auto	

3.1.8 Setting signal modulation method (Modulation)

Sets the modulation method for the measured signal.

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to “Modulation.”
2. Press [Set] Entry key.
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
5. Press [Set].

When the setting is completed, the set modulation method appears in [ ] for Modulation. The following settings are available:

- OFDM-BPSK: OFDM (Orthogonal Frequency Division Multiplex) modulation. For each sub-carrier, BPSK (Binary Phase Shift Keying) is used.
- OFDM-QPSK: OFDM modulation. For each sub-carrier, QPSK (Quadrature Phase Shift Keying) is used.
- OFDM-16QAM: OFDM modulation. For each sub-carrier, 16QAM (16-Quadrature Amplitude Modulation) is used.
- OFDM-64QAM: OFDM modulation. For each sub-carrier, 64QAM (64-Quadrature Amplitude Modulation) is used.
- DBPSK: DBPSK (Differential Binary Phase Shift Keying) modulation
- DQPSK: DQPSK (Differential Quadrature Phase Shift Keying) modulation
- CCK-5.5 Mbps: CCK (Complementary Code Keying) modulation. Transmits 4 bits per symbol.
- CCK-11 Mbps: CCK modulation. Transmits 8 bits per symbol.

3.1.9 Setting filter (Filter)

Set whether filter processing should be used when analyzing signals conforming to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to “Filter” item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item to select.
5. Press [Set].

When the setting is completed, the set filter appears in the square brackets [ ] at the right of the “Filter” item.
The following settings are available.

- No Filter: Analyzes signals without using the filter processing.
- Rectangular: Analyzes signals that passed through the rectangular filter.
- Gaussian: Analyzes signals that passed through the Gaussian filter. Refer to Section 3.1.10, “Setting BT product (BT)” for more information on the BT product.
- Root Raised Cos: Analizes signals that passed through the Root Raised Cosine filter. Refer to 3.1.11, “Setting roll off factor (α)” for more information on the roll off factor setting.

This item does not appear if communications standard other than IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) is selected.

3.1.10 Setting BT product (BT)

Set the BT product when the Gaussian filter is selected as described in Section 3.1.9, “Setting Filter.”

1. Press ⌃ ⌄ (Entry keys) or turn the rotary knob to move the cursor to "BT" item.
2. Press Set or input a value to set using the numeric keypad.
3. The setting window opens.
4. Press ⌃ ⌄ (Entry keys), turn the rotary knob, or use the numeric keypad to input a value to set.
5. Press Set.

When the setting is completed, the set BT product appears in the square brackets [ ] at the right of the “BT” item.

This item does not appear if communications standard other than IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) is selected or if any other filter than the Gaussian filter is selected.

3.1.11 Setting roll off factor (α)

Set the roll off factor when the Root Raised Cosine filter is selected as de-scribed in Section 3.1.9, “Setting Filter.”

1. Press ⌃ ⌄ (Entry keys) or turn the rotary knob to move the cursor to “α” item.
2. Press Set or input a value to set using the numeric keypad.
3. The setting window opens.
4. Press ⌃ ⌄ (Entry keys), turn the rotary knob, or use the numeric keypad to input a value to set.
5. Press Set.

When the setting is completed, the set roll off factor appears in the square brackets [ ] at the right of the “α” item.

This item does not appear if communications standard other than IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) is selected or if any other filter than the Root Raised Cosine filter is selected.

3.1.12 Setting trigger (Trigger)

Set the trigger mode as shown below.
This function is valid only during CCDF measurement.

- Setting the trigger mode

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to Trigger item.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
5. Press [Set].

When setting is completed, the set trigger mode (shown below) appears in square brackets [ ] on the "Trigger" line.

- Free Run: Detects and measures the burst in accordance with the internal timing.
- Wide IF: Detects and measures the burst by an internal Wide IF Video trigger.
- External: Measures the first burst detected starting from the point in time when an external trigger signal is first received from Trig/Gate In connector on the rear panel.

When Wide IF is selected, the edge and delay of the trigger signal must be set.
When External is selected as trigger mode, the edge and delay of the trigger signal must be set as shown below.

- Setting trigger edge

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to Trigger Edge.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
5. Press [Set].

When the setting is completed, the set condition (shown below) appears in square brackets [ ] on “Trigger Edge” line.

- Rise: Synchronizes with the rising edge (of the pulse signal) of the trigger signal.
- Fall: Synchronizes with the falling edge (of the pulse signal) of the trigger signal.

- Setting trigger delay

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to Trigger Delay.
2. Press [Set] or input the value you wish to set using the numeric keypad.
3. The setting window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input the value you wish to set.
5. Press [Set].

When the setting is completed, the set delay time appears in square brackets [ ] on the “Trigger Delay” line.

- Setting trigger level

1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to Trigger Level.
2. Press [Set] (Entry key).
3. The selection window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
5. Press [Set].

When the setting is completed, the set condition (shown below) appears in square brackets [ ] on “Trigger Level” line.

- Low: Sets the trigger measurement start level to “Low.”
- Middle: Sets the trigger measurement start level to “Middle.”
- High: Sets the trigger measurement start level to “High.”

3.1.13 Setting table for frequency characteristic correction factors (Correction)

To correct the frequency-dependent values (such as characteristics and loss of the cable for connecting the measuring object with the Analyzer); the correction factors can be stored in the internal memory of the spectrum analyzer and the measured values can be displayed after adding these correction factors to the measured values.
The use of this function enables direct reading of the required measured values on the analyzer.

Refer to the separate "MS268*A Spectrum Analyzer operation manual Vol. 2, Detailed Panel Operation" or "MS860*A Digital Mobile Radio Transmitter Tester operation manual Vol.2, Detailed Panel Operation" for more information on how to store the frequency characteristic correction factors (correction data) in the internal memory of the spectrum analyzer.

Five correction factor tables can be stored in the internal memory.
How to select a correction factor table from among the five tables internally stored, is described below.

- Selecting correction factor table

1. Press [Amplitude] to display the Amplitude function label at the function keys.
2. Press [F4] (Correction) to open the window to select a correction factor table.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the correction factor table you wish to select.
4. Press [Set].

When the setting is completed, the set correction factor table is displayed in the Correction field at the lower right of the screen.

3.1.14 Setting pre-amplifier (Pre Ampl.)

This function is available when the optional MS2681A-08/MS2683A-08/MS8608A-08/MS8609A-08 is installed.

- Setting Pre-Amplifier

1. Press [Amplitude] to display the Amplitude function label at the function keys.
2. Press [F5] (Pre Ampl.) to switch the Pre-Amplifier function ON and OFF.

When the setting is completed, “On” or “Off” is displayed in the Pre Ampl field at the lower right of the screen.

When the screen is moved to the Spurious Emission measurement screen while the Pre-Amplifier function is set to ON, it is forcibly set to OFF.

3.2 Analyzing Modulation Accuracy

Press [F2] (Modulation Analysis) on the Setup Common Parameter screen to move to the Modulation Analysis screen for modulation accuracy analysis measurement.

This section explains the measured results and setting parameters shown on the Modulation Analysis screen (modulation accuracy analysis) as well as operation cautions.

3.2.1 Explanation of measured results

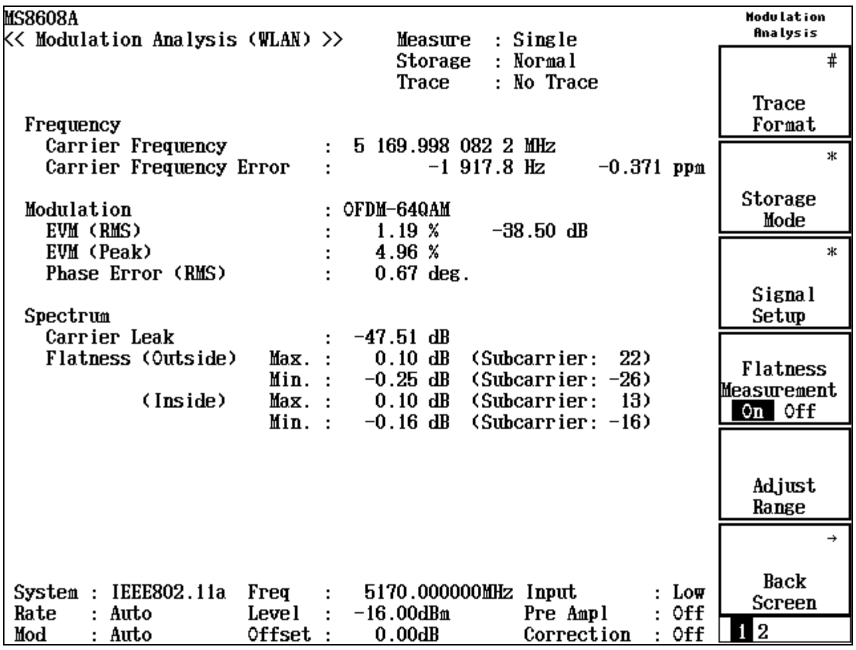
This section explains the measured results shown on the Modulation Analysis screen (modulation accuracy analysis). Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. For the RF input level adjustment method, refer to Section 3.2.15, “Optimizing measurement range (Adjust Range).”

Results of modulation accuracy measurement

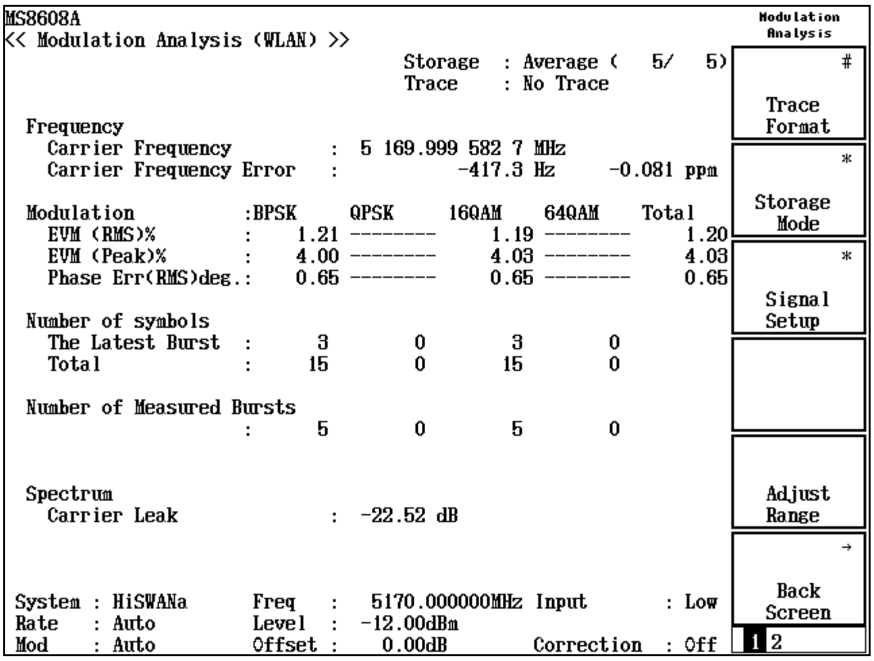
The screen shown below appears when “No Trace” is selected for Trace Format. Refer to Section 3.2.2, “Changing waveform display format” for more information on how to set the trace format.

Communication standard: IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

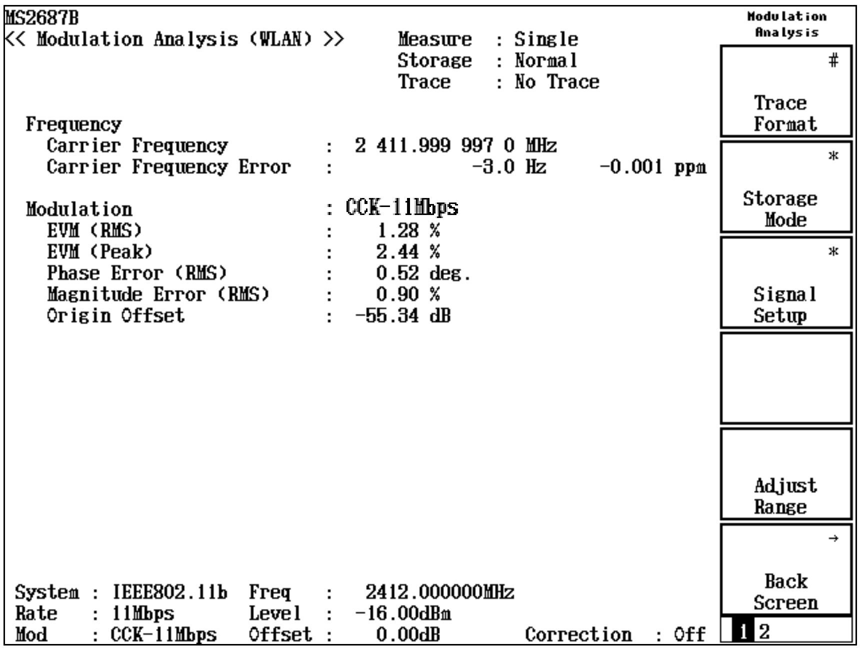
When communication standard HiSWANa is chosen,Data Rate is except Auto.



Communication standard: HiSWANa
Date Rate is Auto.



Communication standard: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)



Frequency

(1) Carrier Frequency

Displays the frequency of the measured signal obtained by the phase-locus method in MHz units.

(2) Carrier Frequency Error

Displays the above Carrier Frequency error against the set frequency in Hz and ppm units.

Modulation

(1) Modulation

Displays the modulation method for the measured signal.

(2) EVM (RMS)

Displays the effective value of the error vector magnitude (in % and dB units) of the signal measured at the symbol judgment point.
Note that the % unit value only is displayed for the communication standard of IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK).

When Communication standard is HiSWANa and Data Rate is Auto, displays a measurement result of every modulation method.

(3) EVM (Peak)

Displays the maximum value of the error vector magnitude (in % units) of the signal measured at the symbol judgment point.

When Communication standard is HiSWANa and Data Rate is Auto, displays a measurement result of every modulation method.

(4) Phase Error (RMS)

Displays the effective value of the phase error (in degree units) of the signal measured at the symbol judgment point.

When Communication standard is HiSWANa and Data Rate is Auto, displays a measurement result of every modulation method.

(5) Magnitude Error (RMS)

Displays the effective value of the magnitude error (in %) of the signal measured at the symbol judgment point.

(6) Origin Offset

Displays the origin offset (in dB units) of the signal measured.

Number of symbols

(1) The Latest Burst

When Communication standard is HiSWANa and Data Rate is Auto, measured number of OFDM symbols is displayed for every modulation method.

(2) Total

When Communication standard is HiSWANa and Data Rate is Auto, The number of OFDM symbols covering all PHY bursts is made applicable to measurement.

It is displayed for every abnormal-conditions system.

However, when chosen except Average by the clause of 3.2.14 Averaging(Storage mode), it does not display.

Number of Measured Bursts

When Communication standard is HiSWANa and Data Rate is Auto, measured number of PHY burst is displayed for every modulation method.

However, when chosen except Average by the clause of 3.2.14 Averaging(Storage mode), it does not display.

Spectrum

(1) Carrier Leak

When measuring the OFDM modulation signal, displays the 0-level of the sub-carrier (carrier leakage component) of the signal measured in dB units.

(2) Flatness

When measuring the OFDM modulation signal, displays spectrum flatness of the outside sub-carrier and the inside sub-carrier in dB units.

The flatness measurement takes several seconds. This is longer than the measurement time of other modulation analysis items. To shorten the overall modulation analysis time, do not execute the flat-ness measurement.Message of "Measuring Now---" is displayed when communications standard is HiSWANa.

The measured results explained are the values obtained by the analysis of the symbol length set in Analysis Length. See Section 3.2.6 “Setting analysis length” for more information on how to set the analysis length.

3.2.2 Changing waveform display format (Trace Format)

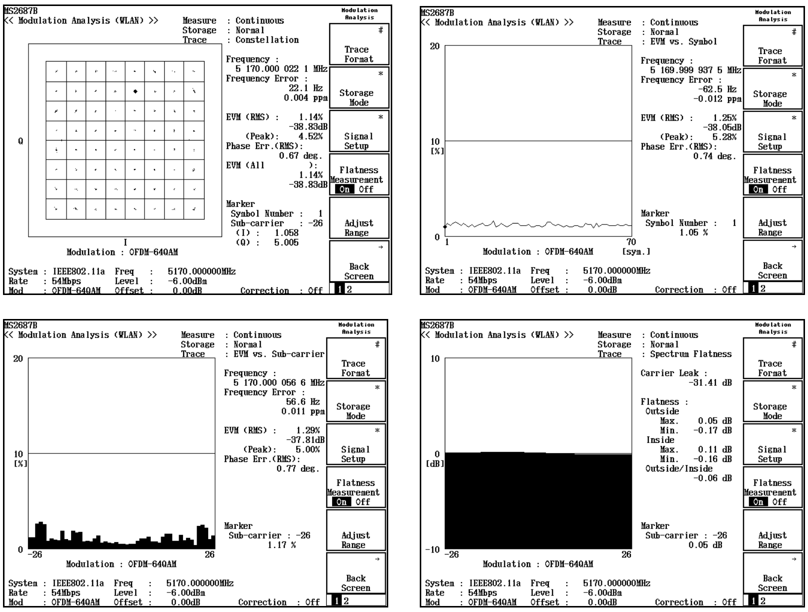
This section explains how to change the display format for a waveform appearing on the screen.

- Selecting the display format

1. Press [F1] (Trace Format) on the Modulation Analysis screen.
2. The window for format selection opens.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
4. Press [Set].

After setting, the waveform displayed is switched and the format selected appears in the field showing the trace format at the top right of the screen. The following formats are available:

• No Trace:	Displays numeric value results only.
• Constellation:	Displays constellation. When communications standard HiSWANa and Data Rate is Auto, displays a waveform for every modulation method.
• Eye Diagram:	Displays the eye diagram.
• EVM vs. Symbol:	Displays EVM for each symbol.
• EVM vs. Chip:	Displays EVM for each chip.
• Phase Error vs. Symbol:	Displays phase error for each symbol.
• Phase Error vs. Chip:	Displays phase error for each chip.
• EVM vs. Sub-carrier:	When measuring the OFDM modulation signal, displays EVM for each sub-carrier. When communications standard HiSWANa and Data Rate is Auto, displays a waveform for every modulation method.
• Spectrum Flatness:	When measureing the OFDM modulaiton Burst signal, displays spectrum flatness. This cannot be selected when [F4] (Flatness Measurement) is set to Off or IQ input or communications standard HiSWANa and Data Rate is Auto. Note: When the level fluctuates, correct measurement may not be able to be obtained.



3.2.3 Changing input signal settings (Signal Setup)

This section explains how to change the settings on the measured signal.

- Setting the input signal

1. Press F3 (Signal Setup) on the Modulation Analysis screen.
2. Function label for Signal Setup is displayed.
3. Press the function key for the item to be set.
4. The setting screen opens.

The following items are available. Refer to Section 3.2.4, “Changing signal transmission rate (Data Rate)” through 3.2.9, “Changing threshold of modulation accuracy.” for more information on each item.

- Data Rate: Changes transmission rate.
- Modulation: Changes modulation method.
- Analysis Length: Changes signal length (number of symbols/chips for modulation analysis).
- Analysis Start: Changes analysis start position.
- EVM Threshold: Selects whether threshold setting of modulation accuracy carries out or not.
- Threshold Level: Changes threshold of modulation accuracy.

3.2.4 Changing signal transmission rate (Data Rate)

Changes the transmission rate setting for the measured signal.

- Changing the transmission rate

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup.
2. Press [F1] (Data Rate) to open the setting window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
4. Press [Set].

After setting, another measurement is taken. When no values are changed or when Cancel is selected, the signal is not re-measured.
According to the set transmission rate, the corresponding modulation method is automatically set as is defined in the communications standard.
Refer to Section 3.1.7, "Setting signal transmission rate (Data Rate)" for the transmission rate that can be set and the modulation method that is automatically set according to the rate.
Refer to Section 3.2.5, "Changing signal modulation method (Modulation)" for changing the modulation method.

3.2.5 Changing signal modulation method (Modulation)

Changes the modulation method setting for the measured signal.

- Changing the modulation method

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup.
2. Press [F2] (Modulation) to open the setting window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
4. Press [Set].

After setting, another measurement is taken. When no values are changed or when Cancel is selected, the signal is not re-measured.
Refer to Section 3.1.8, "Setting signal modulation method (Modulation)" for the modulation method that can be set.
Note that this parameter cannot be set when "Auto" is set for Data Rate in Section 3.1.7, "Setting signal transmission rate (Data Rate)" or Section 3.2.4, "Changing signal transmission rate (Data Rate)."

CAUTION ⚠

Note that the modulation accuracy analysis cannot be measured for the following signals.

(Target System:HiperLAN2):

- **Signals for which the modulation mode changes in the middle of measurement, including:**
  1. **Burst signals for which the modulation mode changes within a burst**
  2. **Continuous signals for which the modulation mode changes in the middle of measurement (except for constant modulation)**

3.2.6 Setting analysis length (Analysis Length)

Sets the number of symbols to be analyzed (measured signal length excluding preamble).

- Setting the analysis length

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup.
2. Press [F3] (Analysis Length) to open the setting window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input the analysis length in symbol units or chip units.
4. Press [Set].

After setting, another measurement is taken. When no values are changed or when Cancel is selected, the signal is not re-measured.
If the analysis length is set longer than the measured signal length, the excess part of the signal length cannot be analyzed correctly. Be sure to set so that (Analysis length) ≤ (Measured signal length excluding preamble).
Note that this parameter cannot be set when "Auto" is set for Data Rate in Section 3.1.7, "Setting Signal Transmission Rate (Data Rate)" or Section 3.2.4, "Changing signal transmission rate (Data Rate)."

3.2.7 Setting analysis start (Analysis Start)

Sets the start position to be analyzed.

- Setting the analysis start

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup.
2. Press [F4] (Analysis Start) to open the setting window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input the analysis start in symbol units.
4. Press [Set].

After setting, another measurement is taken. When no values are changed or when Cancel is selected, the signal is not re-measured.
Note that this parameter cannot be set When Communication standard is except HiSWANa or when "Auto" is set for Data Rate in Section 3.1.7, "Setting Signal Transmission Rate (Data Rate)" or Section 3.2.4, "Changing signal transmission rate (Data Rate)."

3.2.8 Changing threshold of modulation accuracy (EVM Threshold)

Selects whether threshold setting of modulation accuracy carries out or not.

- Changing threshold of modulation accuracy

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup and Press [ ] (More) to display the second page of the function label.
2. Pressing [F1] (EVM Threshold On Off) sets the function to set up the threshold of modulation accuracy to On/Off.

Except when Communication standard is HiSWANa and Data Rate is auto, threshold of modulation accuracy cannot be changed.

3.2.9 Setting threshold of modulation accuracy (Threshold Level)

Sets the threshold of modulation accuracy.

• Setting threshold of modulation accuracy

1. Press [F3] (Signal Setup) on the Modulation Analysis screen to display the function label for Signal Setup and Press [ ] (More) to display the second page of the function label.
2. Press [F2] (Threshold Level) to open the setting window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input the threshold of modulation accuracy.
3. Press [Set].

Except when Communication standard is HiSWANa and Data Rate is auto or when EVM Threshold is Off, threshold of modulation accuracy cannot be set.

3.2.10 Selecting waveform display format (View Selection)

Selects the display format for the constellation waveform.

This setting is invalid in the following cases:

- When the communications standard for the system to be measured (Target System) is set to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).
- When the waveform display format (Trace Format) is set to other than "Constellation".

When Communication standard is HiSWANa and Data Rate is Auto cannot be set First Symbol and Last Symbol.

- Setting the waveform display format

1. Press [ ] (More) on the Modulation Analysis screen to display the second page of the function label.
2. Press [F1] (View Selection) to open the selection window.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item you wish to select.
4. Press [Set].

The following waveform display formats are available:

- All: Displays all sub-carriers for the symbol specified with the analysis length.
- First Symbol: Displays only the top symbol of the signal.
- Last Symbol: Displays only the last symbol of the signal. Calculates the last symbol location as (Measured signal length) = (Analysis length).
- Pilot Only: Displays only sub-carriers with pilots. The pilots should be at sub-carrier −21, −7, +7 and +21.
- One Sub-carrier: Displays only the sub-carriers specified with markers. Use [∧] [∨] keys to specify the sub-carriers with markers.
- Outside Pair: Displays only sub-carrier −26 and +26.

3.2.11 Changing error circle scale (Error Scale)

This section explains how to display the error circle in the constellation waveform display.

This setting is invalid in the following cases:

- When the modulation method is set to OFDM-16QAM or OFDM-64QAM.
- When the transmission rate (Data Rate) is set to “Auto”.
- When the waveform display format (Trace Format) is set to other than “Constellation”.

Note that when the modulation method is changed to OFDM-16QAM or OFDM-64QAM while an error circle is displayed, the error circle display disappears.

- Setting the error circle

1. Press [ ] (More) on the Modulation Analysis screen to display the second page of the function label.
2. Press [F2] (Error Scale). The following function labels appear for error scale selection:

- [F1] (5%): Draws an error circle with 5% error scale.
- [F2] (10%): Draws an error circle with 10% error scale.
- [F3] (20%): Draws an error circle with 20% error scale.
- [F4] (35%): Draws an error circle with 35% error scale.
- [F5] (OFF): Deletes the error circle.
- [F6] (return): Returns to the previous function label display.

3.2.12 Changing vertical scale for waveform display (Vertical Scale)

This section explains how to change the vertical scale for waveform display.

This setting is invalid when the waveform display format (Trace Format) is set to one of the following:

- No Trace
- Constellation
- Eye Diagram

- Setting the vertical scale

1. Press [ ] (More) on the Modulation Analysis screen to display the second page of the function label.
2. Press [F3] (Vertical Scale). The following function labels appear for vertical scale selection:

When the waveform display format is set to EVM vs. Symbol or EVM vs. Sub-carrier:

- [F1] (5%): Sets the maximum value of the vertical scale to 5%.
- [F2] (10%): Sets the maximum value of the vertical scale to 10%.
- [F3] (20%): Sets the maximum value of the vertical scale to 20%.
- [F4] (50%): Sets the maximum value of the vertical scale to 50%.
- [F5] (100%): Sets the maximum value of the vertical scale to 100%.
- [F6] (return): Returns to the previous function label display.

When the waveform display format is set to Phase Error vs. Symbol:

- [F1] (5 deg): Sets the maximum value of the vertical scale to 5°.
- [F2] (10 deg): Sets the maximum value of the vertical scale to 10°.
- [F3] (20 deg): Sets the maximum value of the vertical scale to 20°.
- [F4] (50 deg): Sets the maximum value of the vertical scale to 50°.
- [F5] (100 deg): Sets the maximum value of the vertical scale to 100°.
- [F6] (return): Returns to the previous function label display.

3.2.13 Displaying marker

When the waveform display format is set to other than "No Trace", a marker can be displayed on the waveform.

- Displaying marker

1. Press [Marker] to display the Marker function label.
2. Press [F1] (Marker) to switch between the marker displays "Normal" and "Off".

When the marker display is set to "Normal," a diamond (♦) mark appears on the waveform.

- Moving marker

Press [∧] [∨] (Entry keys), or use the rotary knob or the ten-key pad to move the marker. Items moved and their step values are shown below.

Constellation waveform display format:

	IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)		IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	
	Transferred items:	Step value	Transferred items:	Step value
Up & down keys	Subcarrier	1	Chip number	Analysis length/20
Rotary knob	Symbol number	1	Chip number	1
Numeric keypad	Symbol number	1	Chip number	1

Eye Diagram waveform display format:

	IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	
	Transferred items:	Step value
Up & down keys	Chip number	Analysis length/20
Rotary knob	Chip number	0.1
Numeric keypad	Chip number	0.1

EVM vs. Symbol or Phase Error vs. Symbol waveform display format:

	IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)		IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	
	Transferred items:	**Step value**	**Transferred items:**	**Step value**
Up & down keys	Symbol number	10	Chip number	Analysis length/20
Rotary knob	Symbol number	1	Chip number	1
Numeric keypad	Symbol number	1	Chip number	1

EVM vs. Sub-carrier or Spectrum Flatness waveform display format:

	IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	
	Transferred items:	**Step value**
Up & down keys	Subcarrier	10
Rotary knob	Subcarrier	1
Numeric keypad	Subcarrier	1

3.2.14 Averaging (Storage Mode)

This section explains how to set the averaging process for measured results.

- Setting averaging process

1. Press [F2] (Storage Mode) on the Modulation Analysis screen to display the Storage Mode function labels.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob or use the ten-key pad to input the average count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."
7. Press [Set].

After setting, another measurement is taken.
If the average count is changed when the storage mode is set to "Average," another measurement is taken after completing the setting. When no values are changed or when Cancel is selected, measurement is not taken again.

Refresh Interval: Sets the update timing for the average value display.
After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement.
- Once: Updates the display after measurements are taken up to the set average count.

In addition to Average, the following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after each measurement.
- Overwrite: Updates the measured result after each measurement by overwriting the waveform, though no averaging is performed. However, note that when the waveform display format is to "No Trace," the waveform is not overwritten.

3.2.15 Optimizing measurement range (Adjust Range)

We recommend that you optimize the measurement range using the Adjust Range function before performing measurement. However, you need to optimize the measurement range only once while you are inputting data at approximately the same level.

Implement the Adjust Range function by pressing [F5] (Adjust Range) in a measurement screen.

When the measurement range is optimized, the internal level diagram is automatically changed so that the internal A/D converter for analysis can be used in optimal condition. In other words, the internal circuit is adjusted to maximize the dynamic range (S/N) of the A/D converter.

Since the internal level diagram is changed according to the measured signal level, the measured signal must be input while the measurement range is being optimized. The Adjust Range function may not normally operate with signals that fluctuate greatly.

The optimization of the measurement range is disabled during IQ input.

3.2.16 Calibration function (Calibration)

This section describes how to perform calibration to acquire an accurate measurement result.
The calibration function includes three functions: level calibration using a built-in calibration signal, pre-selector tuning and level calibration using the built-in power meter. Perform one of these functions as required.

Level calibration using built-in calibration signal

Calibrate the internal signal path based on built-in calibration signals of the measuring instrument. Perform this calibration when you make level measurements. However, this level calibration function does not have to be used often under an environment with stable temperature conditions.
The level calibration function using a built-in calibration signal is disabled during IQ input.

Performing level calibration using built-in calibration signal

1. Move to the measurement screen.
2. Press [ ] (More) to display the second page of the function label.
3. Press [F5] (Calibration) to display the Calibration function label.
4. Press [F1] (Level Calibration) to implement level calibration function using a built-in calibration signal.

Calibration signals do not have to be input from the outside because this level calibration function uses the built-in calibration signals of the measuring instrument.

Pre-selector tuning

Signals with a frequency over 3.201 GHz at analysis go through the pre-selector (band pass filter with variable tuning patterns) inside the measuring instrument. Therefore, you need to tune the pre-selector before analyzing broadband signals. Tune the pre-selector before carrying out modulation analysis or level measurement.
The pre-selector tuning is disabled during IQ input or if a frequency below 3.201 GHz is set.

Performing pre-selector tuning

1. Move to the measurement screen.
2. Press [ ] (More) to display the second page of the function label.
3. Press [F5] (Calibration) to display the Calibration function label.
4. Press [F2] (Pre-selector Tuning) to implement the pre-selector tuning function.

Implement the pre-selector tuning function while inputting the signal to be measured or a modulated signal equivalent to the signal to be measured.

Level calibration using built-in power meter

When using the MS860x as the analyzer main body, a level calibration function using the built-in power meter is available by which level measurement can be performed with high accuracy. We recommend implementing this level calibration function for level measurement. It is not necessary to implement the level calibration function using the power meter frequently in an environment with a stable ambient temperature. If the frequency used fluctuates greatly, however, it is recommended to implement the level calibration function using the built-in power meter.

The level calibration function using the built-in power meter is disabled when IQ is input and the measured signal is the burst signal, or when either Option 36 or 37, the power meter upper limit frequency expansion option (6 GHz), is not installed and the frequency is greater than 3 GHz.

Performing level calibration using built-in power meter

1. Move to the measurement screen.
2. Press [ ] (More) to display the second page of the function label.
3. Press [F5] (Calibration) to display the Calibration function label.
4. Press [F3] (Level Calibration (using PM)) to implement the level calibration function using the power meter.

The level calibration function using the power meter calibrates the measured signal value in the tester mode with the value measured by the power meter by comparing them. Therefore, the signal to be measured must be input while the level calibration function using the power meter is implemented. Zero-point calibration must be implemented for the power meter before starting level calibration using the power meter.

Checking calibration status

It is possible to display the status of each calibration: level calibration using a built-in calibration signal, pre-selector tuning and level calibration using the power meter. One of the following messages is displayed in the center of the screen according to the current calibration status.

Status	Level calibration using built-in calibration signal	Pre-selector tuning	Level calibration using built-in power meter
Normal termination	Complete (date)	Complete (date; frequency used during calibration)	Complete (date; frequency used during calibration)
Not calibrated	No calibration	No calibration	No calibration
Abnormal termination	Incomplete	Incomplete	Incomplete

Checking calibration status

1. Move to the measurement screen.
2. Press [ ] (More) to display the second page of the function label.
3. Press [F5] (Calibration) to display the Calibration function label.
4. Press [F5] (Calibration Status) to display the calibration status.

3.3 Measuring Transmit Power

Press [F3] (RF Power) on the Setup Common Parameter screen to move to the transmit power measurement screen.

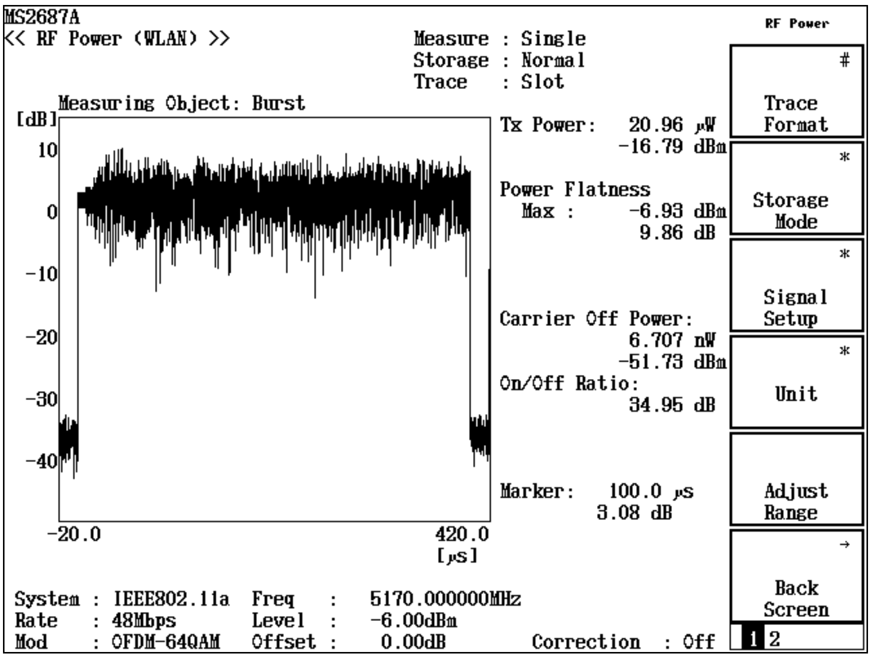
This section explains measured results and setting parameters shown on the RF Power screen (transmit power measurement) as well as operation notes.

3.3.1 Explanation of measured results

This section explains the measured results shown on the RF Power screen (transmit power measurement). Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on how to adjust the RF input level.

Results of transmit power measurement

The screen shown below appears when “Slot” is selected for Trace Format. Refer to Section 3.3.2, “Changing waveform display format (Trace Format)” for more information on how to set the trace format.



TX Power

Displays the average power in one slot of the measured signal in dBm and W units.

Power Flatness

(1) Max

Displays the maximum momentary power in one slot of the measured signal in dBm or W units. The ratio between it and the reference (average power or maximum momentary power) are also displayed in dB or % units.

(2) Carrier Off Power

Displays the average power while transmission is Off in dBm and W units.

However, when the Off section is below 20 μ sec, it cannot measure correctly.

This item is not displayed if Continuous is selected as the signal to be measured.

(3) On/Off ratio

Displays the ratio between the transmit power and the average power while transmission is Off in dB units.

This item is not displayed if Continuous is selected as the signal to be measured.

The measured results explained here is the value obtained by analyzing the symbol length that is set for Analysis Length. Refer to Section 3.3.3, “Changing analysis length (Analysis Length)” for more information on how to change the analysis length.

CAUTION ⚠

When Target System is HiperLAN2, note that the transmitter power cannot be measured in the following case:

- **Power time mask measurement**

3.3.2 Changing waveform display format (Trace Format)

This section explains how to change the display format for a waveform appearing on the screen.

Selecting the display format

1. Press [F1] (Trace Format) on the RF Power screen.
2. The format selection window opens.
3. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the item to select.
4. Press [Set].

When the setting is completed, the displayed waveform is switched and the selected format appears in the field showing the trace format on the upper right of the screen. The following formats are available.

- Slot: Displays the waveform data in one slot.
  A slot refers to the section from the beginning of a signal and up to the (analysis length + preamble length). The preamble length, which varies depending on the communications standard and signal type, is automatically recognized. The preamble length does not have to be set.
- Transient: Displays zoom of the leading and trailing edges of a slot.
  The slot length is the (analysis length + preamble length). If the analysis length is not set correctly, the trailing edge may not be displayed. This function is disabled when “Continuous” is selected for the signal to be measured (Measuring Object).

3.3.3 Changing analysis length (Analysis Length)

This section explains setting the number of symbols to be analyzed (signal length of a signal to be measured excluding the preamble).

Setting the analysis length

1. Press F3 (Signal Setup) on the RF Power screen to display the Signal Setup function label.
2. Press F1 (Analysis Length) to open the setting window.
3. Press ∧ ∨ (Entry keys), turn the rotary knob, or use the numeric keypad to enter the analysis length in symbol units or chip units.
4. Press Set.

After the setting is completed, another measurement is taken. The signal is not re-measured if no values are changed or when Cancel is selected.

If the analysis length is longer than the signal length of a signal to be measured, the section exceeding the signal length cannot be correctly analyzed. If the analysis length is shorter, the trailing edge cannot be correctly analyzed. Set the analysis length so that it is equal to the signal length of the signal to be measured except for the preamble.

The spectrum analyzer itself can also detect the measured signal length where unknown to automatically set the number of symbols. Refer to Section 3.3.4, "Automatic detection of signal length (Ramp-down Detection)" for details.

3.3.4 Automatic detection of signal length (Ramp-down Detection)

The spectrum analyzer can automatically detect burst falling edge when the measured signal length is unknown to set appropriate analysis length (number of symbols).

Detecting signal length automatically

1. Press F3 (Signal Setup) in the RF Power screen to display the Signal Setup function label.
2. Pressing F3 (Ramp-down detection On Off) sets the function to detect burst falling edge to On/Off and set the signal length automatically.

Analysis length cannot be set when Ramp-down Detection is set to On.

3.3.5 Changing signal detection method (Preamble Search)

Normally, the spectrum analyzer performs analysis by detecting burst rising edge based on level transition of the measured signal. However, the rising edge of burst signal with gradual or stepwise rise cannot be detected from level transition only. In this case, burst signal rising edge can be detected based on preamble information.

Changing signal detection method

1. Press [F3] (Signal Setup) in the RF Power screen to display the Signal Setup function label.
2. Press [F2] (Preamble Search On Off) to select detect burst rising edge from preamble section of the measured signal (On) or from RF level transition (Off).

3.3.6 Changing analysis length detection level (Detection Level)

Normally, the spectrum analyzer performs analysis by detecting burst rising/falling edges based on level transition of the measured signal. Set the threshold level for rising/falling edge detection.

Changing analysis length detection level

1. Press [F3] (Signal Setup) in the RF Power screen to display the Signal Setup function label.
2. Press [F4] (Detection Level).
3. The threshold level input window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input threshold level. Threshold level is set in dB assuming the normal detection level is 0 dB.
5. Press [Set] .

Analysis length detection level cannot be set when Ramp-down detection is set to Off and Preamble Search is set to On.

3.3.7 Changing analysis length detection point offset (Detection Offset)

Adjust position in time direction during rising/falling edge of the burst signal in the Transient screen.

Changing analysis length detection position offset

1. Press [F3] (Signal Setup) in the RF Power screen to display the Signal Setup function label.
2. Press [F5] (Detection Offset).
3. The offset value input window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input offset value. Offset value is set in us units.
5. Press [Set] .

Analysis length detection position offset cannot be set when Ramp-down detection is set to Off and Preamble Search is set to On.

3.3.8 Changing display unit (Unit)

This section describes how to change the display unit for the measured results. Change the display unit to switch the waveform display and the Power Flatness results.

Changing the display unit

1. Press [F4] (Unit) on the RF Power screen to display the Unit function label.
2. Select either of the following displays units:

- [F1] (dB): Displays the waveform in dB units. The maximum momentary power is also displayed during Power Flatness in dBm units as well as the ratios between them and the reference in dB units.
- [F2] (dBm): Displays the waveform in dBm units. The maximum momentary power is also displayed during Power Flatness in dBm units as well as the ratios between them and the reference in dB units.
- [F3] (%): Displays the waveform in % units. The maximum momentary power is also displayed during Power Flatness in W units as well as the ratios between them and the reference in % units.
- [F6] (return): Returns to the previous function label display.

3.3.9 Changing reference value for waveform display (Display Reference Level)

This section describes how to change the reference value for waveform display. Change the reference value to switch the reference for waveform display (0 dB or 100%). You can also change the reference (average power or maximum momentary power) for display of the ratio during Power Flatness.

Changing the reference value for waveform display

1. Press [ ] (More) on the RF Power screen to display the second page of the function label.
2. Press [F1] (Display Ref. Level) to switch between the maximum momentary power and the average power to be used as reference.

- Max.: Sets the maximum momentary power as the reference value.
- Ave.: Sets the average power as the reference value.

3.3.10 Changing display range for rising/falling waveforms (Transient Time Scale)

When the rising and falling waveforms of the burst signal are displayed on the Transient screen, the display range of the horizontal axis can be changed.

Changing the display range for rising/falling waveforms

1. Press [ ] (More) on the RF Power screen to display the second page of the function label.
2. Press [F2] (Transient Time Scale).
3. The waveform display range input window opens.
4. Press [∧] [∨] (Entry keys) or turn the rotary knob, or use the numeric keypad to input a waveform display range.
5. Press [Set].

The display range for rising/falling waveforms cannot be changed when “Slot” is set for the waveform display format (Trace Format) or when “Continuous” is set for the type of the signal to be measured (Measuring Object).

3.3.11 Change the Reference Value of Transmitted Electric Power of Rising and Falling Waveform (Transient Ref.Power)

When burst signal of rising and falling is displayed at the Transient screen, change the reference value of transmitted electric power.

The change method of the reference value of transmitted electric power of rising and falling waveform.

1. Press [ ] (more) to display the second function label page at the RF Power screen.
2. Press [F3] (Transient Ref.Power) and transmitted electric power of the whole burst or each transmitted electric power in the rising / falling waveform range is set to reference.

This function is enabled when Target System is IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK).
This function is disenabled when the waveform display format is set as Slot or the Continuous.

3.3.12 Smoothing waveform (Smoothing Filter)

This section describes how to select whether or not to smooth the waveform to be measured.

Setting the smoothing processing

1. Press [ ] (More) on the RF Power screen to display the second page of the function label.
2. Press [F4] (Smoothing Filter) to switch between performing and not performing the smoothing processing.

3.3.13 Averaging (Storage Mode)

This section explains how to set the averaging process for measured results.

Setting the averaging process

1. Press [F2] (Storage Mode) on the RF Power screen to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to input the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."

7. Press [Set].

After the setting is completed, another measurement is taken.
If the averaging count is changed when the storage mode is set to "Average," another measurement is also taken after the setting is completed. When no values are changed or when Cancel is selected, measurement is not taken again.

Refresh Interval: Sets the update timing for the average value display. After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement is taken.
- Once: Updates the display after as many measurements as the set averaging count are taken.

In addition to the averaging process, the following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after every measurement.
- Overwrite: Does not average but updates the measured result after every measurement and overwrites the waveform.

3.3.14 Optimizing measurement range (Adjust Range)

We recommend that you optimize the measurement range using the Adjust Range function before performing measurements. However, you need to optimize the measurement range only once while you are inputting data at approximately the same level. Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.3.15 Calibration function (Calibration)

This section describes how to perform calibration to acquire an accurate measurement result.
The calibration function includes three functions: level calibration using a built-in calibration signal, pre-selector tuning and level calibration using the built-in power meter. Perform one of these functions as required. Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

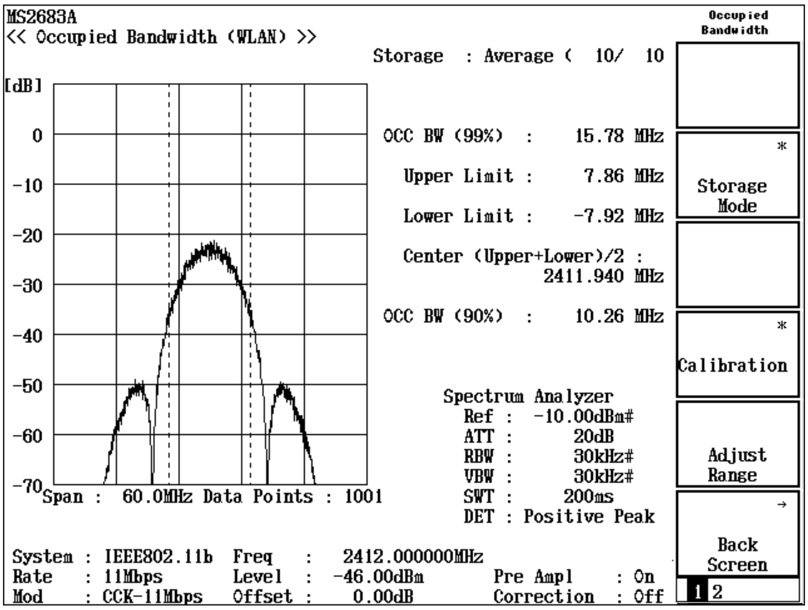
3.4 Measuring Occupied Frequency Bandwidth

The MX268x30A/MX860x30A can perform occupied frequency bandwidth measurements according to the Technical Regulations Conformity Certification stipulated by TELEC (Telecom Engineering Center) with easy operations. Measurements can also be performed by using any parameter. Press F4 (Occupied Bandwidth) on the Setup Common Parameter screen to move to the occupied bandwidth measurement screen.

3.4.1 Explanation of measured results

This section explains the measured results shown on the Occupied Bandwidth screen (occupied frequency bandwidth). Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on how to adjust the RF input level.

Results of occupied frequency bandwidth measurement



(1) Occ BW (99%)

Occupied frequency bandwidth. 99% of the total radiation power is defined as the contained frequency width. Actual measurements are performed by using the spectrum analyzer function. Power integration is performed with the measured data according to the upper and lower frequency limits of the set frequency span. The measured result is the difference of frequencies at which the above value becomes 0.5% of the power obtained by integrating the measured data for the whole frequency span.

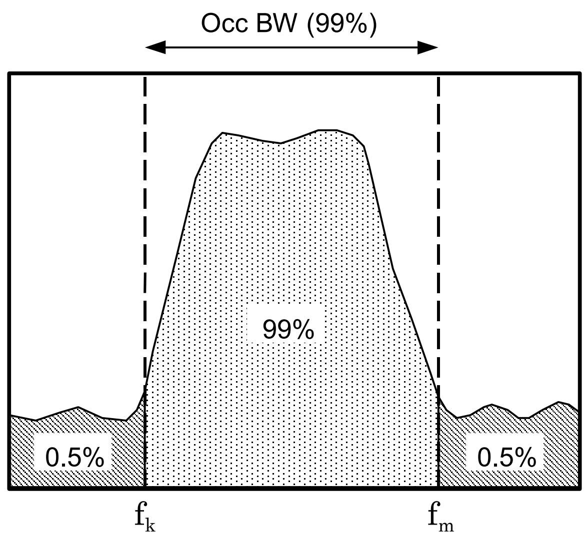
For the power P_n (W) measured at frequency f_n, and the total number of data is N+1;

$$P_{Total} = \sum_{n=0}^{n=N} P_n$$

$$\sum_{n=0}^{k} P_n \le 0.005\, P_{Total} < \sum_{n=0}^{k+1} P_n$$

$$\sum_{n=m}^{N} P_n \le 0.005\, P_{Total} < \sum_{n=m-1}^{N} P_n$$

$$Occ\ \ BW\,(99\%) = f_m - f_k$$



(2) Upper Limit

The upper limit of the occupied frequency bandwidth (Occ BW (99%)). This corresponds to fm calculated in (1).

(3) Lower Limit

The lower limit of the occupied frequency bandwidth (Occ BW (99%)). This corresponds to fk calculated in (1).

(4) Center (Upper + Lower)/2
The center frequency of the occupied frequency bandwidth (Occ BW (99%)). This is the average value of fk and fm calculated in (1).

(5) Occ BW (90%)
Frequency bandwidth containing 90% of the total radiation power. The measurement method is the same as (1). This value is called "spreading bandwidth" in TELEC's Technical Regulations Conformity Certification.
This item appears when IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) is selected for the target system.

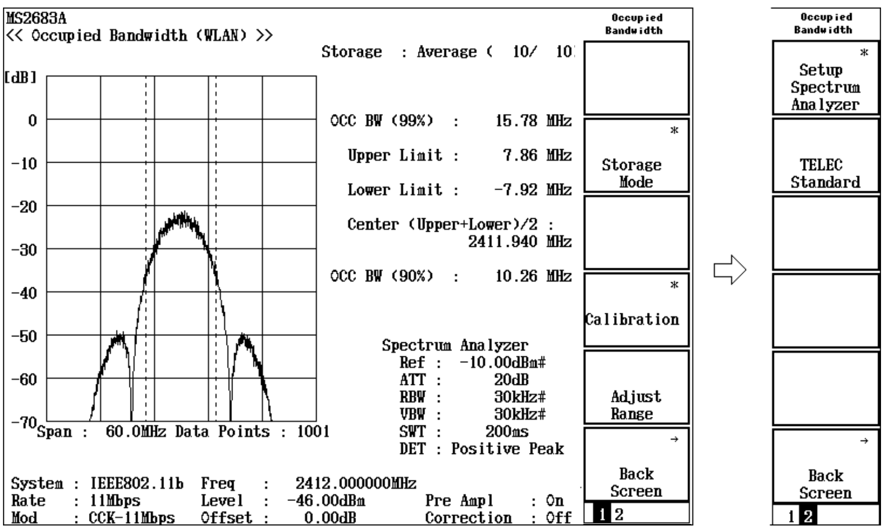
(6) Spectrum Analyzer
Setting values for the spectrum analyzer when measuring occupied frequency bandwidth. The setting values cannot be changed when TELEC Standard (Indoor), TELEC Standard (Outdoor) or TELEC Standard is selected as the measurement standard.
The values can be changed when Setup Spectrum Analyzer is selected. Refer to Section 3.4.3, "Measuring by using any measurement parameters" for more information.

3.4.2 Selecting measurement standard

The measurement method and standard for occupied frequency bandwidth are stipulated in the Technical Regulations Conformity Certification by TELEC (Japan). The MX268x30A/MX860x30A can easily perform measurements conforming to the stipulations.

Selecting the measurement standard

1. Press [ ] (More) on the Occupied Bandwidth screen to display the second page of the function label. Select a function label page from those shown below.



2. Each soft key corresponds to the following standard.
   - F1 (Setup Spectrum Analyzer):
     Perform measurements by setting any measurement parameters. Refer to Section 3.4.3, “Measuring by using any measurement parameters” for more information.

   Communication standard: IEEE802.11a, HiperLAN2, HiSWANa
   - F2 (TELEC Standard (Indoor)): 5 GHz band low power data communication system
   - F3 (TELEC Standard (Outdoor)): 5 GHz band radio access system

   Communication standard: IEEE802.11b or IEEE802.11g
   - F2 (TELEC Standard): 2.4 GHz band wide band low power data communication system

Measurement parameters for each standard

Each measurement standard uses the following measurement parameters.

- TELEC Standard (Indoor)
  Frequency span: 40 MHz
  RBW: 300 kHz
  VBW: 300 kHz
  Number of sampling: 1001 points
  Detection mode: Positive Peak

- TELEC Standard (Outdoor)
  Frequency span: 40 MHz
  RBW: 30 kHz
  VBW: 30 kHz
  Number of sampling: 1001 points
  Detection mode: Positive Peak

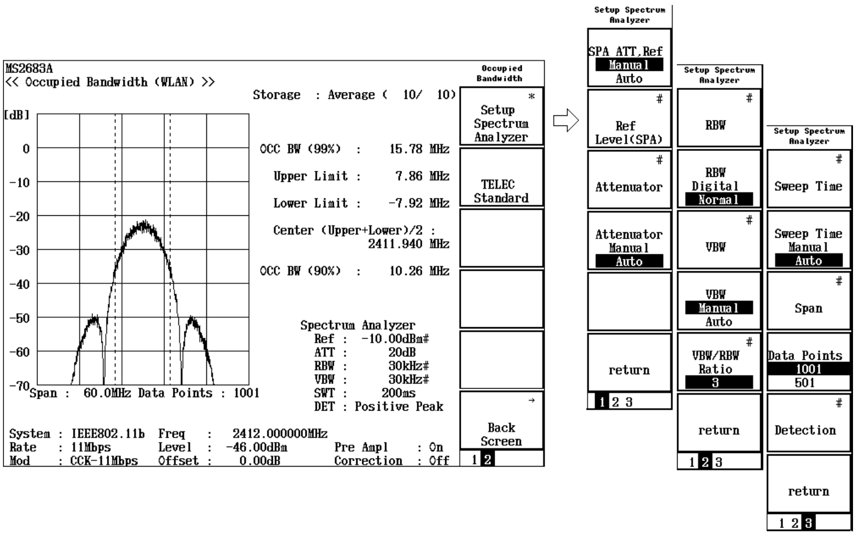
- TELEC Standard
  Frequency span: 60 MHz
  RBW: 300 kHz
  VBW: 300 kHz
  Number of sampling: 1001 points
  Detection mode: Positive Peak

3.4.3 Measuring by using any measurement parameters

Occupied frequency bandwidth is measured by the spectrum analyzer function. Therefore, the measured value for occupied frequency bandwidth varies depending on the parameter values set for the spectrum analyzer. The MX268x30A/MX860x30A can perform measurements conforming to official standards as explained in Section 3.4.2, while also being capable of measurement by setting any measurement parameters for the spectrum analyzer.

Setting the measurement parameter

1. Press [ ] (More) on the Occupied Bandwidth screen to display the second page of the function label.
2. Press [F1] (Setup Spectrum Analyzer).
3. The measurement parameter settings are displayed across three function label pages.



The first page of the function label

- [F1] (SPA ATT Ref Manual/Auto):

  Manual: Sets the reference level and the attenuator of the spectrum analyzer regardless of the set value for signal analysis.

  Auto: Sets the reference level and the attenuator of the spectrum analyzer to the same value set for signal analysis.

- [F2] (Ref Level (SPA)):

  When [F1] (SPA ATT Ref Manual/Auto) of the function label is set to Manual, the value set here is set as the reference level for the spectrum analyzer.

- F3 (Attenuator):
  When F4 (Attenuator Manual/Auto) of the function label is set to Manual, the value set here is set to the attenuator of the spectrum analyzer.

- F4 (Attenuator Manual/Auto):
  Manual: Sets the attenuator of the spectrum analyzer regardless of the reference level set on F2 (Ref Level (SPA)) of the function label. Press F3 (Attenuator) to set the attenuator.
  Auto: Sets the attenuator of the spectrum analyzer automatically according to the reference level set on F2 (Ref Level (SPA)) of the function label.

- F6 (return):
  Returns to the upper-layer screen.

The second page of the function label

- F1 (RBW):
  Sets RBW of the spectrum analyzer.

- F2 (RBW Digital/Normal):
  Selects RBW type.
  Normal: Implements RBW using the hardware band pass filter. The IF signal goes through the band pass filter, and is then fetched via the A/D converter.
  Digital: Implements RBW by digital processing. The IF signal is fetched via the A/D converter, and then goes through the band pass filter by mathematical calculation. This provides RBW with better selectivity than the Normal type.
  Refer to the Spectrum Analyzer Operation Manual for more information.

- F3 (VBW):
  Selects VBW type of the spectrum analyzer.

- F4 (VBW Manual/Auto):
  Selects whether to set VBW regardless of RBW or to set it automatically in conjunction with RBW.
  Manual: Sets VBW to any value regardless of RBW. This enables F3 (VBW).
  Auto: Sets VBW value in conjunction with RBW. VBW cannot be set directly. This disables F3 (VBW). When RBW changes, VBW changes automatically accordingly.

- F5 (VBW/RBW Ratio):
  Sets the ratio used when the VBW setting mode is set to Auto.

- F6 (return):
  Returns to the upper-layer screen.

The third page of the function label

- F1 (Sweep Time):
  Sets the sweep time of the spectrum analyzer. Enter the sweep time value by using numeric keypad and then press Set to set the value in μsec unit.

- F2 (Sweep Time Manual/Auto):
  Selects whether to set the sweep time regardless of RBW and the frequency span or to set it automatically in conjunction with them.
  Manual: Sets the sweep time value regardless of RBW and the frequency span. This enables F1 (Sweep Time).
  Auto: Sets the sweep time value in conjunction with RBW and the frequency span. The sweep time cannot be set directly. This disables F1 (Sweep Time). When RBW or the frequency span changes, the sweep time changes automatically accordingly.

- F3 (Span):
  Sets the frequency span.

- F4 (Data Point):
  Selects the total number of data for measured data acquisition. Select between the following:
  501 points
  1001 points
  Measurement frequency resolution is determined by this setting and the frequency span.

- F5 (Detection):
  Sets the level measurement method at each data point. Select one from the following:
  Sample
  Positive Peak
  Negative Peak
  Average or RMS (RMS is available only for Option 04 installed with RBW of Digital.)
  Refer to the Spectrum Analyzer Operation Manual for more information on each measurement method.

- F6 (return):
  Returns to the upper-layer screen.

3.4.4 Setting storage mode

This section explains the averaging of the measured results.

1. Press [F2] (Storage Mode) on the Occupied Bandwidth screen to display the function label for Storage Mode.
2. Press [F2] (Average Count) to open the setting window.
3. Enter the average count by using [∧] [∨] (Entry keys), the rotary knob, or the numeric keypad.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average".
7. Press [Set].

After setting, another measurement is taken.
If the average count has changed when the storage mode is set to "Average," another measurement is taken after completing the setting. When no values are changed or when Cancel is selected, measurement is not taken again.

Refresh Interval: Sets the update timing for the average value display.
After setting is changed, another measurement is taken.

- Every: Updates the display after each measurement.
- Once: Updates the display after measurements are taken up to the set average count.

The following modes can be selected for the storage mode:
Normal: Updates and displays the measured result after each measurement.
Average: Averages and displays the measured result after each measurement.

3.4.5 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.4.6 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.5 Measuring Adjacent Channel Leakage Power

The MX268x30A/MX860x30A can perform adjacent channel leakage power measurements according to the Technical Regulations Conformity Certification stipulated by TELEC (Telecom Engineering Center) with easy operations. Measurements can also be performed by using any parameter.

Press [F5] (Adjacent Channel Power) on the Setup Common Parameter screen to move to the adjacent channel leakage power measurement screen.

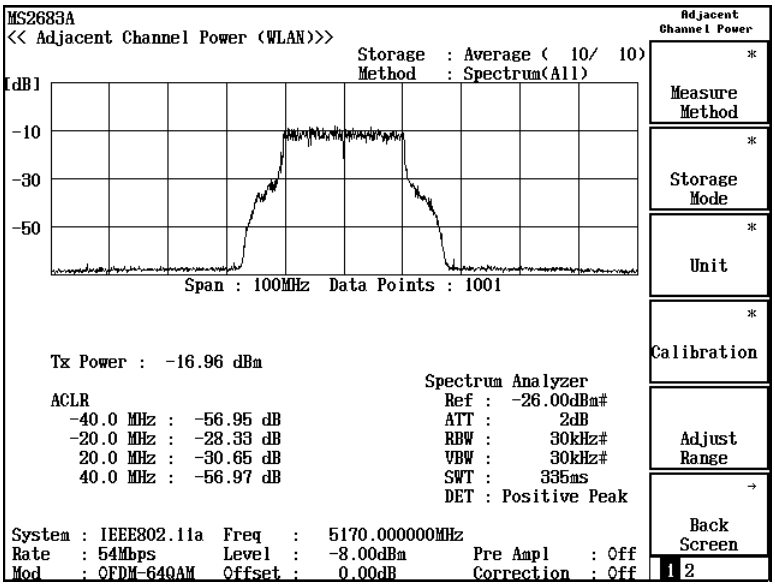
CAUTION

Adjacent channel leakage power measurement is enabled when the target system is set to IEEE802.11a, HiSWANa or HiperLAN2. When IEEE802.11b or IEEE802.11g is set, adjacent channel leakage power measurement is disabled.

3.5.1 Explanation of measured results

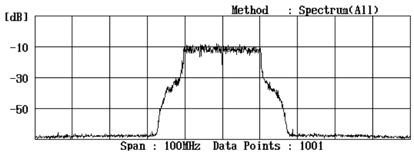
This section explains the measured results shown on the Adjacent Channel Power screen (adjacent channel leakage power). Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on how to adjust the RF input level.

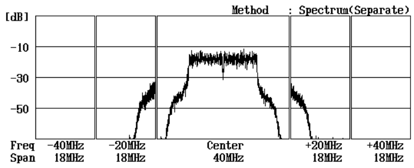
Results of adjacent channel leakage power measurement



(1) Waveform display

The spectrum waveform in the range up to the next adjacent channel. Two types of displays are available according to measurement method. Refer to Section 3.5.3, “Selecting measurement method” for the measurement method.





- Spectrum (All): Displays the spectrum waveform of a wide range including the upper and lower next adjacent channels.

- Spectrum (Separate): Displays the spectrum waveform of each channel up to the upper and lower next adjacent channels.

(2) Tx Power

Transmission signal power.

(3) ACLR

Measured value for the adjacent channel leakage power. The measured result at each offset frequency is displayed.

(4) Marker: Offset

Frequency at the marker position on the waveform screen. The offset value from the center of the waveform screen (set frequency) is displayed.

(5) Marker: Power

Power at the marker position on the waveform screen. Power integral for the frequency band of ±9 MHz from the marker position.

(6) Spectrum Analyzer

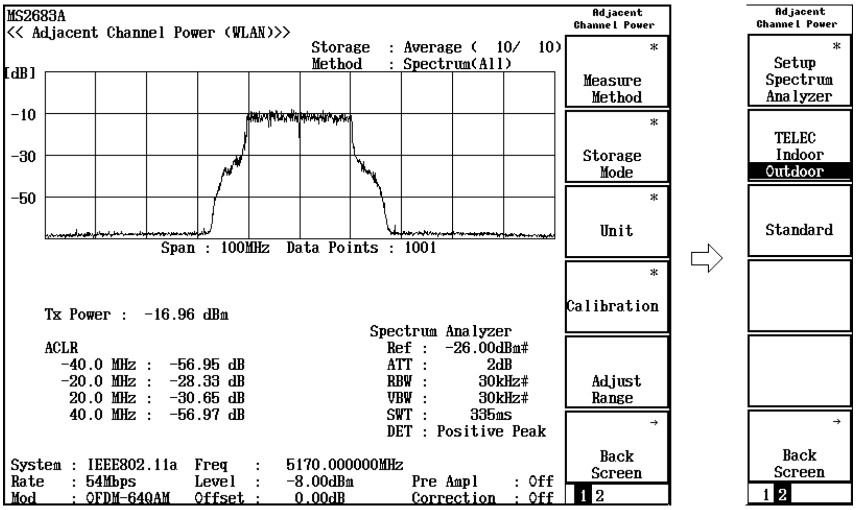
Setting values for the spectrum analyzer when measuring adjacent channel leakage power. The setting values cannot be changed when TELEC Standard (Indoor) or TELEC Standard (Outdoor) is selected as the measurement standard.

The values can be changed when Setup Spectrum Analyzer is selected. Refer to Section 3.5.5, “Measuring by using any measurement parameters” for more information.

3.5.2 Selecting measurement standard

The measurement method and standard for adjacent channel leakage power are stipulated in the Technical Regulations Conformity Certification by TELEC (Japan). The MX268x30A can easily perform measurements conforming to the stipulations.

1. Press [ ] (More) on the Adjacent Channel Power screen to display the second page of the function label. Select a function label page from those shown below.



2. Each soft key corresponds to the following standard.
   - [F1] (Setup Spectrum Analyzer):
     Perform measurements by setting any measurement parameters. Refer to Section 3.5.5, “Measuring by using any measurment parameters” for more information.

   - [F2] (TELEC Indoor Outdoor):
     Sets measurement parameters conforming to TELEC Technical Regulations Conformity Certification Test.
     - Indoor: 5 GHz band low power data communicatio system.
     - Outdoor: 5 GHz band radio access system.

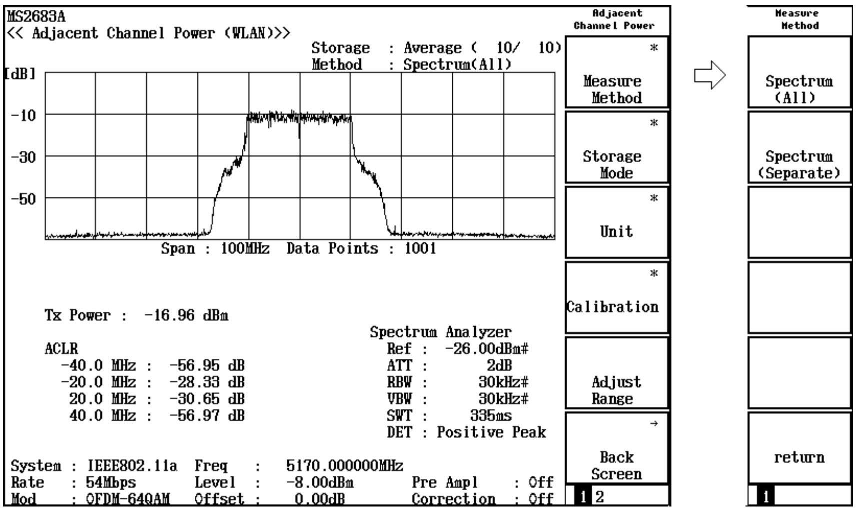
   - [F3] (Standard):
     Sets spectrum analyzer parameters conforming to selected standards in [F2] (TELEC Indoor Outdoor).

   - [F6] (Back Screen):
     Switches the screen from the current screen to the upper-layer screen by one rank.

3.5.3 Selecting measurement method

Two measurement methods for adjacent channel leakage power are stipulated by TELEC.

1. Press [F1] (Measure Method) on the Adjacent Channel Power screen. The function label changes. Select one from those shown below.



- [F1] (Spectrum (All)):
  Sweeps a wide range including the upper and lower next adjacent channels at once to obtain data, then calculates the leakage power of each channel. Measurement time becomes shorter because sweeping is performed only once.

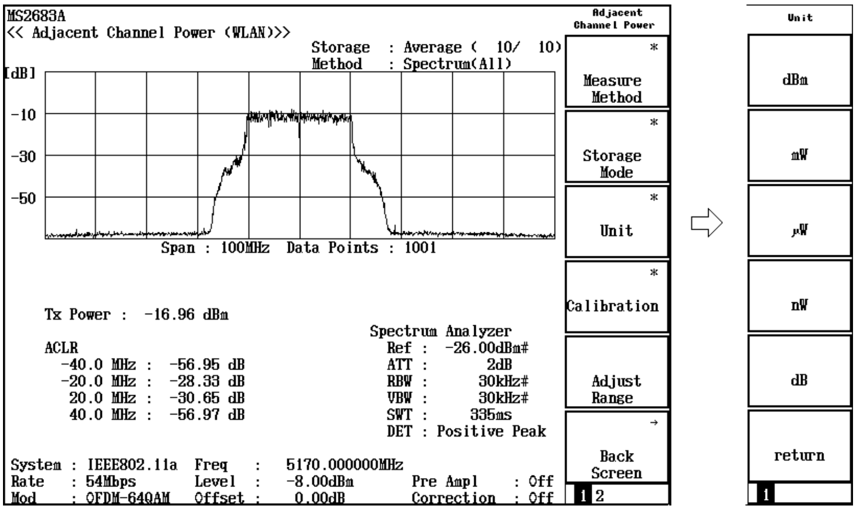
- [F2] (Spectrum (Separate)):
  Sets the center frequency and frequency span for each channel and performs measurements. Measurement time becomes longer because sweeping is performed five times.

- [F6] (return):
  Returns to the previous function label display.

3.5.4 Changing measured result unit

The unit of the measured results for adjacent channel leakage power can be changed.

1. Press [F3] (Unit) on the Adjacent Channel Power screen. The function label changes. Select one from those shown below.



- [F1] (dBm):
  Displays measured results in dBm units.

- [F2] (mW):
  Displays measured results in mW units.

- [F3] (uW):
  Displays measured results in uW units.

- [F4] (nW):
  Displays measured results in nW units.

- [F5] (dB):
  Displays measured results in dB units. The relative value to the transmission signal is displayed.

- [F6] (return):
  Returns to the previous function label display.

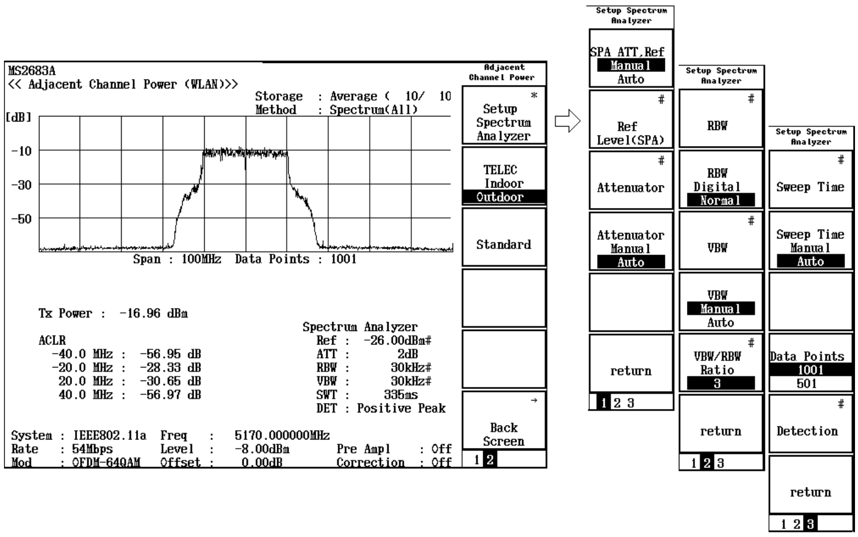
3.5.5 Measuring by using any measurement parameters

Adjacent channel leakage power is measured by the spectrum analyzer function. Therefore, the measured value for adjacent channel leakage power varies depending on the parameter values set for the spectrum analyzer.

The MX268x30A can perform measurements conforming to official standards as explained in Section 3.5.2, while also being capable of measurement by setting any measurement parameters for the spectrum analyzer.

Selecting the measurement standard

1. Press [ ] (More) on the Adjacent Channel Power screen to display the second page of the function label.
2. Press [F1] (Setup Spectrum Analyzer).



3. The measurement parameter settings are displayed across three function label pages.

The first page of the function label

- [F1] (SPA ATT Ref Manual/Auto):

  Manual: Sets the reference level and the attenuator of the spectrum analyzer regardless of the set value for signal analysis.

  Auto: Sets the reference level and the attenuator of the spectrum analyzer to the same value set for signal analysis.

- [F2] (Ref Level (SPA)):

  When [F1] (SPA ATT Ref Manual/Auto) of the function label is set to Manual, the value set here is set as the reference level for the spectrum analyzer.

- F3 (Attenuator):
  When F4 (Attenuator Manual/Auto) of the function label is set to Manual, the value set here is set to the attenuator of the spectrum analyzer.

- F4 (Attenuator Manual/Auto):
  Manual: Sets the attenuator of the spectrum analyzer regardless of the reference level set on F2 (Ref Level (SPA)) of the function label. Press F3 (Attenuator) to set the attenuator.
  Auto: Sets the attenuator of the spectrum analyzer automatically according to the reference level set on F2 (Ref Level (SPA)) of the function label.

- F6 (return):
  Returns to the upper-layer screen.

The second page of the function label

- F1 (RBW):
  Sets RBW of the spectrum analyzer.

- F2 (RBW Digital/Normal):
  Selects RBW type.
  Normal: Implements RBW using the hardware band pass filter. The IF signal goes through the band pass filter, and is then fetched via the A/D converter.
  Digital: Implements RBW by digital processing. The IF signal is fetched via the A/D converter, and then goes through the band pass filter by mathematical calculation. This provides RBW with better selectivity than the Normal type.
  Refer to the Spectrum Analyzer Operation Manual for more information.

- F3 (VBW):
  Selects VBW type of the spectrum analyzer.

- F4 (VBW Manual/Auto):
  Selects whether to set VBW regardless of RBW or to set it automatically in conjunction with RBW.
  Manual: Sets VBW to any value regardless of RBW. This enables F3 (VBW).
  Auto: Sets VBW value in conjunction with RBW. VBW cannot be set directly. This disables F3 (VBW). When RBW changes, VBW changes automatically accordingly.

- F5 (VBW/RBW Ratio):
  Sets the ratio used when the VBW setting mode is set to Auto.

- F6 (return):
  Returns to the upper-layer screen.

The third page of the function label

- F1 (Sweep Time):
  Sets the sweep time of the spectrum analyzer. Enter the sweep time value by using numeric keypad and then press Set to set the value in μsec unit.

- F2 (Sweep Time Manual/Auto):
  Selects whether to set the sweep time regardless of RBW and the frequency span or to set it automatically in conjunction with them.
  Manual: Sets the sweep time value regardless of RBW and the frequency span. This enables F1 (Sweep Time).
  Auto: Sets the sweep time value in conjunction with RBW and the frequency span. The sweep time cannot be set directly. This disables F1 (Sweep Time). When RBW or the frequency span changes, the sweep time changes automatically accordingly.

- F4 (Data Point):
  Selects the total number of data for measured data acquisition. Select between the following:
  501 points
  1001 points
  Measurement frequency resolution is determined by this setting and the frequency span.

- F5 (Detection):
  Sets the level measurement method at each data point. Select one from the following:
  Sample
  Positive Peak
  Negative Peak
  Average or RMS (RMS is available only for Option 04 installed with RBW of Digital.)
  Refer to the Spectrum Analyzer Operation Manual for more information on each measurement method.

- F6 (return):
  Returns to the upper-layer screen.

3.5.6 Setting storage mode

This section explains the averaging of the measured results.

1. Press [F2] (Storage Mode) on the Adjacent Channel Power screen to display the function label for Storage Mode.
2. Press [F2] (Average Count) to open the setting window.
3. Enter the average count by using [∧] [∨] (Entry keys), the rotary knob, or the numeric keypad.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average".
7. Press [Set].

After setting, another measurement is taken.
If the average count has changed when the storage mode is set to "Average," another measurement is taken after completing the setting. When no values are changed or when Cancel is selected, measurement is not taken again.

[F3] (Refresh Interval):
Sets the interval to update the display of the average value.
After setting is changed, another measurement is taken.

- Every: Updates the display after each measurement.
- Once: Updates the display after measurements are taken up to the set average count.

The following modes can be selected for the storage mode:
Normal: Updates and displays the measured result after each measurement.
Average: Averages and displays the measured result after each measurement.

3.5.7 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.5.8 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.6 Measuring Spectrum Mask

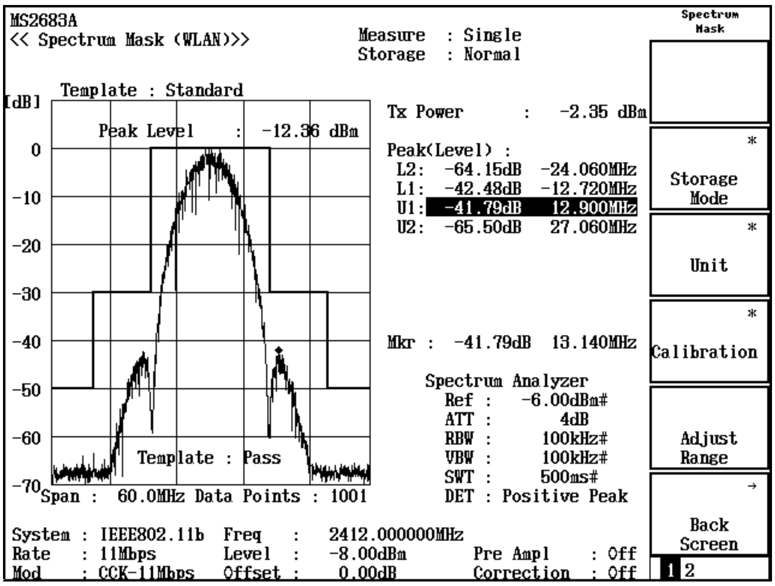
The MX268x30A/MX860x30A can perform measurements using methods conforming to IEEE802.11a, IEEE802.11b or IEEE802.11g via easy operations. Measurements can also be performed by using any parameter.

Press [F6] (Spectrum Mask) on the Setup Common Parameter screen to move to the spectrum mask measurement screen.

3.6.1 Explanation of measured results

This section explains the measured results shown on the Spectrum Mask screen. Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on how to adjust the RF input level.

Results of spectrum mask measurement



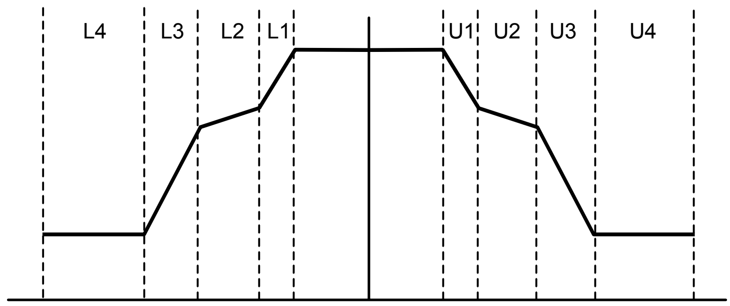
(1) Waveform display
Measured waveform and the standard line of spectrum mask.

(2) Tx Power
Transmission signal power.

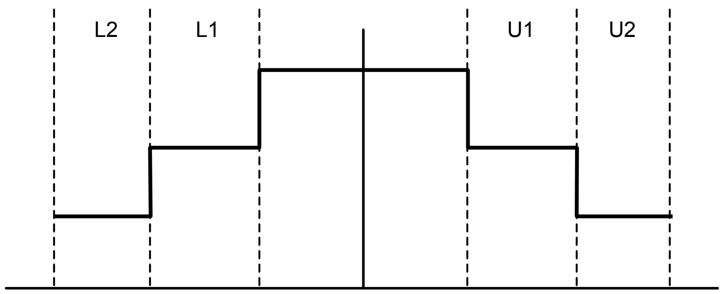
(3) Peak (Margin)/Peak (Level)

Displays the level difference (Margin) between the standard line and measured value, and frequency at that point. Or, it displays the measured level value and frequency at that point. Pressing F4 (Display Data Type) on the second page of the function label switches between the two display types.

Symbols beginning with L or U in the leftmost row indicate standard line intervals. The relationship between the symbols and standard lines are shown in the figure below:



IEEE802.11a, HiSWANa, HiperLAN2, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM) standard lines



IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK) standard lines

(4) Mkr

Frequency and measured value for the marker displayed on the waveform screen.

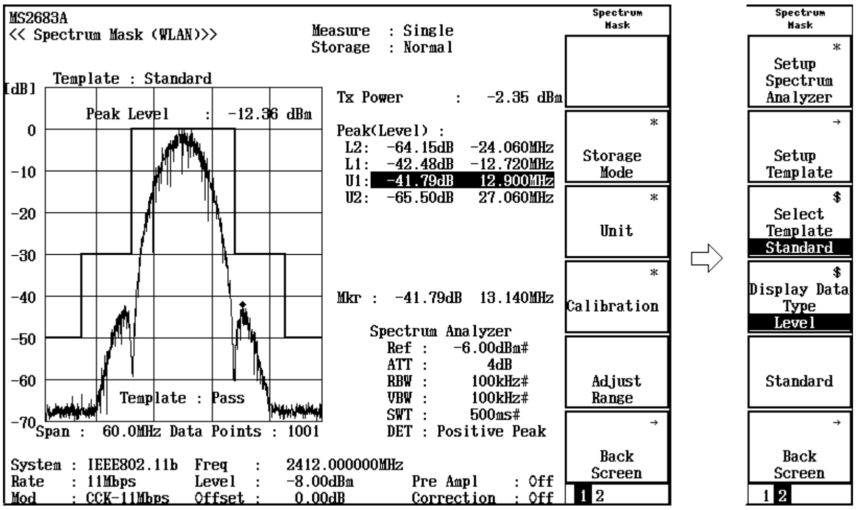
(5) Spectrum Analyzer

Setting values for the spectrum analyzer when measuring spectrum mask. Refer to Section 3.6.5, "Measuring by using any measurement parameters" for more information.

3.6.2 Selecting measurement standard

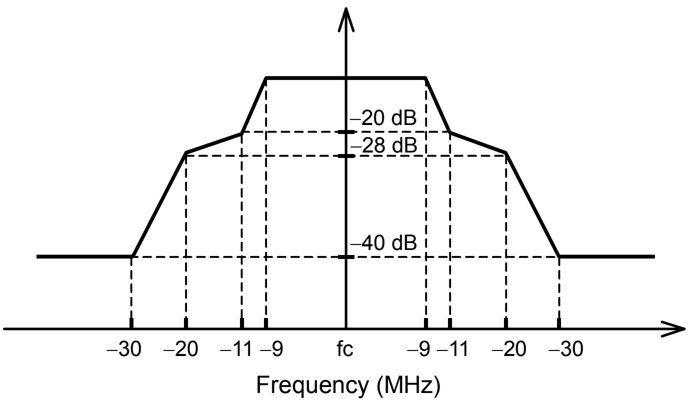
The measurement method and spectrum mask are stipulated in IEEE802.11a, IEEE802.11b and IEEE802.11g. The MX268x30A/MX860x30A can easily perform measurements conforming to the stipulated methods.

1. Press [ ] (More) on the Spectrum Mask screen to display the second page of the function label.
   Then press [F3] (Select Template) to change the function label display to "Standard".



2. The spectrum mask corresponding to the currently set target system is selected.
   Each spectrum mask and measurement setting of the spectrum analyzer are shown below:

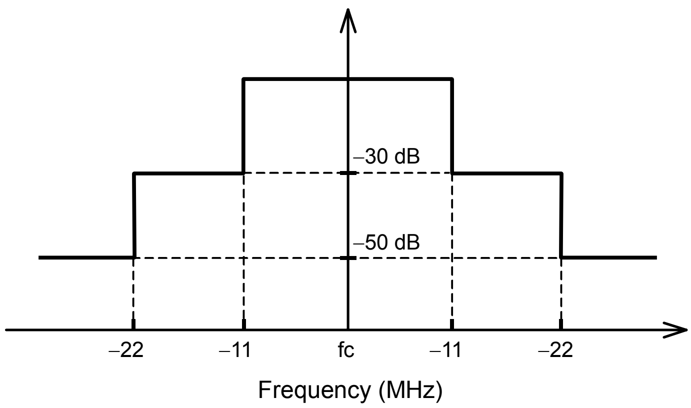
Spectrum mask for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM)



Spectrum analyzer settings for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM)

- Span frequency: 80 MHz
- RBW: 100 kHz
- VBW: 30 kHz
- Detection mode: Positive Peak

Spectrum mask for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)



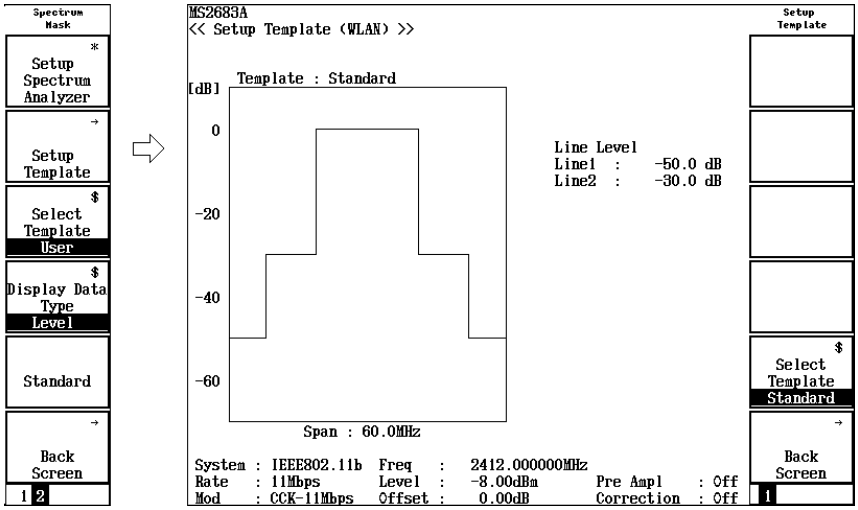
Spectrum analyzer settings for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)

- Span frequency: 60 MHz
- RBW: 100 kHz
- VBW: 100 kHz
- Detection mode: Positive Peak

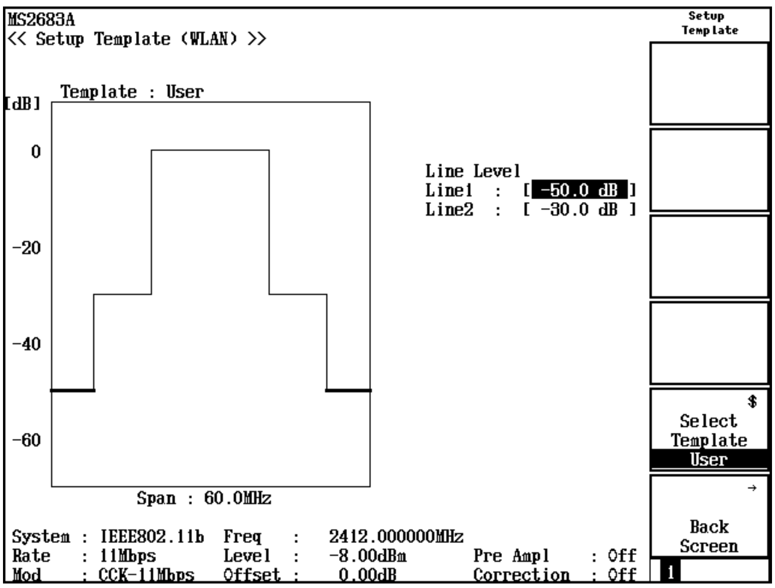
3.6.3 Changing standard line of spectrum mask

Spectrum mask can be changed by the user.

1. Press [ ] (More) on the Spectrum Mask screen to display the second page of the function label. Then press [F2] (Setup Template) to move to the spectrum mask input screen.



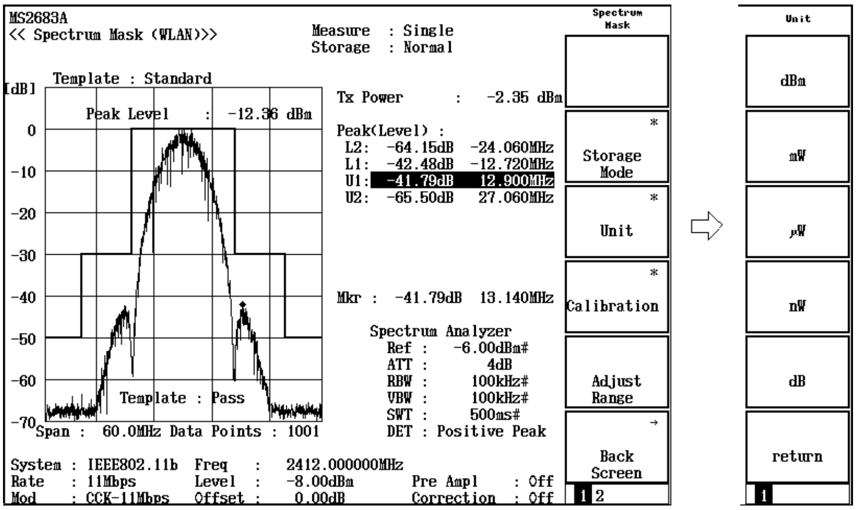
2. Press [F5] (Select Template) of the function label to change the function label display to “User”.
3. Input spectrum mask based on IEEE802.11a, IEEE802.11b or IEEE802.11g spectrum mask. The offset frequency cannot be changed. Only the level can be changed.
   Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor to the level to be changed, and then press [Set].
4. Press [∧] [∨] (Entry keys) or the numeric keypad, or turn the rotary knob to change the level for spectrum mask. Press [Set] to set the value.



3.6.4 Changing measured result unit

The unit of the measured results for spectrum mask level can be changed.

1. Press [F3] (Unit) on the Spectrum Mask screen. The function label changes. Select one from those shown below.



- [F1] (dBm):
  Displays measured results in dBm units.

- [F2] (mW):
  Displays measured results in mW units.

- [F3] (uW):
  Displays measured results in uW units.

- [F4] (nW):
  Displays measured results in nW units.

- [F5] (dB):
  Displays measured results in dB units. The relative value to the transmission signal is displayed.

- [F6] (return):
  Returns to the previous function label display.

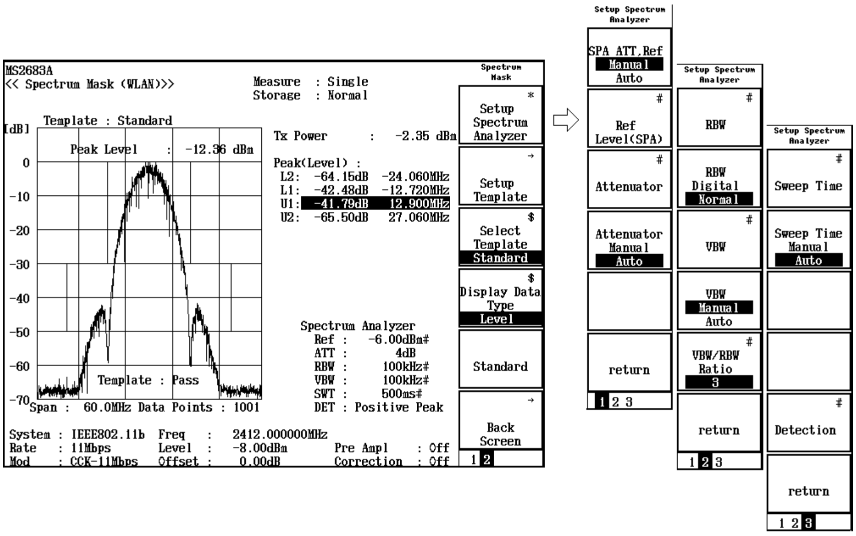
3.6.5 Measuring by using any measurement parameters

Spectrum mask is measured by the spectrum analyzer function. Therefore, the measured value for spectrum mask varies depending on the parameter values set for the spectrum analyzer.

The MX268x30A/MX860x30A can perform measurements conforming to official standards as explained in Section 3.6.2, while also being capable of measurement by setting any measurement parameters for the spectrum analyzer.

Selecting the measurement standard

1. Press [ ] (More) on the Spectrum Mask screen to display the second page of the function label.
2. Press [F1] (Setup Spectrum Analyzer).



3. The measurement parameter settings are displayed across three function label pages.

The first page of the function label

- [F1] (SPA ATT Ref Manual/Auto):

  Manual: Sets the reference level and the attenuator of the spectrum analyzer regardless of the set value for signal analysis.

  Auto: Sets the reference level and the attenuator of the spectrum analyzer to the same value set for signal analysis.

- [F2] (Ref Level (SPA)):

  When [F1] (SPA ATT Ref Manual/Auto) of the function label is set to Manual, the value set here is set as the reference level for the spectrum analyzer.

- F3 (Attenuator):
  When F4 (Attenuator Manual/Auto) of the function label is set to Manual, the value set here is set to the attenuator of the spectrum analyzer.

- F4 (Attenuator Manual/Auto):
  Manual: Sets the attenuator of the spectrum analyzer regardless of the reference level set on F2 (Ref Level (SPA)) of the function label. Press F3 (Attenuator) to set the attenuator.
  Auto: Sets the attenuator of the spectrum analyzer automatically according to the reference level set on F2 (Ref Level (SPA)) of the function label.

- F6 (return):
  Returns to the upper-layer screen.

The second page of the function label

- F1 (RBW):
  Sets RBW of the spectrum analyzer.

- F2 (RBW Digital/Normal):
  Selects RBW type.
  Normal: Implements RBW using the hardware band pass filter. The IF signal goes through the band pass filter, and is then fetched via the A/D converter.
  Digital: Implements RBW by digital processing. The IF signal is fetched via the A/D converter, and then goes through the band pass filter by mathematical calculation. This provides RBW with better selectivity than the Normal type.
  Refer to the Spectrum Analyzer Operation Manual for more information.

- F3 (VBW):
  Selects VBW type of the spectrum analyzer.

- F4 (VBW Manual/Auto):
  Selects whether to set VBW regardless of RBW or to set it automatically in conjunction with RBW.
  Manual: Sets VBW to any value regardless of RBW. This enables F3 (VBW).
  Auto: Sets VBW value in conjunction with RBW. VBW cannot be set directly. This disables F3 (VBW). When RBW changes, VBW changes automatically accordingly.

- [F5] (VBW/RBW Ratio):
  Sets the ratio used when the VBW setting mode is set to Auto.

- [F6] (return):
  Returns to the upper-layer screen.

The third page of the function label

- [F1] (Sweep Time):
  Sets the sweep time of the spectrum analyzer. Enter the sweep time value by using numeric keypad and then press [Set] to set the value in μsec unit.

- [F2] (Sweep Time Manual/Auto):
  Selects whether to set the sweep time regardless of RBW and the frequency span or to set it automatically in conjunction with them.
  Manual: Sets the sweep time value regardless of RBW and the frequency span. This enables [F1] (Sweep Time).
  Auto: Sets the sweep time value in conjunction with RBW and the frequency span. The sweep time cannot be set directly. This disables [F1] (Sweep Time). When RBW or the frequency span changes, the sweep time changes automatically accordingly.

- [F5] (Detection):
  Sets the level measurement method at each data point. Select one from the following:
  Sample
  Positive Peak
  Negative Peak
  Average or RMS (RMS is available only for Option 04 installed with RBW of Digital.)
  Refer to the Spectrum Analyzer Operation Manual for more information on each measurement method.

- [F6] (return):
  Returns to the upper-layer screen.

3.6.6 Setting storage mode

This section explains the averaging of the measured results.

1. Press [F2] (Storage Mode) on the Spectrum Mask screen to display the function label for Storage Mode.
2. Press [F2] (Average Count) to open the setting window.
3. Enter the average count by using [∧] [∨] (Entry keys), the rotary knob, or the numeric keypad.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average".
7. Press [Set].

After setting, another measurement is taken.
If the average count has changed when the storage mode is set to "Average," another measurement is taken after completing the setting. When no values are changed or when Cancel is selected, measurement is not taken again.

[F3] (Refresh Internal):
Sets the interval to update the display of the average value.
After setting is changed, another measurement is taken.

- Every: Updates the display after each measurement.
- Once: Updates the display after measurements are taken up to the set average count.

The following modes can be selected for the storage mode:

Normal: Updates and displays the measured result after each measurement.

Average: Averages and displays the measured result after each measurement.

3.6.7 Measuring by using the measurement parameters confirming to measurement standard

The MX268x30A can also perform measurements by using the measurement parameters conforming to the measurement standard.

1. Press [ ] (More) on the Spectrum Mask screen to display the function label for Storage Mode.
2. Press [F5] (Standard).

3.6.8 Calibration function (Calibration)

Refer to 3.2.16, “Calibration function (Calibration)” for more information on calibration.

3.6.9 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on measurement range optimization.

3.7 Measuring Spurious

The Wireless LAN software can perform measurements according to the Technical Regulations Conformity Certification stipulated by TELEC, etc., via simple operations. Measurements can also be performed using any parameter.

Press [ ] (More) in the Setup Common Parameter screen to display the second page. Then press [F2] (Spurious Emission) to move to the measurement screen for spurious.

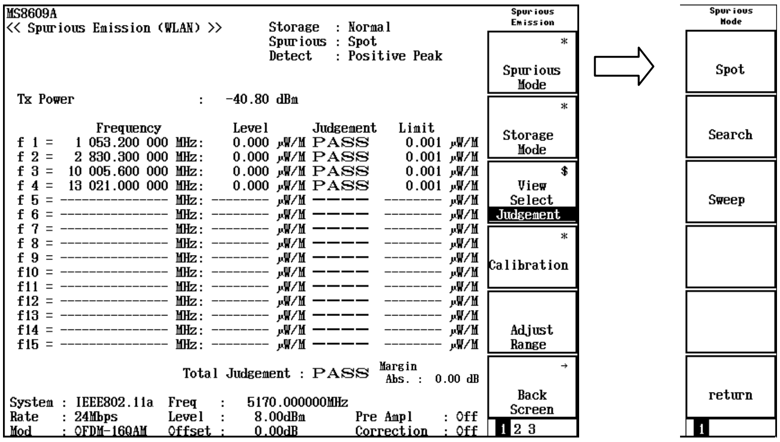
Adjust RF input level to optimize level setting inside the spectrum analyzer before measuring spurious. Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for adjusting RF input level.

3.7.1 Measurement procedures

The following three methods of spurious measurement are available. Choose the suitable one for the purpose as they vary greatly.

- Spot: Measures spurious for specified frequency. Use this method when frequency at which spurious is generated can be predicted. This method skips sweeping and measures only the specified frequency, thus measurement time is shorter than other methods.
- Sweep: Sweeps within the specified frequency range and detects the maximum level spurious. Use this method when frequency at which spurious generated cannot be predicted. This method detects waves at Positive Peak, thus the measured results may be larger than actual level.
- Search: Sweeps within the specified frequency range as well as "Sweep" above, and searches the maximum level signal. In addition, performs zero-span by setting the signal frequency as the center, and Sample wave detection to measure accurate signal level. Spurious level where frequency cannot be determined can be measured accurately. Measurement time is longer than other methods.

Press [F1] (Spurious Mode) in the Spurious Emission screen to switch the measurement method. The function label contents change to measurement method. Select one from here.



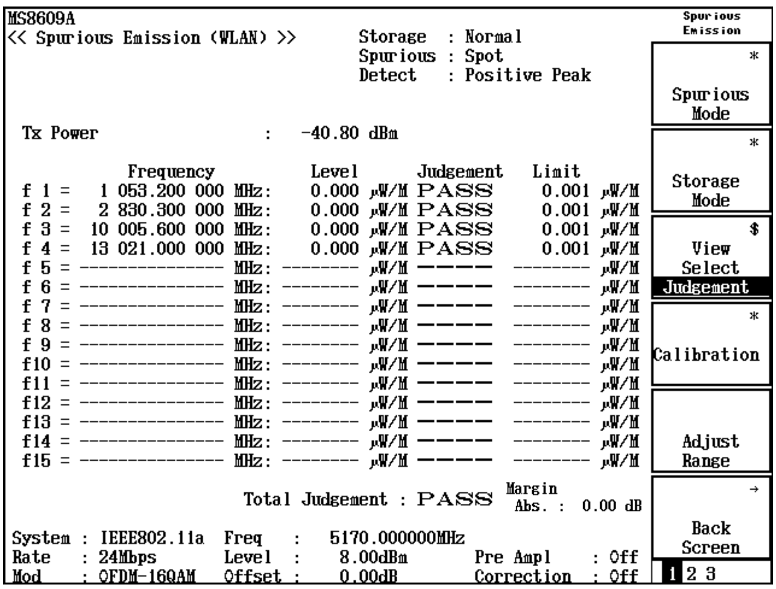
3.7.2 Measured results

The following two types of measured results display are available.

- Numeric value screen: Displays list of frequency and level for measured spurious.
- Waveform screen: Displays waveform for sweep range and measured results for spurious. Available for Sweep and Search measurements.

Refer to Section 3.7.5, "Viewing waveform" for switching between numeric value and waveform screens.

1. Numeric value screen



(1) Tx Power

Signal level for the frequency set in “Freq” at the bottom of the screen.

(2) Frequency

Spurious measurement frequency. Refer to Section 3.7.6, “Defining frequency table (Spot measurement)” or 3.7.7, “Defining frequency table (Sweep and Search measurements)” for settings.

(3) Level

Spurious level at frequency specified in (2) above.

(4) Judgment and Limit

Judgment result of spurious level measured in (3) above to standard value, and standard value for pass/fail judgment of spurious. Display contents of this part can be changed from [F3] (View Select) of function label.

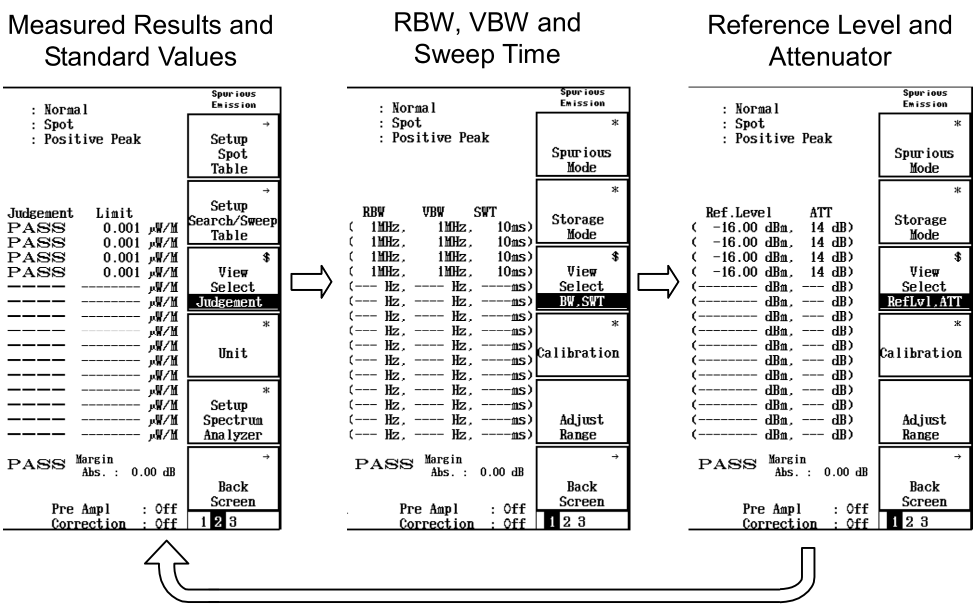
(5) Total Judgment

Judgment result for all frequencies.

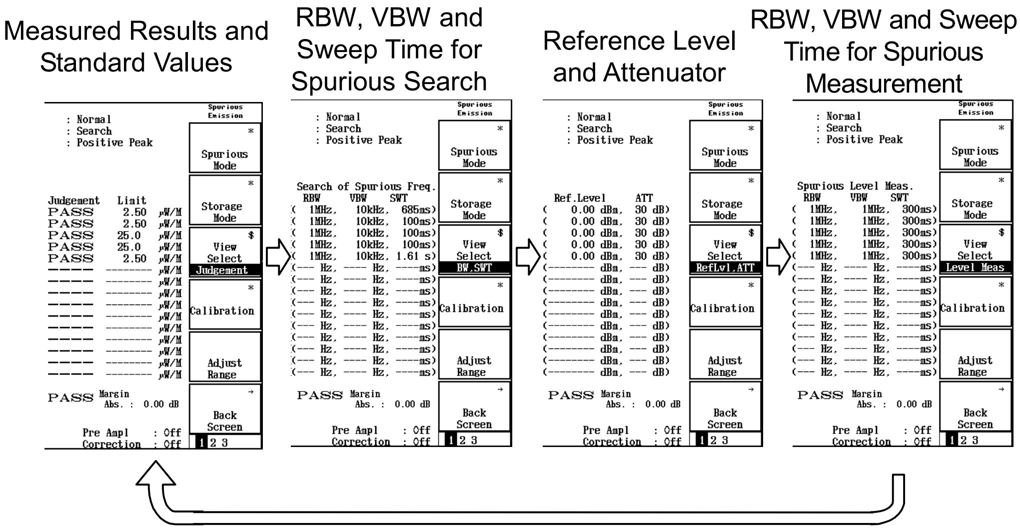
(6) [F3] (View Select)

Results and conditions for spurious measurement cannot be displayed in one screen. Pressing this key toggles results and conditions for measurement in the order shown below.

- Spot and Sweep measurements



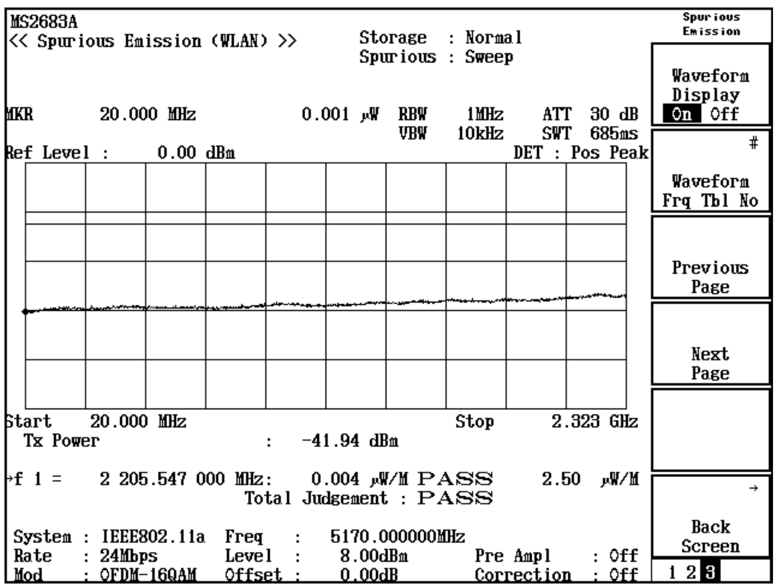
- Search measurement



(7) Margin

Displays a margin value, which can be taken into consideration for pass/fail judgment of a spurious level standard value. Refer to Section 3.7.6, “Defining frequency table (Spot measurement)” or 3.7.7, “Defining frequency table (Sweep and Search measurements)” for settings.

2. Waveform Screen



(1) MKR

Frequency and level at marker point (red diamond mark) in the waveform screen. Move the marker using [∧] and [∨] (Entry keys) or rotary knob.

(2) RBW, VBW, ATT, SWT, DET

Setting value for spectrum analyzer when measuring spurious.

RBW: Resolution bandwidth
VBW: Video bandwidth
ATT: Input attenuator
SWT: Sweep time
DET: Wave detection mode

Refer to Section 3.7.7, "Defining frequency table (Sweep and Search measurements)" for changing the above values.

(3) Ref Level

Level at the top of the waveform graph. The vertical axis of the waveform graph is 10 dB/div.

(4) Start, Stop

Sweep range when measuring spurious.

Start: Sweep start frequency
Stop :Sweep stop frequency

Refer to Section 3.7.7, "Defining frequency table (Sweep and Search measurements)" for changing the above values.

(5) Tx Power

Signal level at the frequency set in "Freq" at the bottom of the screen.

(6) →

Spurious measurement results within displayed waveform.

No. in Frequency Table   Spurious Level   Standard Value

→f 1 = 2 205.547 000 MHz: 0.004 μW/M PASS 2.50 μW/M

Spurious Frequency   Judgment Result with Standard Value

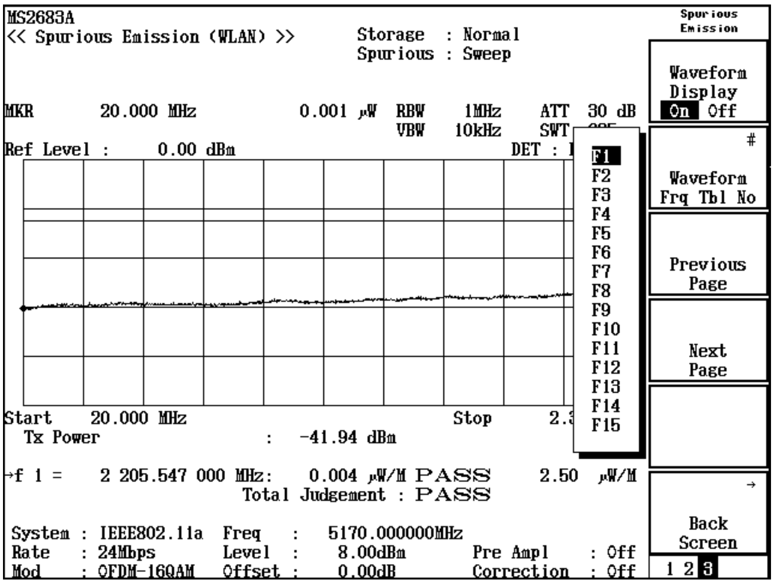
(7) Total Judgment

Judgment result for all frequencies.

(8) [F2] (Waveform Frq Tbl No):

Specify the frequency table with this key. Pressing this key opens a list of frequency table No's. Select a number using [∧] and [∨] (Entry keys) or rotary knob, then press [Set].

This item cannot be set when [F1] (Waveform Display) is set to off.



(9) [F3] (Previous Page):

Pressing this key decreases the frequency table No. for waveform display by one.

This item cannot be set when [F1] (Waveform Display) is set to off.

(10) [F4] (Next Page):

Pressing this key increases the frequency table No. for waveform display by one.

This item cannot be set when [F1] (Waveform Display) is set to off.

(11) [F6] (Back Screen):

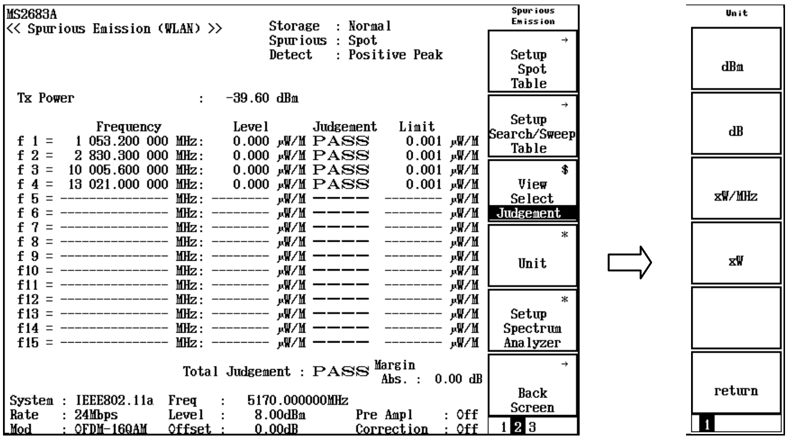
Switches the screen from the current screen to the upper-layer screen by one rank.

3.7.3 Changing measured results unit

The measured results unit for spurious can be changed.

1. Press [ ] (More) on the Spurious Emission screen to display the second page of the function label. Press [F4] (Unit) on the second page of function label.

   The function label contents change. Select one from here.



- [F1] (dBm):
  Displays in dBm units.

- [F2] (dB):
  Displays relative value to transmission signal in dB units.

- [F3] (xW/MHz):
  Displays power per 1 MHz bandwidth in W units.

- [F4] (xW):
  Displays in W units.

- [F6] (return):
  Returns to the previous function label display.

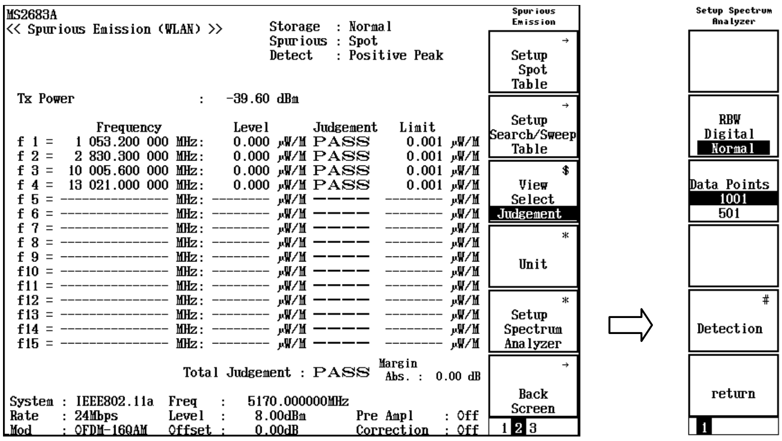
3.7.4 Measuring by using any measurement parameters

Spurious Emission is measured by the spectrum analyzer function. Therefore, the measured value for spurious emission varies depending on the parameter values set for the spectrum analyzer.

The MX268x30A/MX860x30A can perform measurements conforming to official standards as explained in Section 3.7.8, while also being capable of measurement by setting any measurement parameters for the spectrum analyzer.

Selecting the measurement standard

1. Press [ ] (More) on the Spurious Emission screen to display the second page of the function label.
2. Press [F5] (Setup Spectrum Analyzer).



- [F2] (RBW Digital/Normal):

  Selects RBW type.

  Normal: Implements RBW using the hardware band pass filter. The IF signal goes through the band pass filter, and is then fetched via the A/D converter.

  Digital: Implements RBW by digital processing. The IF signal is fetched via the A/D converter, and then goes through the band pass filter by mathematical calculation. This provides RBW with better selectivity than the Normal type.

  Refer to the Spectrum Analyzer Operation Manual for more information.

- [F3] (Data Points):
  Selects the total number of data for measured data acquisition. Select between the following:
  501 points
  1001 points
  Measurement frequency resolution is determined by this setting and the frequency span.

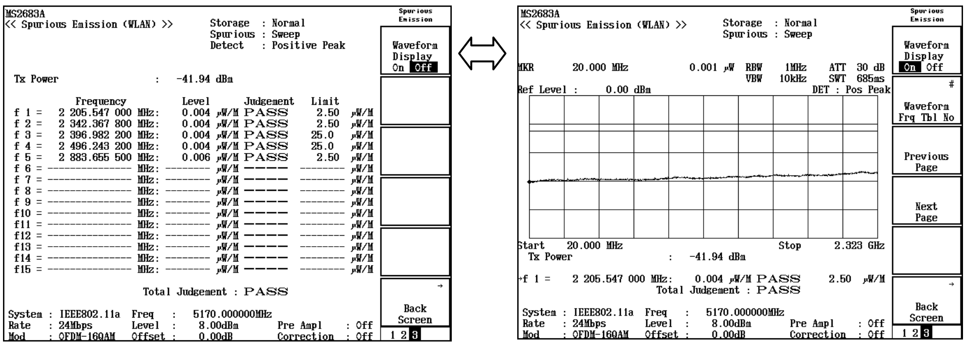
- [F5] (Detection):
  Sets the level measurement method at each data point. Select one from the following:
  Sample
  Positive Peak
  Negative Peak
  Average

- [F6] (return):
  Returns to the upper-layer screen.

3.7.5 Viewing waveform

Sweep waveform can be displayed during Sweep or Search measurement. This enables checking status except measured spurious.

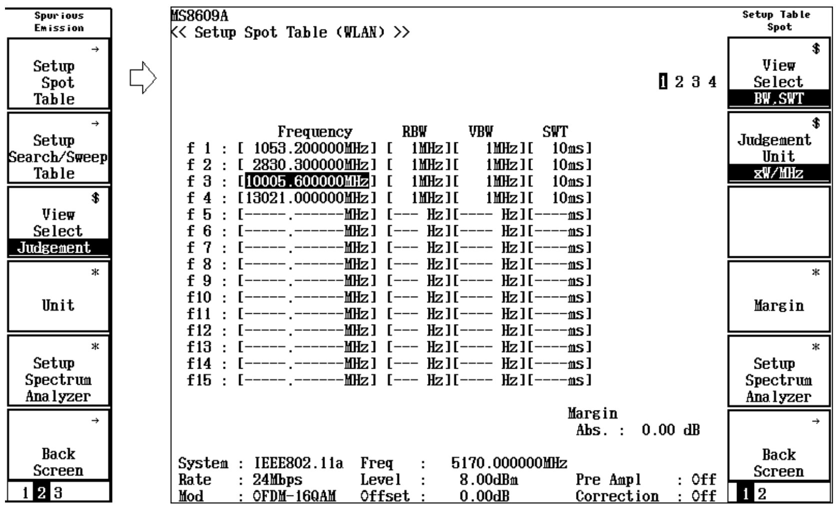
Press [F1] (Waveform Display) on the third page of the function label on the Spurious Emission screen to switch between the numeric value screen and the waveform screen.



3.7.6 Defining frequency table (Spot measurement)

Frequency for spurious measurement must be specified for Spot measurement. Frequency range for spurious measurement must be specified for Sweep and Search measurements.

Press [F1] (Setup Spot Table) on the second page of the function label on the Spurious Emission screen to move to the frequency table definition screen.

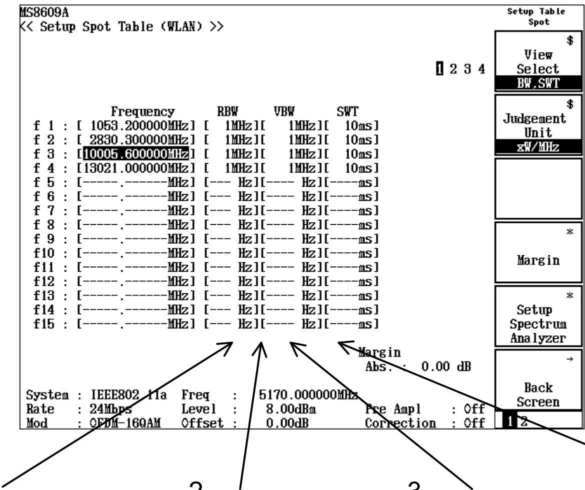


Up to 15 frequency tables can be defined. Inverted display indicates imputable parts. Move the cursor using [∧] and [∨] (Entry keys) or rotary knob.

Set the following items for definition of each frequency table.

- Measurement frequency (Frequency)
- Resolution bandwidth for spectrum analyzer (RBW)
- Video bandwidth for spectrum analyzer (VBW)
- Sweep time for spectrum analyzer (SWT)
- Reference level for spectrum analyzer (Ref Level)
- Attenuator for spectrum analyzer (ATT)
- Absolute standard value for pass/fail judgment in dBm units (Abs Limit)
- Relative standard value for pass/fail judgment in dB units (Rel Limit)
- Absolute standard value for pass/fail judgment in W units (Abs Limit)
- Absolute standard value for pass/fail judgment in auxiliary unit of W (Unit)

All setting items cannot be displayed within one screen. They are displayed by switching sequentially except for frequency.
Press [F1] (View Select) on the function label to switch display.

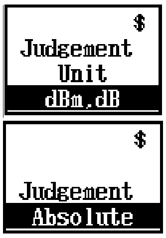


1			2		3		4	
RBW	VBW	SWT	Ref Level	ATT	Abs Limit	Rel Limit	Abs Limit	Unit
[1MHz]	[1MHz]	[10ms]	[-16.00dBm]	[14dB]	[0.00dBm]	[0.00dB]	[0.001]	[μW/MHz]
[1MHz]	[1MHz]	[10ms]	[-16.00dBm]	[14dB]	[0.00dBm]	[0.00dB]	[0.001]	[μW/MHz]
[1MHz]	[1MHz]	[10ms]	[-16.00dBm]	[14dB]	[0.00dBm]	[0.00dB]	[0.001]	[μW/MHz]
[1MHz]	[1MHz]	[10ms]	[-16.00dBm]	[14dB]	[0.00dBm]	[0.00dB]	[0.001]	[μW/MHz]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]
[--- Hz]	[---- Hz]	[----ms]	[----.--dBm]	[--dB]	[----.--dBm]	[----.--dB]	[----.---]	[------]

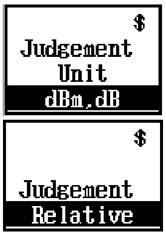
Absolute and relative standard values are used as pass/fail judgment criteria. Absolute standard values can be set in dBm and W. Select one to be used from these standard values in [F2] (Judgment Unit) and [F3] (Judgment) in the function label.

Performs pass/fail judgment with absolute standard values in W units.
The result is MHz-band converted for display.

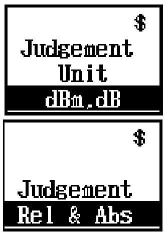
Performs pass/fail judgment with absolute standard values in W units.



Performs pass/fail judgment with absolute standard values in dBm units.



Performs pass/fail judgment with relative standard values in dB units.



Performs pass/fail judgment with both absolute standard values in dBm units and relative standard values in dB units.

Press [F4] (Margin) on the function label to add a margin value for the pass/fail judgment standard in dB units.

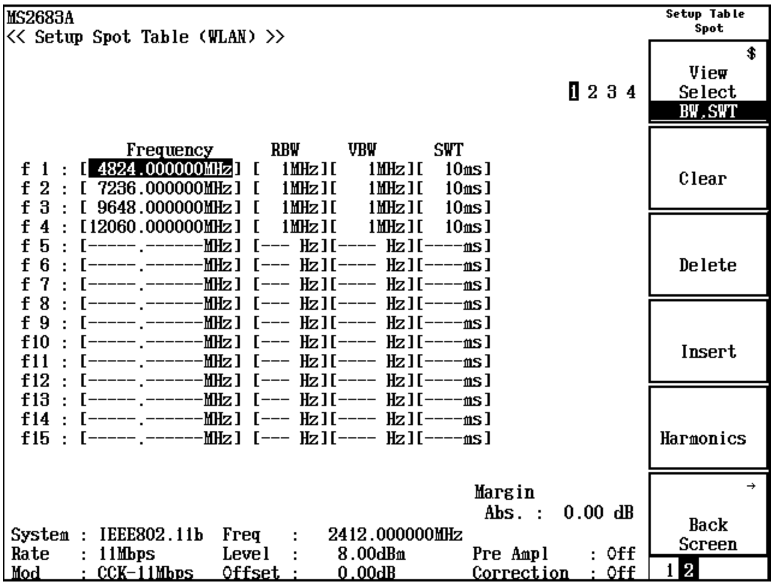
- [F1] (Absolute (xW, xW/MHz))
  Sets a margin value of the absolute standard value in W units or W units per MHz (MHz-band conversion).
- [F2] (Absolute (dBm))
  Sets a margin value of the absolute standard value in dBm units.
- [F3] (Relative (dB))
  Sets a margin value of the relative standard value in dB units.

- Setting a margin value

1. Press [F1] (Absolute (xW, xW/MHz)), [F2] (Absolute (dBm)) or [F3] (Relative (dB)) to open the setting window.
2. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to input the margin value to be set.
3. Press [Set].

Press [F5] (Setup Spectrum Analyzer) on the function label to enable measurement using user-defined parameters. Refer to 3.7.9, "Measuring by using any measurement parameters (Setup Table)" for details.

Use keys on second page of the function label for additions or deletions on existing frequency table.



- F2 (Clear):

  Deletes all frequency tables
- F3 (Delete):

  Deletes inverted line
- F4 (Insert):

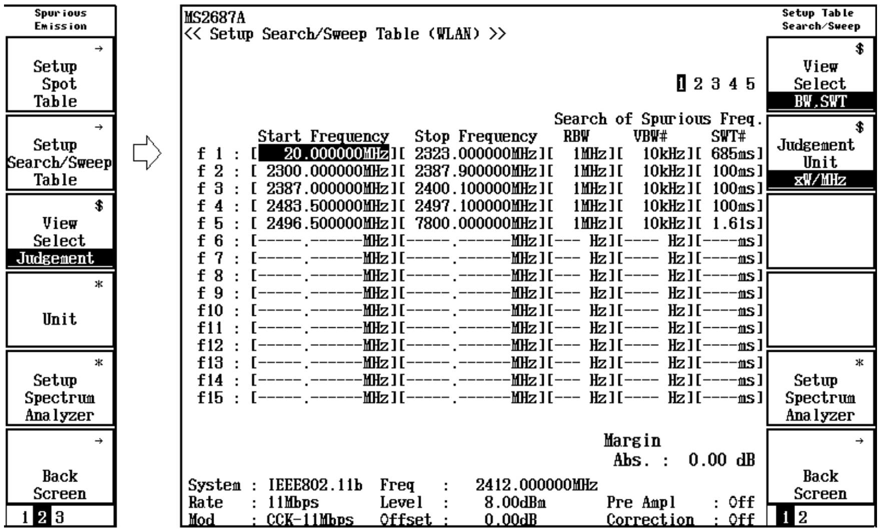
  Adds a new line above the inverted line
- F5 (Harmonics):

  Sets frequency that is the multiplier of the set frequency
- F6 (Back Screen):

  Switches the screen from the current screen to the upper-layer screen by one rank.

3.7.7 Defining frequency table (Sweep and Search measurements)

Press [F2] (Setup Search/Sweep Table) on the second page of the function label on the Spurious Emission screen to move to the frequency table definition screen.

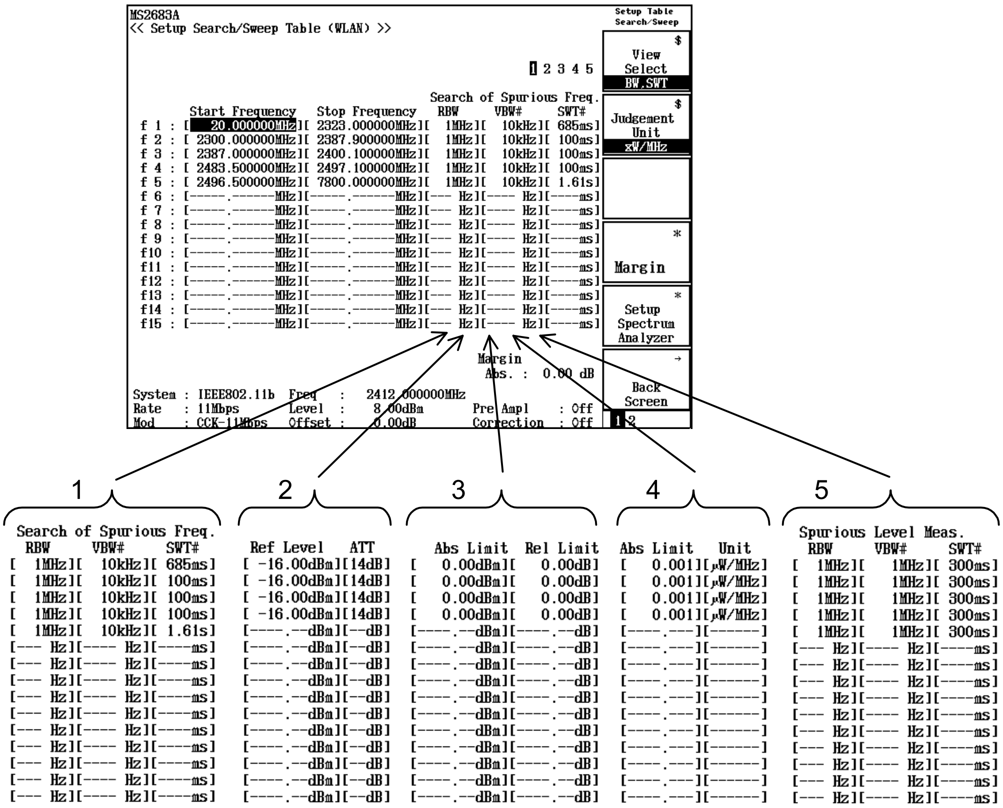


Up to 15 frequency tables can be defined. Inverted display indicates imputable parts. Move the cursor using [∧] and [∨] (Entry keys) or rotary knob.

Set the following items for definition of each frequency table.

- Sweep start frequency (Start Frequency)
- Sweep stop frequency (Stop Frequency)
- Resolution bandwidth for spectrum analyzer during spurious search (RBW)
- Video bandwidth for spectrum analyzer during spurious search (VBW)
- Sweep time for spectrum analyzer during spurious search (SWT)
- Reference level for spectrum analyzer (Ref Level)
- Attenuator for spectrum analyzer (ATT)
- Absolute standard value for pass/fail judgment in dBm units (Abs Limit)
- Relative standard value for pass/fail judgment in dB units (Rel Limit)
- Absolute standard value for pass/fail judgment in W units (Abs Limit)
- Absolute standard value for pass/fail judgment in auxiliary unit of W (Unit)
- Resolution bandwidth for spectrum analyzer during spurious measurement (RBW)
- Video bandwidth for spectrum analyzer during spurious measurement (VBW)
- Sweep time for spectrum analyzer during spurious measurement (SWT)

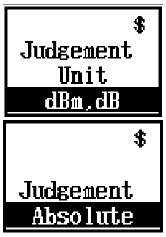
All setting items cannot be displayed within one screen. They are displayed by switching sequentially except for frequency.
Press F1 (View Select) on the function label to switch display.



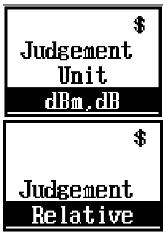
Absolute and relative standard values are used as pass/fail judgment criteria. Absolute standard value can be set in dBm and W. Select one to be used from these standard values in F2 (Judgment Unit) and F3 (Judgment) in the function label.

Performs pass/fail judgment with absolute standard values in W units.
The result is MHz-band converted for display.

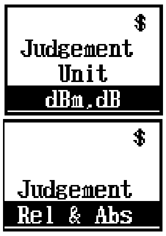
Performs pass/fail judgment with absolute standard values in W units.



Performs pass/fail judgment with absolute standard values in dBm units.



Performs pass/fail judgment with relative standard values in dB units.



Performs pass/fail judgment with both absolute standard values in dBm units and relative standard values in dB units.

Press [F4] (Margin) on the function label to add a margin value for the pass/fail judgment standard in dB units.

- [F1] (Absolute (xW, xW/MHz))
  Sets a margin value of the absolute standard value in W units or W units per MHz (MHz-band conversion).
- [F2] (Absolute (dBm))
  Sets a margin value of the absolute standard value in dBm units.
- [F3] (Relative (dB))
  Sets a margin value of the relative standard value in dB units.

- Setting a margin value

1. Press F1 (Absolute (xW, xW/MHz)), F2 (Absolute (dBm)) or F3 (Relative (dB)) to open the setting window.
2. Press ∧ ∨ (Entry keys), turn the rotary knob, or use the numeric keypad to input the margin value to be set.
3. Press Set.

Press F5 (Setup Spectrum Analyzer) on the function label to enable measurement using user-defined parameters. Refer to 3.7.9, "Measuring by using any measurement parameters (Setup Table)" for details.

Notes on settings

- Set sweep frequency bandwidth (Sweep stop frequency − Sweep start frequency) to 10 GHz or lower.

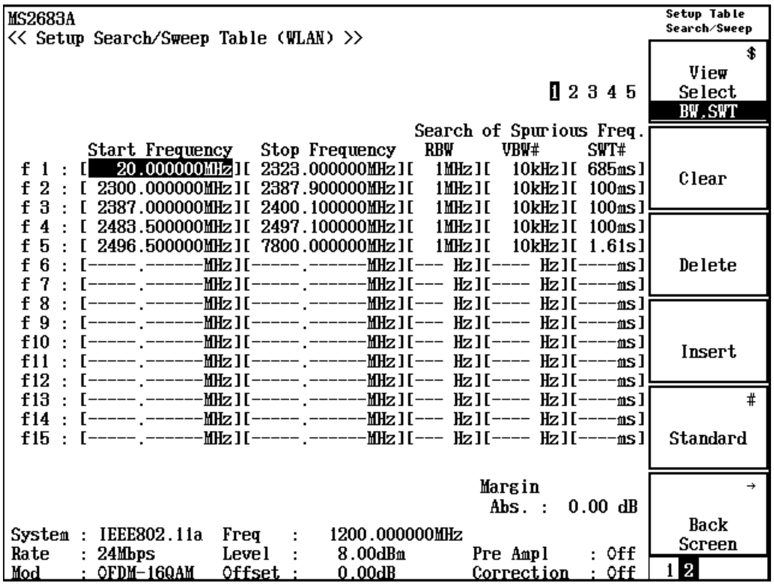
- Sweep frequency of analyzer contains frequency uncertainty. MS268xA/MS860xA series analyzers employ start-lock sweep method. This method locks frequency at sweep start time, and then varies voltage controller oscillator frequency by using ramp voltage to perform sweep. Thus while sweep start frequency is accurate, the sweep stop frequency contains uncertainty. Normally, the uncertainty is defined by span accuracy.
  Set sweep stop frequency in view of set span accuracy.
  For example, when measuring spurious for a range from 100 MHz to 1000 MHz while span accuracy is set to ±1%, uncertainty of ±0.01 × (1 GHz − 100 MHz) = ±9 MHz appears at sweep stop frequency. The actual sweep frequency range should be set to 1000 MHz + 9 MHz = 1009 MHz.

  From the above-mentioned reason,when the setting range of SPAN is made large and Search measurement is performed, a big frequency error is produced. Therefore, the processing (improvement in frequency accuracy) which narrows SPAN focusing on the frequency for which it searched again, and performs Search enters.
  In case of carrying out especially near the Career by Search measurement, by the uncertainty of frequency is the cause,it may not be measured correctly.When searching the 1st frequency, the career signal of the outside of the set-up range may be caught.
  When such, please measure by making SPAN as narrow as possible. In addition, it is effective, if the frequency which Spurious generates beforehand can be predicted and Spot measurement will be performed. Compared with other measuring methods, measurement time becomes short.

- Wave detection mode is set to Positive Peak in Spot and Sweep measurements. Wave detection mode during spurious search is set to Positive Peak while it is set to Sample at final level measurement in Search measurement.

- Internal LO signal leakage called as zero-beat when analyzer frequency is 0 Hz. The zero-beat is misidentified as spurious when relationship between sweep start frequency (fs) and RBW during Sweep and Search measurements are as shown below:
  fs<10RBW (rule of thumb)
  Decrease RBW value in this event.

Use keys in the second page of the function label for additions or deletions on existing frequency table.

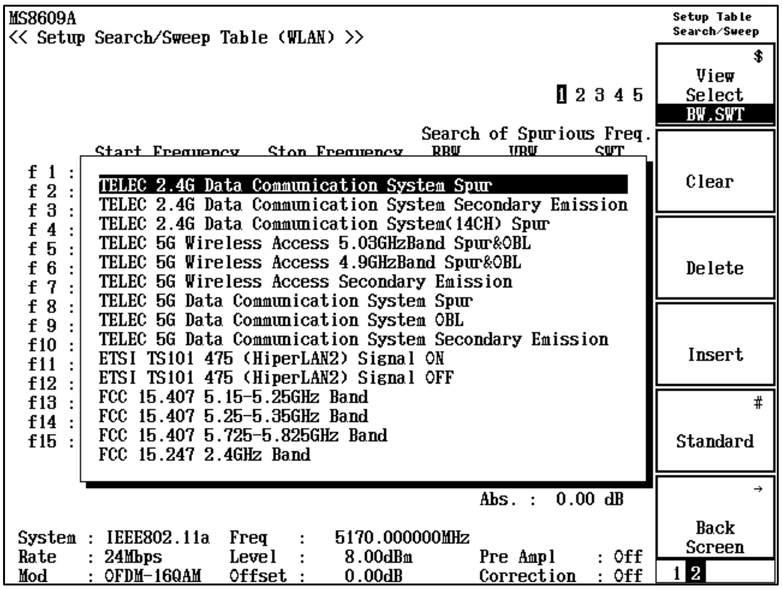


- F2 (Clear):
  Deletes all frequency tables
- F3 (Delete):
  Deletes inverted line
- F4 (Insert):
  Adds a new line above the inverted line
- F5 (Standard):
  Sets frequency that is the multiplier of the set frequency
- F6 (Back Screen):
  Switches the screen from the current screen to the upper-layer screen by one rank.

3.7.8 Measuring using conformance with official standards

Conditions and standards for spurious measurement are stipulated by TELEC and FCC. This section describes measurement parameter settings that conform to these official standards.

- Press (More) in the Spurious Emission screen to display the second page.
- Pressing F2 (Setup Search/Sweep Table) opens the frequency table definition screen. Then press (More) to display the second page.
- Pressing F5 (Standard) opens a list of official standards.
- Select official standards using ∧ and ∨ (Entry keys) or the rotary knob, then press Set to determine the value.



standards corresponding to each item

Official standards referred to by items displayed on the screen are as follows:

TELEC 2.4 G Data Communication System Spur
→ TELEC 2.4 GHz band wide band low power data communication system
Level of spurious emission

TELEC 2.4 G Data Communication System Secondary Emission
→ TELEC 2.4 GHz band wide band low power data communication system
Level of secondary emission

TELEC 2.4 G Data Communication System(14CH) Spur
→ TELEC 2.4 GHz band low power data communicationsystem
Level of spurious emission

TELEC 5 G Wireless Access 5.03 GHz Band Spur & OBL
→ 5.03 thru 5.06 GHz band of TELEC 5 GHz band radio access system
Level of spurious emission and out-of-band leakage power

TELEC 5 G Wireless Access 4.9 GHz Band Spur & OBL
→ 4.9 thru 5 GHz band of TELEC 5 GHz band radio access system
Level of spurious emission and out-of-band leakage power

TELEC 5 G Wireless Access Secondary Emission
→ TELEC 5 GHz band radio access system
Level of secondary emission

TELEC 5 G Data Communication System Spur
→ TELEC 5 GHz band low power data communication system
Level of spurious emission

TELEC 5 G Data Communication System OBL
→ TELEC 5 GHz band low power data communication system
Out-of-band radiation power

TELEC 5 G Data Communication System Secondary Emission
→ TELEC 5 GHz band low power data communication system
Level of secondary emission

ETSI TS 101 475 (HiperLan2) Signal ON
→ ETSI TS 101 475 v1.3.1 5.8.3 Unwanted RF radiation Active Transmit

ETSI TS 101 475 (HiperLan2) Signal OFF
→ ETSI TS 101 475 v1.3.1 5.8.3 Unwanted RF radiation All the other mode

FCC 15.407 5.15-5.25 GHz Band
→ CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (1)

FCC 15.407 5.25-5.35 GHz Band
→ CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (2)

FCC 15.407 5.725-5.825 GHz Band
→ CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (3)

FCC 15.247 2.4 GHz Band
→ CFR Title47, Chapter1, Part15, Sec15.247, Paragraph (c)

Equivalent isotope-radiated power

In the following standards, equivalent isotope-radiated power is used for spurious measurement definition:

- TELEC 5 G Wireless Access 5.03 GHz Band Spur & OBL
- TELEC 5 G Data Comminucation System OBL
- FCC 15.407 5.15-5.25 GHz Band
- FCC 15.407 5.25-5.35 GHz Band
- FCC 15.407 5.725-5.825 GHz Band

Equivalent isotope-radiated power (Poa) is calculated by using the following formula:

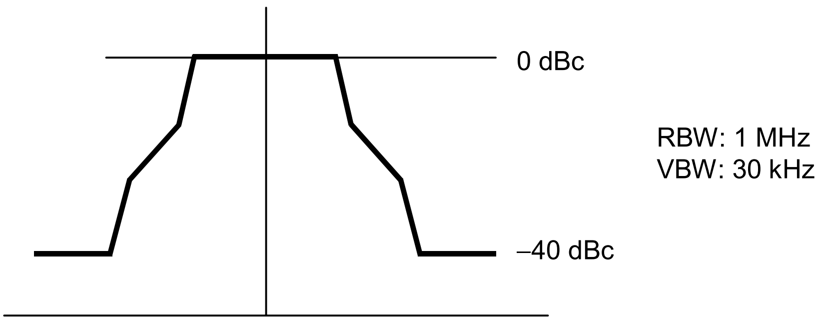
$$Poa = Pa + Gt + Lf$$

Pa: Measured value of analyzer
Gt: Absolute gain for aerial wire
Lf: Loss from cable, etc.

Set the sum of Gt and Lf values above in the correction table on the analyzer to perform measurement. Refer to Operation Manual of the MS268xA Spectrum Analyzer or MS860xA Digital Mobile Radio Transmitter Tester for correction table.

Notes on ETSI TS 101 475 (HiperLan2) Signal ON

In the ETSI standard, unwanted radiation during signal output is stipulated to follow the spectrum mask. The specification for the spectrum mask is as shown in the figure below:



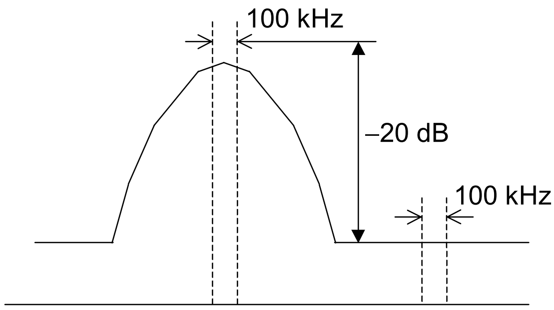
According to this specification, unwanted radiation should be measured in 1 MHz bandwidth, and be 40 dB or less compared to the 1 MHz bandwidth power of the signal.

The 1 MHz bandwidth power of the signal is not directly measured by the MX268x30A/MX860x30A, but rather the channel power is measured. Therefore, instead of −40 dB, the specification value is −52.2 dB, calculated by subtracting 12.2 dB (10 log [16.6]), which is the ratio of 1 MHz to the occupied frequency bandwidth (16.6 MHz).

Spurious is not measured within a range of "±30 MHz of the setting frequency", since signals exist in this range.

Notes on FCC 15.247 2.4 GHz Band

In the FCC standard, 100 kHz bandwidth power in bands other than 2400 MHz thru 2438.5 MHz band should be 20 dB less than 100 kHz bandwidth power that includes the maximum band level.



The 100 kHz bandwidth power of the signal in the band is not directly measured by the MX268x30A/MX860x30A, but rather the channel power is measured. Therefore, instead of −20 dB, the specification value is −43 dB, calculated by subtracting 23 dB, which is the ratio of the channel power to the 100 kHz bandwidth power in the center of the signal band.

Although unwanted radiation in the band stipulated in Sec 15.205, Paragraph (a) is also defined in the FCC standard, the MX268x30A/MX860x30A does not support such radiation since it is defined by electric field intensity.

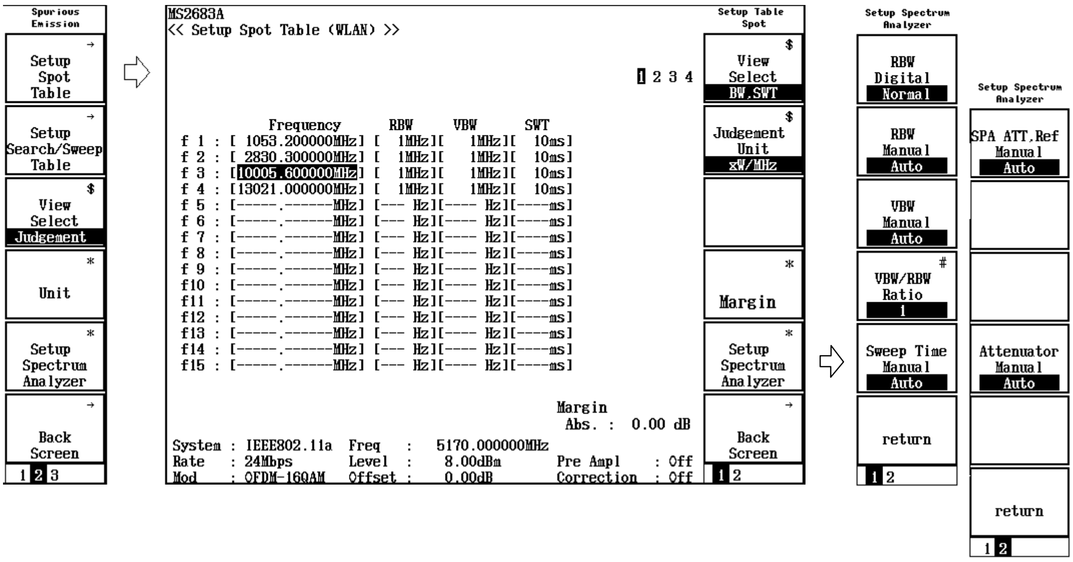
3.7.9 Measuring by using any measurement parameters (Setup Table)

Spurious emission is measured by the spectrum analyzer function. Therefore, the measured value for spurious emission varies depending on the parameter values set for the spectrum analyzer.

The MX268x30A/MX860x30A can perform measurements conforming to official standards as explained in Section 3.7.8, while also being capable of measurement by setting any measurement parameters for the spectrum analyzer.

Selecting the measurement standard

1. Press [ ] (More) on the Spurious Emission screen to display the second page of the function label.
2. Press [F1] (Setup Spot Table), then press [F5] (Setup Spectrum Analyzer).



3. The measurement parameter settings are displayed across two function label pages.

The first page of the function label

- [F1] (RBW Digital/Normal):

  Selects RBW type.

  Normal: Implements RBW using the hardware band pass filter. The IF signal goes through the band pass filter, and is then fetched via the A/D converter.

  Digital: Implements RBW by digital processing. The IF signal is fetched via the A/D converter, and then goes through the band pass filter by mathematical calculation. This provides RBW with better selectivity than the Normal type.

  Refer to the Spectrum Analyzer Operation Manual for more information.

- [F2] (RBW Manual/Auto):

  Selects whether to set RBW regardless of VBW or to set it automatically in conjunction with VBW.

  Manual: Sets RBW to any value regardless of VBW.

  Auto: Sets RBW value in conjunction with VBW. RBW cannot be set directly. When VBW changes, RBW changes automatically accordingly.

- [F3] (VBW Manual/Auto):

  Selects whether to set VBW regardless of RBW or to set it automatically in conjunction with RBW.

  Manual: Sets VBW to any value regardless of RBW.

  Auto: Sets VBW value in conjunction with RBW. VBW cannot be set directly. When RBW changes, VBW changes automatically accordingly.

- [F4] (VBW/RBW Ratio):

  Sets the ratio used when the VBW setting mode is set to Auto.

- [F5] (Sweep Time Manual/Auto):

  Selects whether to set the sweep time regardless of RBW and the frequency span or to set it automatically in conjunction with them.

  Manual: Sets the sweep time value regardless of RBW and the frequency span.

  Auto: Sets the sweep time value in conjunction with RBW and the frequency span. The sweep time cannot be set directly. When RBW or the frequency span changes, the sweep time changes automatically accordingly.

- [F6] (return):

  Returns to the upper-layer screen.

The second page of the function label

- [F1] (SPA ATT Ref Manual/Auto):

  Manual: Sets the reference level and the attenuator of the spectrum analyzer regardless of the set value for signal analysis.

  Auto: Sets the reference level and the attenuator of the spectrum analyzer to the same value set for signal analysis.

- [F4] (Attenuator Manual/Auto):

  Manual: Sets the attenuator of the spectrum analyzer regardless of the set reference level.

  Auto: Sets the attenuator of the spectrum analyzer automatically according to the set reference level.

- [F6] (return):

  Returns to the upper-layer screen.

3.7.10 Setting storage mode

This section explains how to set the averaging process for measured results.

- Setting averaging process

1. Press [F2] (Storage Mode) on the Spurious Emission screen to display the Storage Mode function labels.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob or use the ten-key pad to input the average count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."
7. Press [Set].

After setting, another measurement is taken.
If the average count is changed when the storage mode is set to "Average," another measurement is taken after completing the setting. When no values are changed or when Cancel is selected, measurement is not taken again.

Refresh Interval: Sets the update timing for the average value display.
After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement.
- Once: Updates the display after measurements are taken up to the set average count.

In addition to Average, the following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after each measurement.

3.7.11 Calibration function (Calibration)

Refer to Section 3.2.16, “Calibration function (Calibration)” for more information on calibration.

3.7.12 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on measurement range optimization.

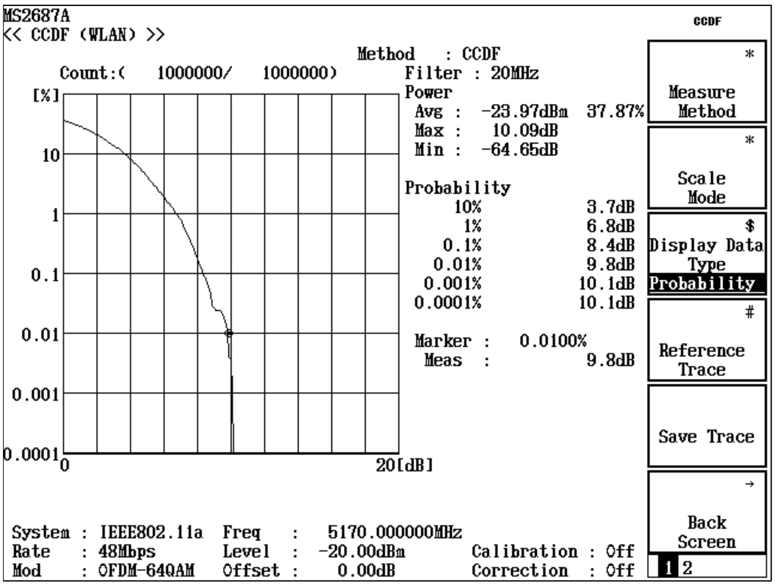
3.8 Measuring CCDF

Press [ ] (more) in the Setup Common Parameter screen to display the second page of the function label. Then press [F1] (CCDF) to move to the measurement screen for CCDF.

This section describes the measured results and setting parameter related to the CCDF (Complementary Cumulative Distribution Function) screen.

3.8.1 Explanation of measured results

The following display appears when CCDF is selected for Measure Method.



Method:

Displays the measurement method selected for Measure Method. Refer to Section 3.8.2, "Selecting measurement method" for details on setting.

Waveform:

Displays the cumulative distribution of the average power band-limited by Filter and the instantaneous power. The horizontal axis indicates the difference between the average value and instantaneous power; the vertical axis indicates distribution.
Refer to Section 3.8.3, "Setting display format" for details on setting.

Count:

Displays the measurement point as count currently being measured/total count.

Filter:

Displays the band of Filter used for analysis. Refer to Section 3.8.4, “Setting for measurement” for details on setting.

Power:

Displays the relative values of Average Power, Maximum Power, and Minimum Power of the measurement point. It also displays the cumulative ratio of Average Power (unit: percent).

Distribution, Probability:

Displays the cumulative distribution of which above deviation at the grid. Refer to Section 3.8.3, “Setting display format” for details on setting.

Marker:

Displays the cumulative distribution of which above deviation at the marker.

Refer to Section 3.8.3, “Setting display format” for details on setting.

Delta Marker:

Displays the difference between the data saved in Reference Trace and the waveform being measured. Refer to Section 3.8.3, “Setting display format” for details on saving/displaying Reference Trace.

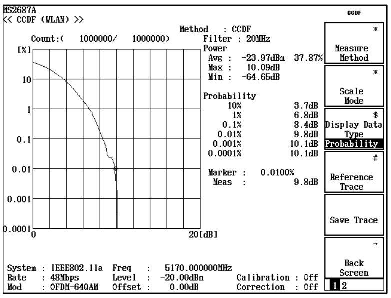
3.8.2 Selecting measurement method

This section describes how to select the Measurement Method. The description advances assuming that the first page of function label is being displayed on the CCDF screen.

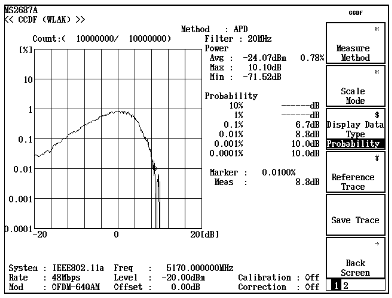
1. Press [F1] (Measure Method) to display the function labels shown below that allows you to select the Measurement Method.

- [F1] (CCDF): Measures and displays CCDF (Complementary Cumulative Distribution Function). In this measurement, the cumulative distribution of the deviation of average power and instantaneous power is to be measured and displayed.
- [F2] (APD): Measures and displays APD (Amplitude Probability Density). In this measurement, the deviation of average power and instantaneous power.
- [F6] (return): Returns to the previous function label.

When Measuring Method is changed, re-measurement is to be carried out.



Measure Method : CCDF



Measure Method : APD

3.8.3 Setting display format

This section describes the Display Format of the measured results. The description advances assuming that the first page of function label is being displayed on the CCDF screen.

- Selecting Trace Format

1. Press [F2] (Scale Mode) to display the function label.
2. Press [F1] (Trace Format) to display the setting window.
3. Select "Trace Format" using [∧] [∨] (Entry keys) or the rotary knob.
4. Press [Set].

The following modes are selectable for Trace Format:

- Positive: Displays the distribution of which above Average Power
- Negative: Displays the distribution of which below Average Power
- Positive & Negative: Displays all distribution

This function is available only when APD is set for Measure Method.

- Selecting Horizontal Scale

1. Press [F2] (Scale Mode) to display the function label.
2. Press [F2] (Horizontal Scale) to display the function labels shown below that allows you to select Scale.

- [F1] (2 dB): Sets the maximum value to 2 dB
- [F2] (5 dB): Sets the maximum value to 5 dB
- [F3] (10 dB): Sets the maximum value to 10 dB
- [F4] (20 dB): Sets the maximum value to 20 dB
- [F5] (50 dB): Sets the maximum value to 50 dB
- [F6] (return): Returns to the previous function label.

• Selecting Display Data Type

1. Press F3 (Display Data Type) to toggle between Probability and Distribution.

Display Data Type is a function to display the value of measured waveform of which the grid locates on either vertical axis or horizontal axis. The following modes are selectable:

- Probability: Displays the distribution of measured waveform at the specified probability (at the grid on the vertical axis). The marker moves along the vertical axis.
- Distribution: Displays the probability of measured waveform at the specified distribution (at the grid on the horizontal axis). The marker moves along the horizontal axis.

• Saving the measured waveform

1. Press F5 (Save Trace).
2. When the confirmation widow appears, select “Yes” and press Set to confirm.

This function saves only selected waveform for Measure Method.

• Selecting “Reference Trace”

1. Press F4 (Reference Trace) to display the setting window.
2. Select “Reference Trace” by using ∧ ∨ (Entry keys) or the rotary knob.

3 Press Set.
When Measure Method is changed and then the waveform is saved, the previous waveform data does not remain.

Measured waveform and Gauss distribution saved by selecting “Reference Trace” are available to be displayed simultaneously.

- Off: Displays waveform currently being measured
- Save Trace: Displays waveforms both currently being measured and being saved
- Gaussian Trace: Displays waveform both currently being measured and gauss distribution
- Save & Gaussian: Displays waveforms both currently being measured and being saved, and gauss distribution

3.8.4 Setting for measurement

This section describes the settings required for the CCDF measurement. The description advances assuming that the second page of function label is being displayed on the CCDF screen.

- Selecting Filter Type

1. Press [F1] (Filter Type) to display the setting window.
2. Select "Filter Type" by using [∧] [∨] (Entry keys) or the rotary knob.
3. Press [Set].

The following Filters are selectable for Filter Type:

- 22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz
- 3.84 MHz (RRC): α = Root Raised Cosine Filter of 0.22
- 3.84 MHz (RC): α = Raised Cosine Filter of 0.22

- Selecting Data Count

1. Press [F2] (Data Count) to display the setting window.
2. Enter the measurement point by using [∧] [∨] (Entry keys), the rotary knob, or the numeric keypad.
3. Press [Set].

Decimal point and the below value is truncated.

- Selecting Analysis Length

1. Press [F3] (Analysis Length) to display the setting window.
2. Enter the analysis length by using [∧] [∨] (Entry keys), the rotary knob, or the numeric keypad.
3. Press [Set].

Analysis Length is a measurement section required for one measurement. The data started from the set Analysis Length is to be measured up to the set Data Count value.

3.8.5 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.8.6 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.9 Measuring Symbol Rate Error

Press (More) on the Setup Common Parameter screen to display the second page of the function label. Then press F3 (Symbol Rate Error) to move to the Symbol Rate Error screen (symbol rate frequency error
measurement).

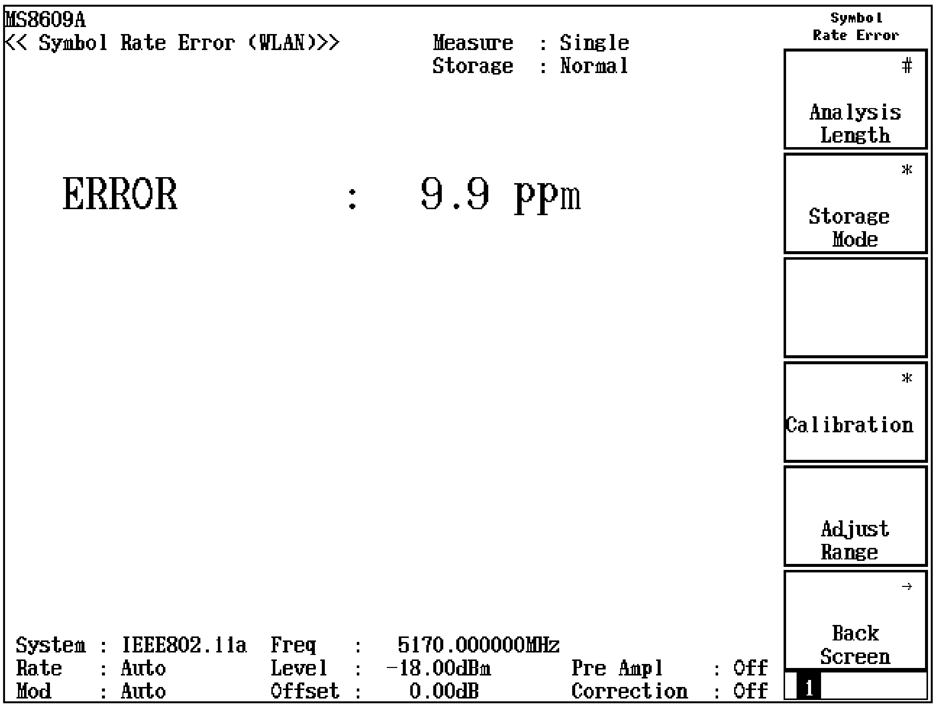
This section explains the measured results and setting parameters shown on the Symbol Rate Error screen (symbol rate frequency error measurement). Measuring Symbol Rate Error is enabled when the target system is set to IEEE802.11a or IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM).

3.9.1 Explanation of measured results

This section explains the measured results shown on the Symbol Rate Error (symbol rate frequency error measurement) screen. Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on how to adjust the RF input level.

Results of symbol rate frequency error measurement

Communication standard: IEEE802.11a, IEEE802.11g (ERP-OFDM)
IEEE802.11g (DSSS-OFDM)



ERROR
Displays the results of symbol rate frequency error measurement in ppm units.

3.9.2 Changing analysis length (Analysis Length)

This section explains how to set the number of symbols to be analyzed (signal length of a signal to be measured excluding the preamble).

Setting the analysis length

1. Press [F1] (Analysis Length) on the Symbol Rate Error screen to open the setting window.
2. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to enter the analysis length in symbol units or symbol units.
3. Press [Set].

After the setting is completed, another measurement is taken. The signal is not re-measured if no values are changed or when Cancel is selected.
If the set analysis length is longer than the signal length of a signal to be measured, the section exceeding the signal length cannot be correctly analyzed. Set the analysis length so that it is equal to or less than the signal length of the signal to be measured except for the preamble.

3.9.3 Averaging (Storage Mode)

This section explains how to set the averaging process for the measured results.

Setting the averaging process

1. Press [F2] (Storage Mode) on the Symbol Rate Error screen to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to input the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."
7. Press [Set].

After the setting is completed, another measurement is taken.

If the averaging count is changed when the storage mode is set to "Average," another measurement is also taken after the setting is completed. When no values are changed or when Cancel is selected, measurement is not taken again.

F3 (Refresh Interval):Sets the update timing for the average value display. After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement is taken.
- Once: Updates the display after as many measurements as the set averaging count are taken.

The following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after every measurement.

3.9.4 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.9.5 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.10 Measuring Chip Clock Frequency

Press (More) on the Setup Common Parameter screen to display the second page of the function label. Then press F4 (Chip Clock Error) to move to the Chip Clock Error screen (chip clock frequency measurement).

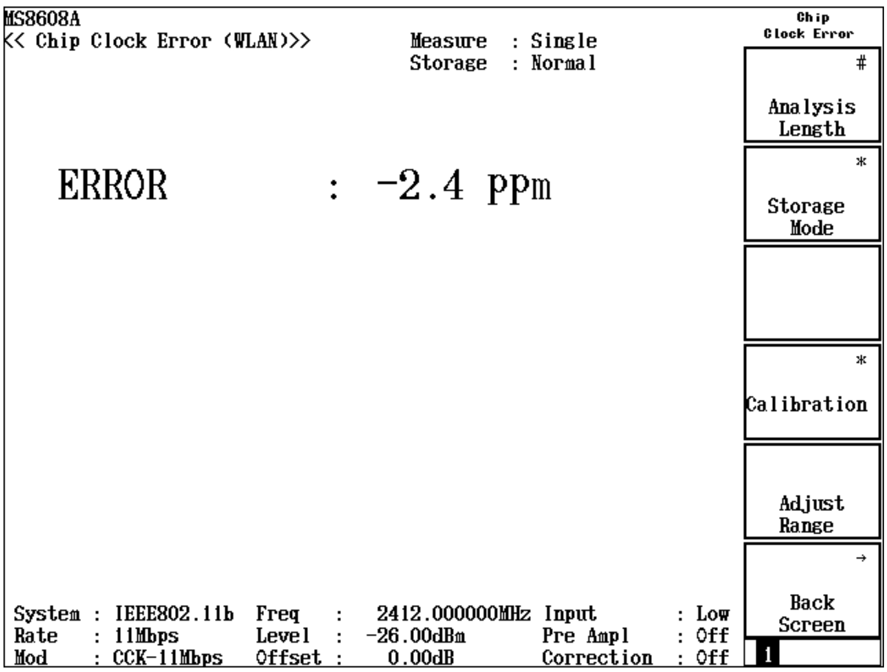
This section explains the measured results and setting parameters shown on the Chip Clock Error screen (chip clock frequency measurement). Measuring Chip Clock Frequency is enabled when the target system is set to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).

3.10.1 Explanation of measured results

This section explains the measured results shown on the Chip Clock Error (chip clock frequency measurement) screen. Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument. Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on how to adjust the RF input level.

Results of chip clock frequency measurement

Communication standard: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)



ERROR

Displays the results of chip clock frequency measurement in ppm units.

3.10.2 Changing analysis length (Analysis Length)

This section explains how to set the number of symbols to be analyzed (signal length of a signal to be measured excluding the preamble).

Setting the analysis length

1. Press [F1] (Analysis Length) on the Chip Clock Error screen to open the setting window.
2. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to enter the analysis length in symbol units or chip units.
3. Press [Set].

After the setting is completed, another measurement is taken. The signal is not re-measured if no values are changed or when Cancel is selected.

If the set analysis length is longer than the signal length of a signal to be measured, the section exceeding the signal length cannot be correctly analyzed. Set the analysis length so that it is equal to or less than the signal length of the signal to be measured except for the preamble.

3.10.3 Averaging (Storage Mode)

This section explains how to set the averaging process for the measured results.

Setting the averaging process

1. Press [F2] (Storage Mode) on the Chip Clock Error screen to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to input the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."
7. Press [Set].

After the setting is completed, another measurement is taken.
If the averaging count is changed when the storage mode is set to "Average," another measurement is also taken after the setting is completed. When no values are changed or when Cancel is selected, measurement is not taken again.

[F3] (Refresh Interval):Sets the update timing for the average value display. After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement is taken.
- Once: Updates the display after as many measurements as the set averaging count are taken.

The following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after every measurement.

3.10.4 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.10.5 Optimizing measurement range (Adjust Range)

Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

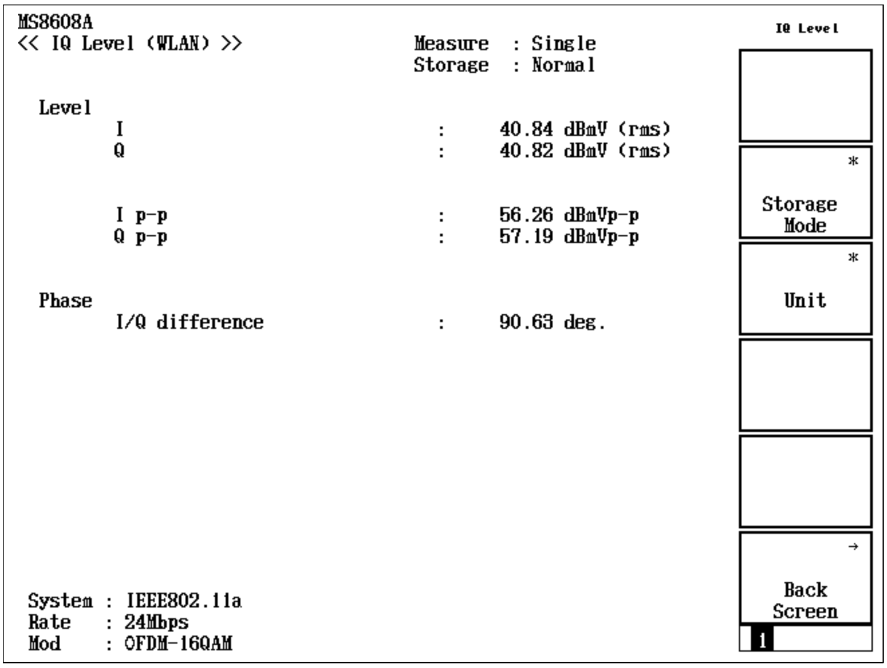
3.11 Measuring IQ Level

Press [ ] (More) on the Setup Common Parameter screen to display the second page of the function label. Then press [F5] (IQ Level) to move to the IQ Level screen (IQ level measurement). This section explains the measured results and setting parameters shown on the IQ Level screen (IQ level measurement) as well as operation cautions. Note that this measurement cannot be performed when RF input is selected.

3.11.1 Explanation of measured results

This section explains the measured results shown on the IQ Level screen (chip clock frequency measurement).

Results of IQ level measurement



(1) Level (I and Q)

Displays the effective value levels of the I-phase signal and Q-phase signal in mV or dBmV units.

(2) Level (Ip-p and Qp-p)

Displays the Peak to Peak value levels of the I-phase signal and Q-phase signal in mV or dBmV units.

(3) Phase (I/Q difference)

Displays the phase difference between the I-phase signal and Q-phase signal in deg. units when CW signals with the same frequency are input to the I-phase input and Q-phase input. This is useful for measuring the orthogonality of a quadrature demodulator.

3.11.2 Averaging (Storage Mode)

This section explains the storage mode by showing how to set the averaging process for measured results.

Setting the averaging process

1. Press [F2] (Storage Mode) on the IQ Level screen to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setting window.
3. Press [∧] [∨] (Entry keys), turn the rotary knob, or use the numeric keypad to input the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode) to open the selecting window.
6. The window for selection opens.
7. Press [∧] [∨] (Entry keys) or turn the rotary knob to select "Average."
8. Press [Set].

After the setting is completed, another measurement is taken.
If the averaging count is changed when the storage mode is set to "Average," another measurement is also taken after the setting is completed. When no values are changed or when Cancel is selected, measurement is not taken again.

Refresh Interval: Sets the update timing for the average value display.
After setting is changed, another measurement is taken.

- Every: Updates the display after every measurement is taken.
- Once: Updates the display after as many measurements as the set averaging count are taken.

The following modes can be selected for the storage mode:

- Normal: Updates and displays the measured result after every measurement.
- Average: Averages and displays the measured result after every measurement.

3.11.3 Changing measured results unit (Unit)

The measured results unit for the IQ level can be changed.

Changing the measured result display unit display for IQ level

Press F3 (Unit) on the IQ Level screen to open the following function labels, and then select a display unit.

- F1 (mV):
  Displays in mV units.

- F2 (dBmV):
  Displays in dBmV units.

- F6 (return):
  Returns to the previous function label display.

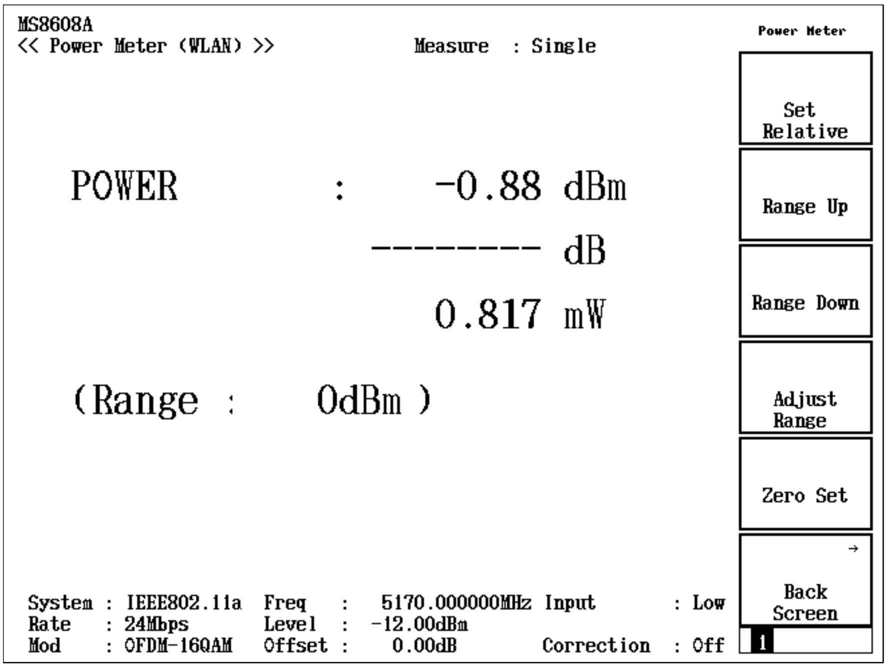
3.12 Power Meter

When using the MS860x as the analyzer main body, press F6 (Power Meter) on the second page of the function label on the Setup Common Parameter screen to move to the Power Meter screen (power meter). This section explains the measured results and setting parameters shown on the Power Meter screen (power meter) as well as operation cautions. Note that this measurement cannot be performed when Terminal is IQ or Measuring Object is Burst.

3.12.1 Explanation of measured results

This section explains the measured results shown on the Power Meter screen (power meter). Before performing measurements, adjust the RF input level to optimize the level settings inside the measuring instrument by pressing F5 (Adjust Range). Refer to Section 3.2.15, “Optimizing measurement range (Adjust Range)” for more information on how to adjust the RF input level.

Results of power meter measurement



(1) POWER

Displays the power measured by the built-in power in dBm, relative level and W units. The relative level is based on the measured value at the point when F1 (Set Relative) is pressed as the reference value (0 dB).

(2) Range

Displays the current measurement range.

3.12.2 Performing zero-point calibration (Zero Set)

Zero-point calibration must be performed before using the power meter. Set the RF input connector to the "no input" status (inputting no signals), then press F5 (Zero Set) to perform zero-point calibration. If power meter measurement is performed without performing zero-point calibration in advance, incorrect measured results may be obtained.

3.12.3 Using relative value display (Set Relative)

This section explains how to display a relative value.
Press F1 (Set Relative) to display a relative value. The relative value is based on the power value at the point when F1 (Set Relative) is pressed as the reference value (0 dB).

3.12.4 Setting measurement range (Range Up/Range Down)

The measurement range for the power meter can be set.

Measurement range

The following measurement range steps are available:

When using MS8608A with high-power input:
0 dBm, +10 dBm, +20 dBm, +30 dBm, +40 dBm

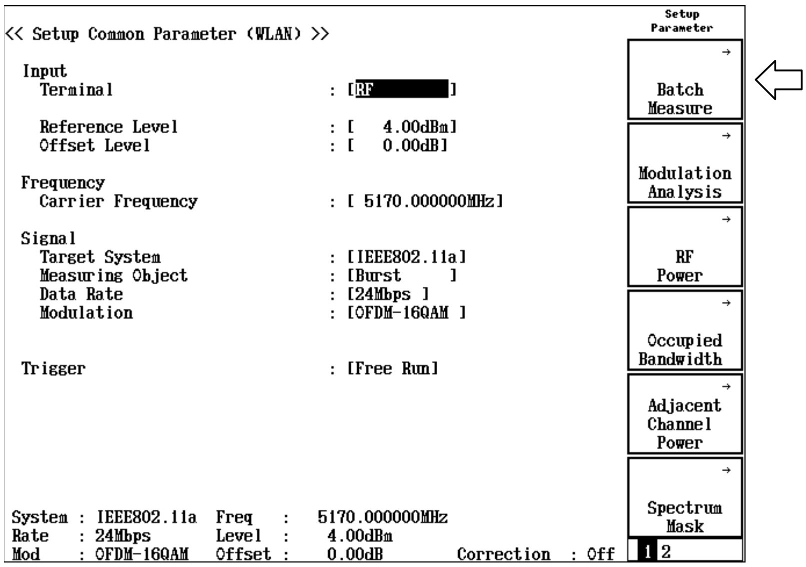
When using MS8608A with low-power input or using MS8609A:
−20 dBm, −10 dBm, 0 dBm, +10 dBm, +20 dBm

Setting measurement range

Pressing F2 (Range Up) raises the measurement range step.
Pressing F3 (Range Down) lowers the measurement range step.
Pressing F4 (Adjust Range) adjusts the measurement range according to the input signal for optimization. Refer to Section 3.2.15, "Optimizing measurement range (Adjust Range)" for more information on measurement range optimization.

3.13 Measuring in Batch

The previous sections describe how to execute each measurement.
This section describes the batch function, which enables to execute these measurements in batch. Using this function, you can easily measure the overall transmission characteristics of a measuring object. You can also easily check that the measuring object meets the standards as pass/fail judgment thresholds are set for each measurement item.
Press [F1] (Batch Measure) on the Setup Common Parameter screen to move to the batch measurement screen.
Note that this measurement cannot be performed when Target System is HiSWANa and Data Rate is Auto.



The following items are measured at batch measurement.

- Modulation analysis
  - Frequency
  - EVM
  - Phase error
  - Carrier leak (for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM) only)
  - Flatness (for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM) only)
  - Magnitude error (for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK) only)
  - Origin offset (for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK only)

- RF power
  - Transmit power
  - Carrier off power
  - On/Off ratio
  - Rising/falling time (for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK only)
- Occupied frequency bandwidth
- Adjacent channel leakage power (for IEEE802.11a, HiperLAN2 and HiSWANa only)
- Spectrum mask
- Spurious (2 tables)

Note:

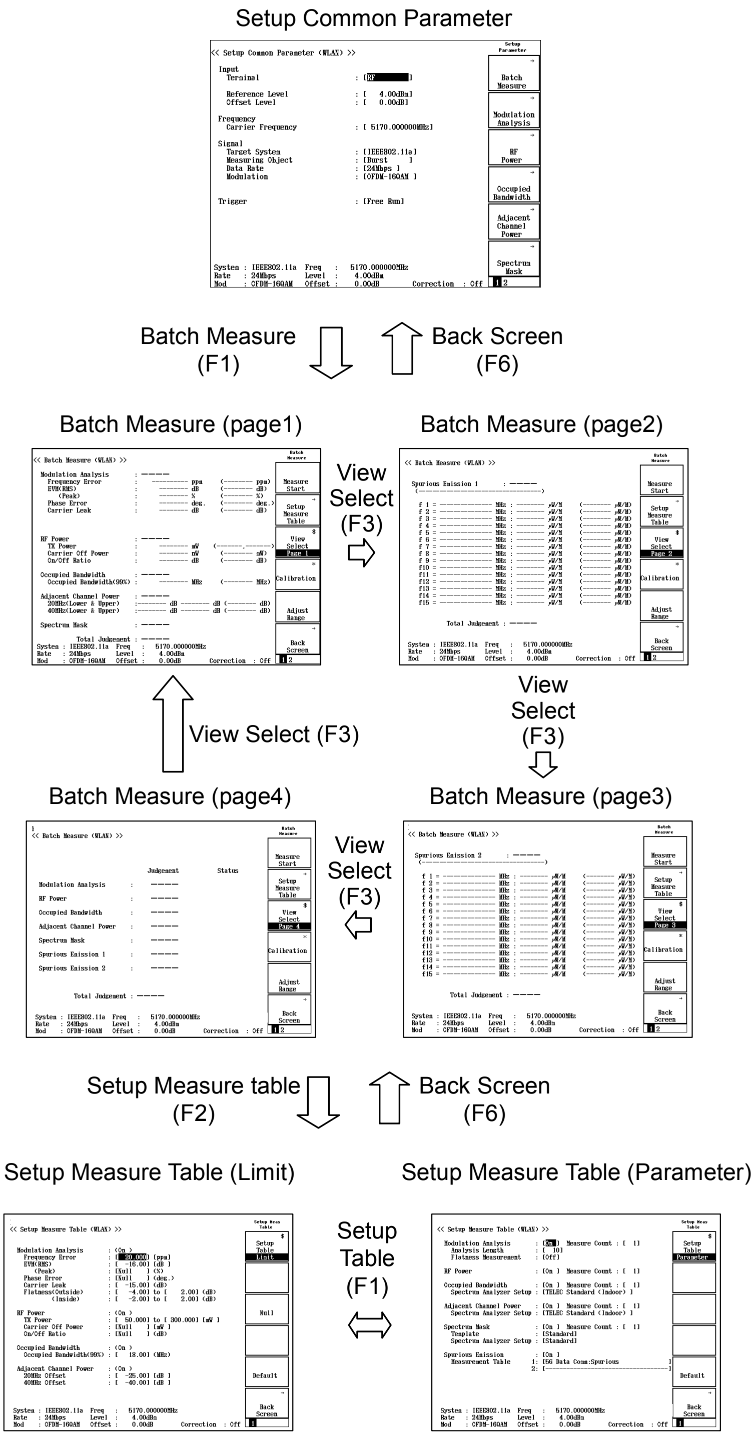
When the window is changed or a parameter is changed on setting window, the measurement becomes the unmeasured state.

3.13.1 Screen transition

Two types of screens are used for batch measurement.

- Measurement screen (Batch Measure), four pages in total
- Measurement parameters setting screen (Setup Measure Table), two pages in total

You can move among screens as shown below.

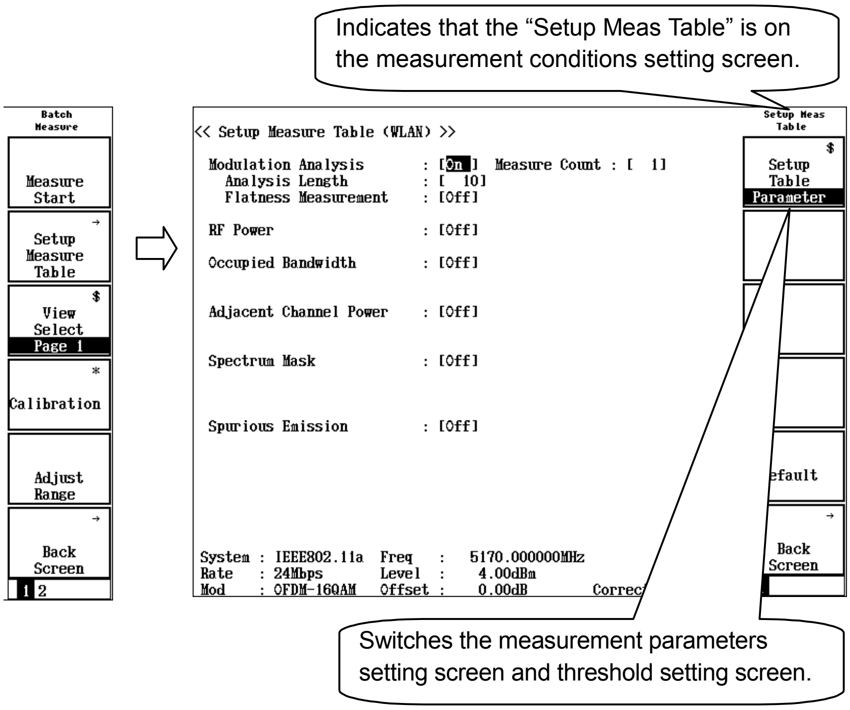


3.13.2 Setting conditions for measurement

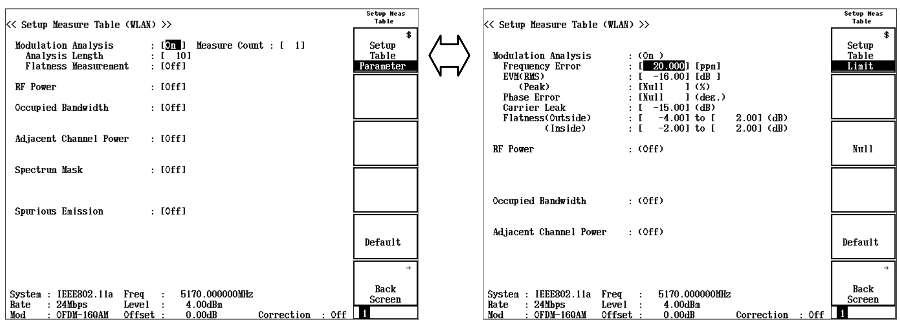
Set the conditions for each measurement item before executing batch measurement. There are the following measurement conditions:

1. Whether or not to measure the item
2. Average count
3. Parameters specific to the measurement item
4. Pass/fail judgment threshold

Press F2 (Setup Measure Table) on the Batch Measure screen to move to the screen for measurement condition setting.

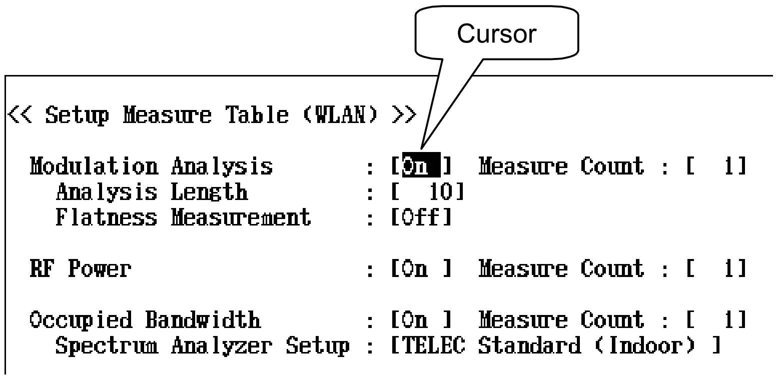


Press F1 (Setup Table Parameter/Limit) to switch between the measurement parameters setting screen and threshold setting screen. This is a toggle key that switches the screens each time it is pressed.

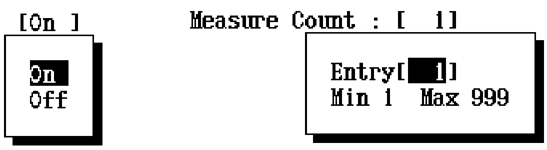


Use the Setup Common Parameter screen to set the input signal parameters such as frequency and reference level as explained in the previous sections.　Refer to Section 3.1, “Setting Measurement Parameters” for details.

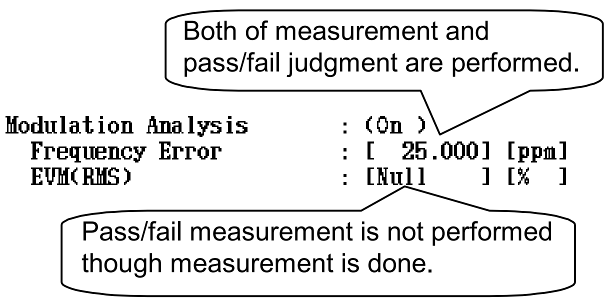
The cursor is positioned on the inverted part on the screen.　You can set the measurement parameter pointed by the cursor.
You can move the cursor up, down, right and left by using the rotary knob or step key.



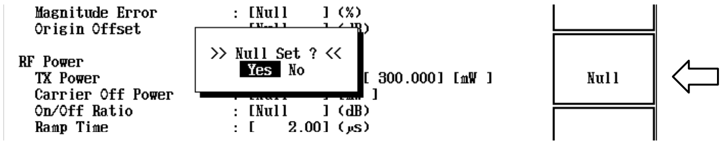
Press [Set] to open a small window near the cursor.　Select an item with the rotary knob or directly enter a value with the numeric keypad. Then press [Set] again to confirm the value.
To cancel the input, press [Cancel].



Whether or not to perform pass/fail judgment is determined when setting a threshold for pass/fail judgment.
Pass/fail judgment will be performed at the same time as measurement when a threshold is set for the item.　If “Null” is set to the threshold, pass/fail judgment is not performed though measurement is done.



Press F3 (Null) to set “Null” to the threshold. When a small window for confirmation opens, select “Yes” and press Set.



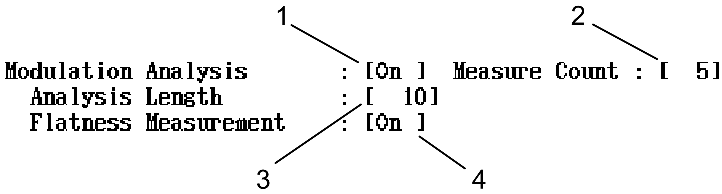
Press F5 (Default) to initialize the threshold setting. When a small window for confirmation appears, select “Yes” and press Set.

The next section will describe the details on each measurement item.

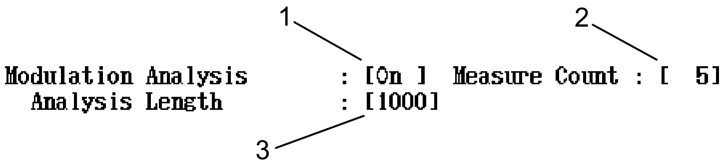
3.13.3 Setting modulation analysis

a. Measurement parameters settings

For IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM)



For IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)



1. Measurement execution

   Sets whether or not to perform the modulation analysis.

   On: Performs the measurement.
   Off: Does not perform the measurement.

2. Average count

   Sets the average count for modulation analysis. The value set here does not affect other measurement items. The range setting is from 1 to 999.

3. Analysis length
   Sets the data length for signal analysis.
   The length is in chip units for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK) and in symbol units for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM).
   Set a longer analysis length so that measurements have the mean effect. However, note that the analysis length should be shorter than a single burst.

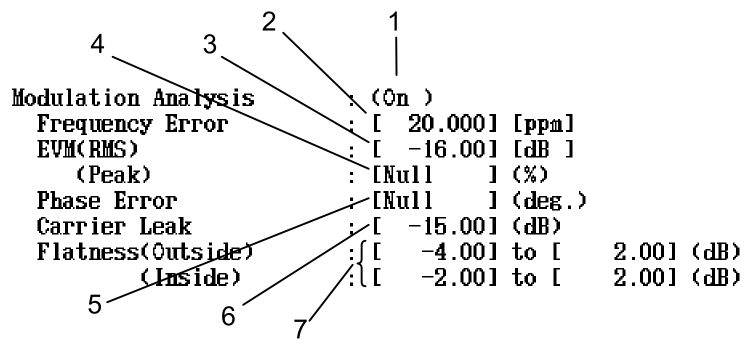
4. Flatness measurement execution (IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM))
   Performs whether or not to perform the flatness measurement.

   On: Performs the measurement.
   Off: Does not perform the measurement.

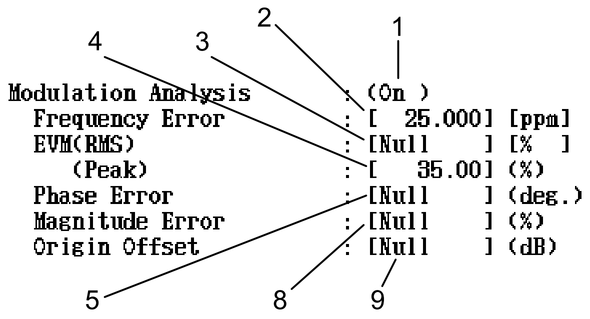
   The flatness measurement takes several seconds. This is longer than the measurement time of other modulation analysis items. To shorten the overall modulation analysis time, do not execute the flatness measurement.
   The flatness measurement is valid only when the signal is in the burst status and RF input is selected. When the signal level fluctuates, the signal may not be measured correctly.

b. Threshold settings

For IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM)



For IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)



1. Measurement execution

   The value set at measurement parameter setting is displayed. This value cannot be changed here.

2. Frequency error

   Sets the frequency threshold. The range settings are as follows:

   0.000 to 99.999 ppm
   0.0 to 200000.0 Hz

   The pass/fail judgment results in Pass if the absolute value of the measured result is equal to or smaller than the set threshold.

3. EVM (RMS)

   Sets the threshold for the rms EVM value. The range settings are as follows:

   −50.00 to 0.00 dB (for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM) only)
   0.30 to 99.99%

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

4. EVM (Peak)

   Sets the threshold for the peak EVM value. The range setting is as follows:

   0.30 to 99.99%

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

5. Phase error
   Sets the threshold for rms phase errors. The range setting is as follows:

   0.01 to 180.00 deg

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

6. Carrier leak
   Sets the threshold for carrier leak for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM). The range setting is as follows:

   −50.00 to 50.00 dB

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

7. Flatness
   Sets the flatness threshold for IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM). The range settings for Outside and Inside are as follows:

   Lower limit value: −20.00 dB to upper limit value
   Upper limit value: Lower limit value to 20.00 dB

   The left value is the lower limit value and the right one is the upper limit value.
   The pass/fail judgment results in Pass if the measured result is between the lower and upper limit values (including these limits).

8. Magnitude error
   Sets the threshold for actual magnitude errors for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK). The range setting is as follows:

   0.01 to 99.99%

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

9. Origin offset
   Sets the origin offset threshold for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK). The range setting is as follows:

   −99.99 to 0.00 dB

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

3.13.4 Setting RF power

a. Measurement parameters settings

```
                              1                        2
RF Power                    : [On ]  Measure Count : [   1]
```

1. Measurement execution

   Sets whether or not to perform the RF power measurement.

   On: Performs the measurement.

   Off: Does not perform the measurement.

2. Average count

   Sets the average count for power measurements. The value set here does not affect other measurement items. The range setting is from 1 to 999.

b. Threshold settings

For IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE802.11g (DSSS-OFDM)

```
                         2   1
RF Power                   : (On )
  TX Power                 : [   50.000] to [ 300.000] [mW ]
  Carrier Off Power        : [Null     ] [mW ]
  On/Off Ratio             : [Null     ] (dB)
                         3   4
```

For IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)

```
                         2   1
                     3
RF Power                   : (On )
  TX Power                 : [   50.000] to [ 300.000] [mW ]
  Carrier Off Power        : [Null     ] [mW ]
  On/Off Ratio             : [Null     ] (dB)
  Ramp Time                : [     2.00] (μs)
                     4    5
```

1. Measurement execution
   The value set at measurement parameter setting is displayed. This value cannot be changed here.

2. Transmit power
   Sets the transmit power threshold. The range settings are as follows:

   Upper limit value: Lower limit value to 999.999 mW, or lower limit value to 40.00 dBm
   Lower limit value: 0.001 mW to upper limit value, or −60 dBm to upper limit value.

   The pass/fail judgment results in Pass if the measured result is between the lower and upper limit values (including these limits).

3. Carrier off power
   Sets the threshold when the burst is Off and the signal is in the burst status. The range settings are as follows:

   0.001 to 999.999 mW
   −99.99 to 40.00 dBm

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

4. On/Off ratio
   Sets the On/Off ratio threshold while the signal is in the burst status. The range setting is as follows:

   0.0 to 99.99 dB

   The pass/fail judgment results in Pass if the measured result is equal to or larger than the set threshold.

5. Ramp time (rising/falling time)
   Sets the threshold for burst rising/falling times while the signal is in the burst status for IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK). The range setting is as follows:

   0.00 to 20.00 us

   The pass/fail judgment results in Pass if both of the rising time and falling time are equal to or smaller than the threshold.

3.13.5 Setting occupied frequency bandwidth

Set the parameters for occupied frequency bandwidth measurement.

a. Measurement parameters settings

```
                                 1                     2
Occupied Bandwidth         : [On ]  Measure Count : [   1]
  Spectrum Analyzer Setup  : [TELEC Standard          ]
                                 3
```

1. Measurement execution
   Sets whether or not to perform the occupied frequency bandwidth measurement.
   On: Performs the measurement.
   Off: Does not perform the measurement.

2. Average count
   Sets the average count for occupied frequency bandwidth measurements. The value set here does not affect other measurement items. The range setting is from 1 to 999.

3. Parameters settings for the spectrum analyzer
   The occupied frequency bandwidth measurement is performed by using the spectrum analyzer function. So, it is necessary to set the RBW, VBW and other parameters that are set to the spectrum analyzer. Select one of the following items.

IEEE802.11a, HiSWANa and HiperLAN2

- TELEC Standard (Indoor): 5 GHz band low power data communication system
- TELEC Standard (Outdoor): 5 GHz band radio access system
- User: User defined. Refer to Section 3.4.3, “Measuring by using any measurement parameters” for details.

IEEE802.11b and IEEE802.11g

- TELEC Standard: 2.4 GHz band wide band low power data communication system
- User: User defined. Refer to Section 3.4.3, “Measuring by using any measurement parameters” for details.

b. Threshold settings

For IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) and IEEE 802.11g (DSSS-OFDM)

```
                                 1
Occupied Bandwidth          : (On )
  Occupied Bandwidth(99%) : [    18.00] (MHz)
                                 2
```

For IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK)

```
                                 1
Occupied Bandwidth          : (On )
  Occupied Bandwidth(99%) : [    26.00] (MHz)
  Occupied Bandwidth(90%) : [     0.50] (MHz)
                      2          3
```

1. Measurement execution
   The value set at measurement parameter setting is displayed. This value cannot be changed here.

2. Occupied frequency bandwidth
   Sets the threshold for the occupied frequency bandwidth. The range setting is as follows:

   0.00 to 40.00 MHz

   The pass/fail judgment results in Pass if the measured result is equal to or smaller than the set threshold.

3. Spreading bandwidth
   Sets the spreading bandwidth threshold when the target system is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK). The range setting is as follows:

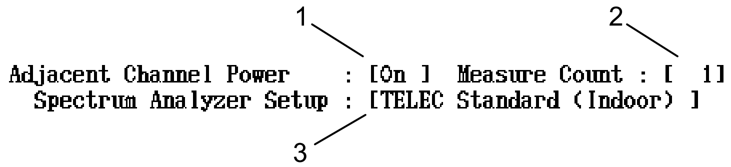
   0.00 to 40.00 MHz

   The pass/fail judgment results in Pass if the measured result is equal to or larger than the set threshold.

3.13.6 Setting adjacent channel leakage power

Set the parameters for adjacent channel leakage power measurement. This measurement is valid when the target system is IEEE802.11a, HiperLAN2, or HiSWANa.

a. Measurement parameters settings



1. Measurement execution
   Sets whether or not to perform the adjacent channel leakage power measurement.

   On: Performs the measurement.
   Off: Does not perform the measurement.

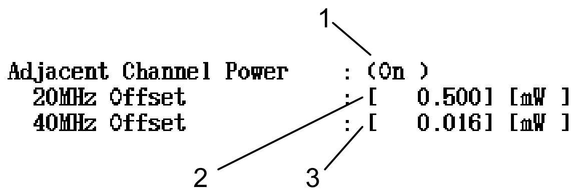
2. Average count (Measure Count)
   Sets the average count for adjacent channel leakage power measurements. The value set here does not affect other measurement items. The range setting is from 1 to 999.

3. Parameters settings for the spectrum analyzer (Spectrum Analyzer Setup)
   The adjacent channel leakage power measurement is performed by using the spectrum analyzer function. So, it is necessary to set the RBW, VBW and other parameters that are set to the spectrum analyzer. Select one of the following items.

   IEEE802.11a, HiperLAN2, and HiSWANa

   - TELEC Standard (Indoor): 5 GHz band low power data communication system
   - TELEC Standard (Outdoor): 5 GHz band radio access system
   - User: User defined. Refer to Section 3.5.5, "Measuring by using any measurement parameters" for details.

b. Threshold settings



1. Measurement execution
   The value set at measurement parameter setting is displayed. This value cannot be changed here.

2. 20 MHz offset adjacent channel leakage power
   Sets the threshold for the ±20 MHz offset adjacent channel leakage power measurement.

   The range settings are as follows:

   −99.99 to 0.00 dB
   −99.99 to 40.00 dBm
   0.001 to 999.999 mW

   The pass/fail judgment results in Pass if both of the +20 MHz and −20 MHz adjacent channel leakage powers are equal to or smaller than the set threshold.

3. 40 MHz offset adjacent channel leakage power
   Sets the threshold for the ±40 MHz offset adjacent channel leakage power measurement.

   The range settings are as follows:

   −99.99 to 0.00 dB
   −99.99 to 40.00 dBm
   0.001 to 999.999 mW

   The pass/fail judgment results in Pass if both of the +40 MHz and −40 MHz adjacent channel leakage powers are equal to or smaller than the set threshold.

3.13.7 Setting spectrum mask

Set the parameters for spectrum mask measurement.

a. Measurement parameters settings

```
                            1                            2
Spectrum Mask             : [On ]  Measure Count : [   1]
  Template                : [Standard]
  Spectrum Analyzer Setup : [Standard]
                  3          4
```

1. Measurement execution

   Sets whether or not to perform the spectrum mask measurement.

   On: Performs the measurement.

   Off: Does not perform the measurement.

2. Average count (Measure Count)

   Sets the average count for spectrum mask measurements. The value set here does not affect other measurement items. The range setting is from 1 to 999.

3. Standard mask (Template)

   Selects the mask used for judgment. Select one of the following items.

   - Standard: Mask conforming to IEEE802.11b, IEEE802.11g or IEEE802.11a
   - User: User-defined mask. Refer to Section 3.6.3, "Changing standard line of spectrum mask" for user-defined masks.

4. Parameters settings for the spectrum analyzer (Spectrum Analyzer Setup)

   The spectrum mask measurement is performed by using the spectrum analyzer function. So, it is necessary to set the RBW, VBW and other parameters that are set to the spectrum analyzer. Select one of the following items.

   - Standard: Setting conforming to IEEE802.11b, IEEE802.11g or IEEE802.11a
   - User: User-defined. Refer to Section 3.6.3, "Changing standard line of spectrum mask" for user-defined settings.

3.13.8 Setting the spurious

Set the parameters for the spurious measurement.

a. Measurement parameters settings

```
                                  1
 Spurious Emission              : [On ]
   Measurement Table           {1: [5G Data Comm:Spurious                    ]
                                2: [------------------------------------]
              2
```

1. Measurement execution
   Sets whether or not to perform the spurious measurement.
   - On: Performs the measurement.
   - Off: Does not perform the measurement.

2. Spurious standards (Measurement Table)
   Selects the spurious standard for judgment, from the following items:

TELEC Technical Regulations Conformity Certification

2.4G Data Comm: Spurious:	Level of spurious emission for the 2.4 GHz band wide band low power data communication system
2.4G Data Comm: Secondary Emission:	Level of secondary emission for the 2.4 GHz band wide band low power data communication system
2.4G Data Comm(14CH): Spurious:	Level of spurious emission for the 2.4 GHz band low power data communication system
5G W-Access 5.03 GHz: Spurious & OBL:	Spurious emission and out-of-band radiation power for the 5.03 GHz band of the 5 GHz band radio access system
5G W-Access 4.9 GHz: Spurious & OBL:	Spurious emission and out-of-band radiation power for the 4.9 GHz band of the 5 GHz band radio access system
5G W-Access: Secondary Emission:	Level of secondary emission for the 5 GHz band radio access system

5G Data Comm: Spurious:	Level of spurious emission of the 5 GHz band low power data communication system
5G Data Comm: OBL:	Out-of-band radiation power of the 5 GHz band low power data communication system
5G Data Comm: Secondary Emission:	Out-of-band leakage power of the 5 GHz band low power data communication system

ETSI

ETSI TS101 475 Signal ON:	ETSI TS 101 475 V1.3.1 (2001-12) 5.8.3 Active Transmit
ETSI TS101 475 Signal OFF:	ETSI TS 101 475 V1.3.1 (2001-12) 5.8.3 Other Modes

FCC

FCC 15.407 5.15-5.25 GHz Band:	CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (1)
FCC 15.407 5.25-5.35 GHz Band:	CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (2)
FCC 15.407 5.725-5.825 GHz Band:	CFR Title47, Chapter1, Part15, Sec15.407, Paragraph (b) (3)
FCC 15.247 2.4 GHz Band:	CFR Title47, Chapter1, Part15, Sec15.247, Paragraph (c)

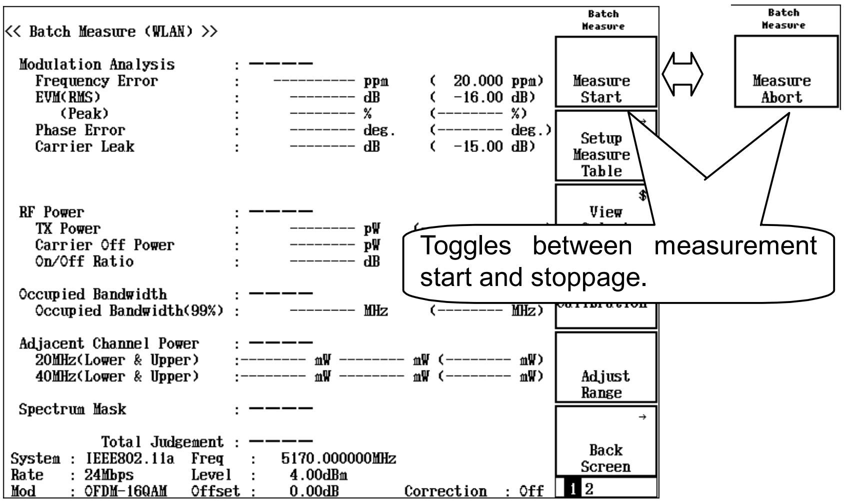
Spot Table

You can set two different spurious standards in Measurement Table 1 and Measurement Table 2.

3.13.9 Starting and stopping measurement

Press F1 (Measure Start) on the Batch Measure screen to start measurement.

Pressing the F1 key during measurement stops the measurement halfway. Note that pressing this key completely stops measurement disabling to resume it.



CAUTION ⚠

Single on the front panel is disabled during batch measurement.

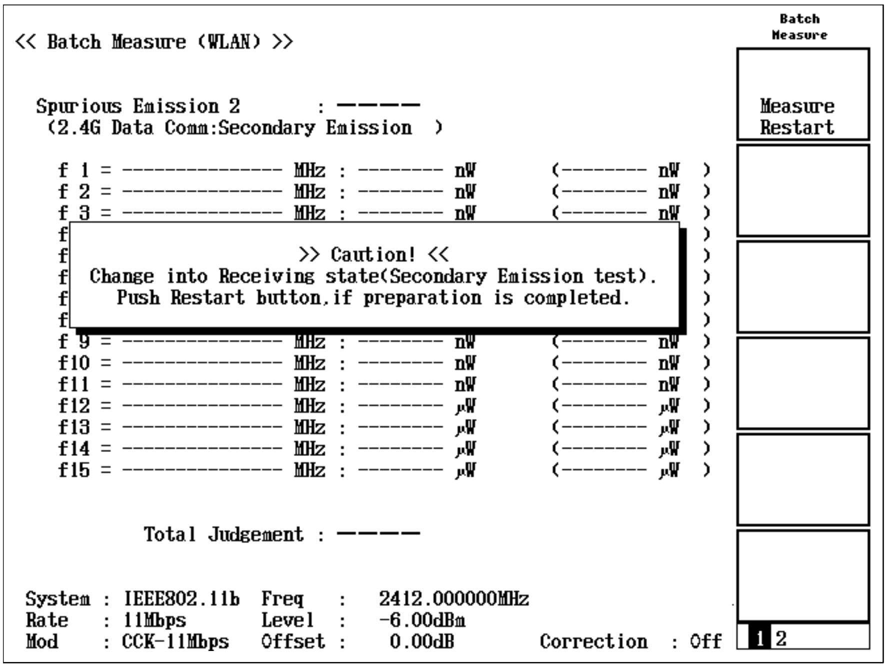
You can stop measurement according to each measurement item's result (pass/fail judgment result) instead of pressing F1. You can choose one of the following conditions.

1. Aborts the measurement when a status error such as "Level Under" occurs during measurement.
2. Aborts the measurement when the pass/fail judgment for an item results in "FAIL".
3. Aborts the measurement when the pass/fail judgment for an item results in "FAIL" or a status abnormality occurs.
4. Continues the measurement irrespective of the pass/fail judgment result and status.

Refer to Section 3.13.13, "Measurement mode" for these settings.

If secondary emission measurement is selected as follows for the spurious measurement (refer to Section 3.13.8, “Setting the spurious”), the message shown in the figure below is displayed before starting the spurious measurement and the measurement operation is interrupted. Change the DUT setting to the receiving state at this time.

- 2.4 G Data Comm: Secondary Emission
- 5 G W-Access: Secondary Emission
- 5 G Data Comm: Secondary Emission



When the DUT setting is changed to the receiving state, press F1 (Measure Restart) to restart the measurement. If some transmission tests still exist after completing the secondary emission measurement, the message above is displayed again. In this event, change the DUT setting to the transmitting state and restart the measurement.

3.13.10 Measured results

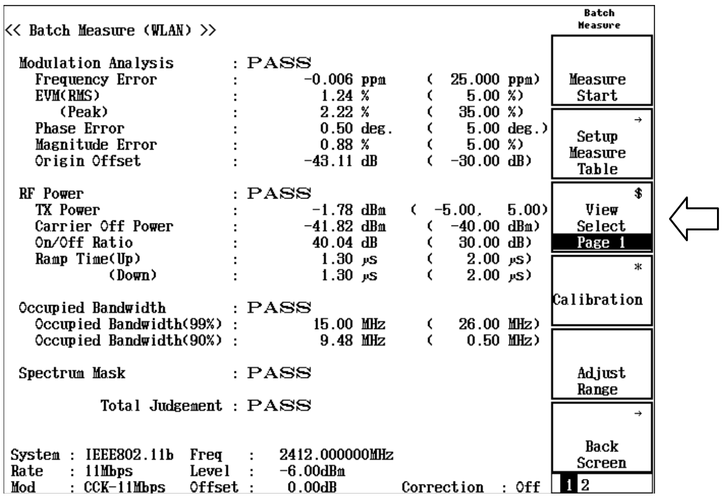
1. Screen switching

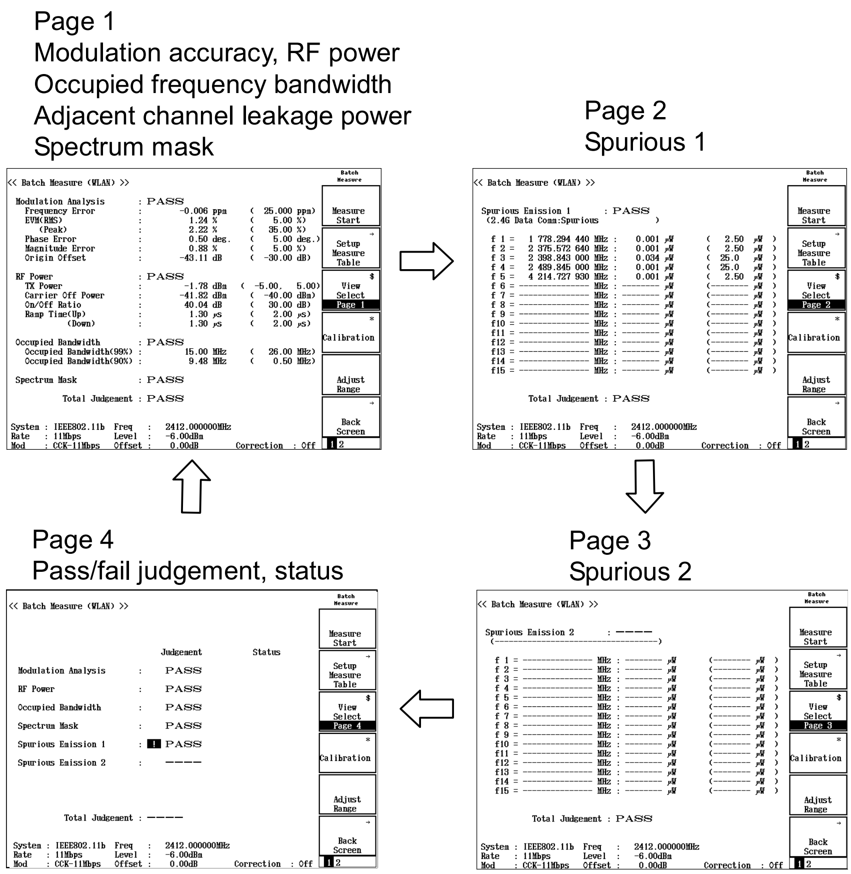
   Measured results are displayed on up to four screens.

   - Modulation accuracy, RF power, occupied frequency bandwidth, adjacent channel leakage power, and spectrum mask
   - Spurious 1
   - Spurious 2
   - Pass/fail judgment status

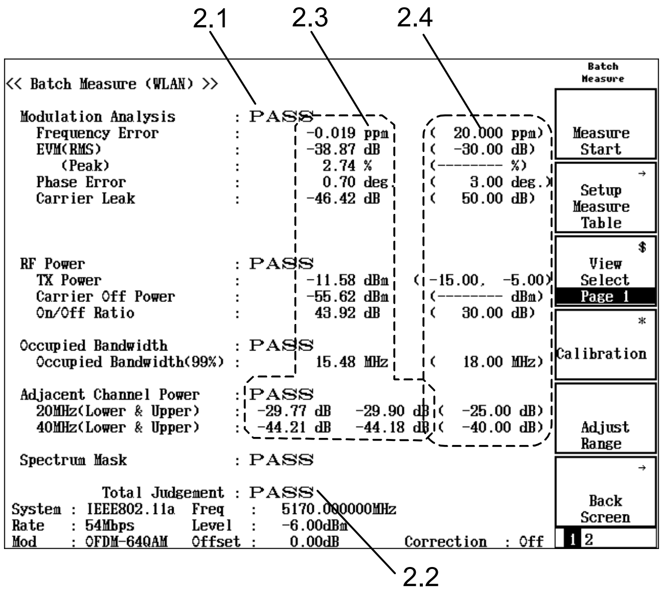
   Press [F3] (View Select) to switch to another screen.

   The Spurious 1 and Spurious 2 screens are displayed when the spurious measurement is set. The Page 4 screen is always displayed when measurement is finished or interrupted.




Page 1
Modulation accuracy, RF power
Occupied frequency bandwidth
Adjacent channel leakage power
Spectrum mask
Page 2
Spurious 1
Page 4
Pass/fail judgement, status
Page 3
Spurious 2

2. Page 1 screen



The Page 1 screen displays the following measured results.

- Modulation accuracy
- RF power
- Occupied frequency bandwidth
- Adjacent channel leakage power
- Spectrum mask

Descriptions on each item displayed in the Page 1 screen are as follows:

2.1 Pass/fail judgment result of each measurement item

Judgment results indicate whether each measured result does not exceed the threshold.

PASS: Accepted (including the case that the measured value equals to the threshold)

FAIL: Rejected

All judgment results for each measurement item are reflected to the total judgment result (Total Judgment).

2.2 Total pass/fail judgment result (Total Judgment)

Total pass/fail judgment of each measured result.

PASS: Accepted (when all items result in “PASS”)

FAIL: Rejected

2.3 Measured value

Measured results of each measurement item.

- When no threshold is set

  The pass/fail judgment is not performed for the item without a threshold although measurement is done. For such an item, the measured value is displayed in gray (according to the default color setting) and bars are displayed in the threshold field.

"---" is displayed in the threshold field when no judgment is performed.

```
Carrier Off Power      :      -55.62 dBm    (-------- dBm)
```

- When the judgment results in FAIL (rejected)

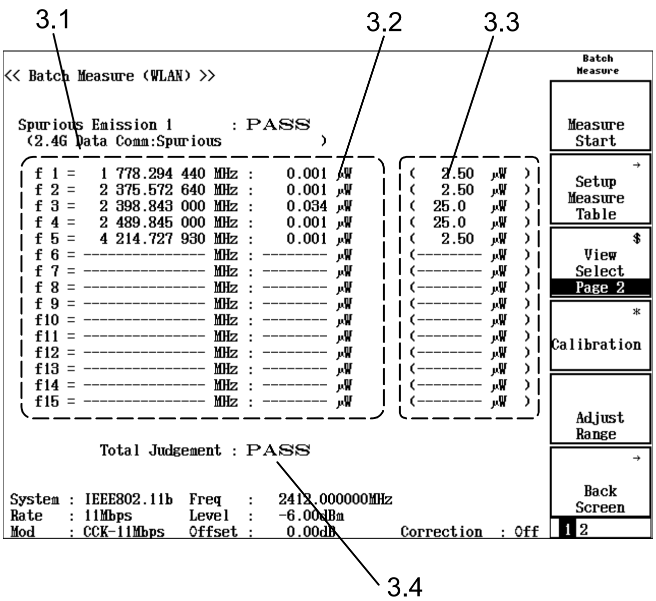
  When the measured value exceeds the threshold, the whole field is highlighted in red (according to the default color setting).

```
EVM(RMS)               :      -28.87 dB     (  -30.00 dB)
```

2.4 Threshold

Reference values for pass/fail judgment of each measurement item.

3. Page 2 and Page 3 screens



The Page 2 and Page 3 screens display the spurious measured results.

3.1 Selected measurement standards.

3.2 Measured results for each spurious table.

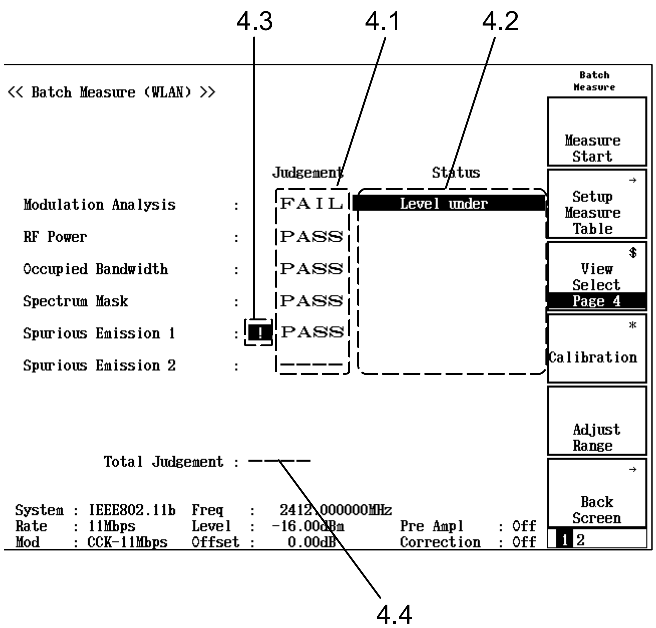
3.3 Reference values for pass/fail judgment of each spurious table.

3.4 Total pass/fail judgment result (Total Judgment)
Total pass/fail judgment of all measured results including those on Page 1.

PASS: Accepted (when all items result in "PASS")

FAIL: Rejected

4. Page 4 screen



The Page 4 screen displays the Pass/fail judgment results and statuses for each measurement item.

4.1 Pass/fail judgment results for each measurement item.

4.2 Statuses for each measurement item. When Error status is displayed, the judgment becomes FAIL.

4.3 A mark indicating the measurement item for which measurement was interrupted after Measure Abort was found.

4.4 Total pass/fail judgment result (Total Judgment)
Total pass/fail judgment of all measured results.
PASS: Accepted (when all items result in "PASS")
FAIL: Rejected

3.13.11 Calibration function (Calibration)

Refer to Section 3.2.16, "Calibration function (Calibration)" for more information on calibration.

3.13.12 Optimizing measurement range (Adjust Range)

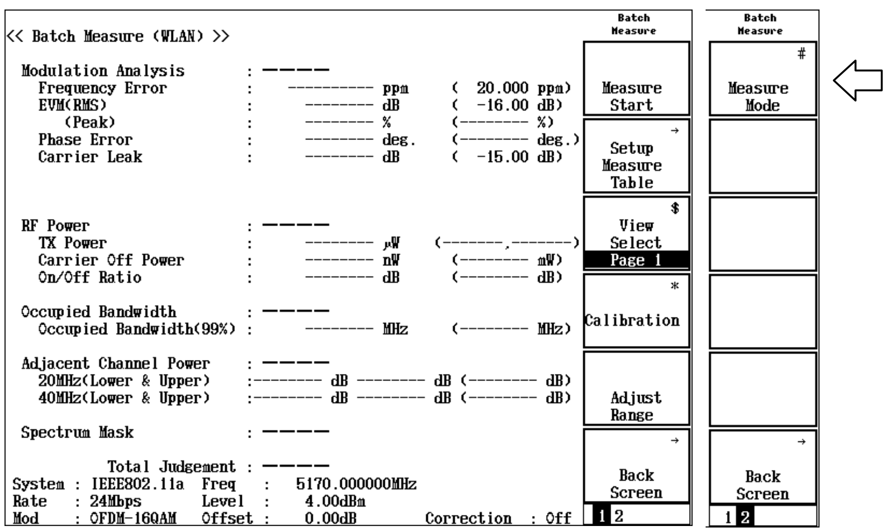
Refer to Section 3.2.15, "Optimizing measurement range" for more information on measurement range optimization.

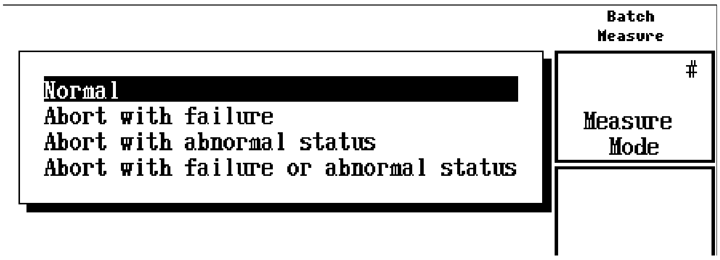
3.13.13 Measurement mode

By default, all the items are measured even if the pass/fail judgment for an item results in "FAIL". However, you can set to abort the measurement when a pass/fail judgment results in "FAIL".

The setting determining measurement abort condition is called the "measurement mode."

In order to switch measurement modes, press [ ] (More) on the Batch Measure screen to move to the second function key page and press [F1] (Measure Mode). Select a mode from the opened small window.





Normal:
Continues measurement until completed, irrespective of the pass/fail judgment results and status errors.

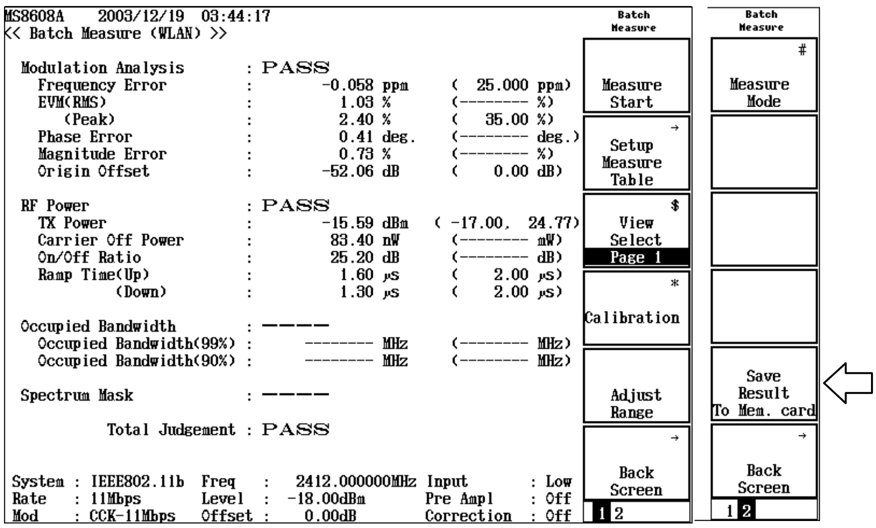
Abort with failure:
Aborts the measurement when the pass/fail judgment for an item results in "FAIL".

Abort with abnormal status:
Aborts the measurement when a status error such as "Level under" and "Signal abnormal" occurs during measurement.

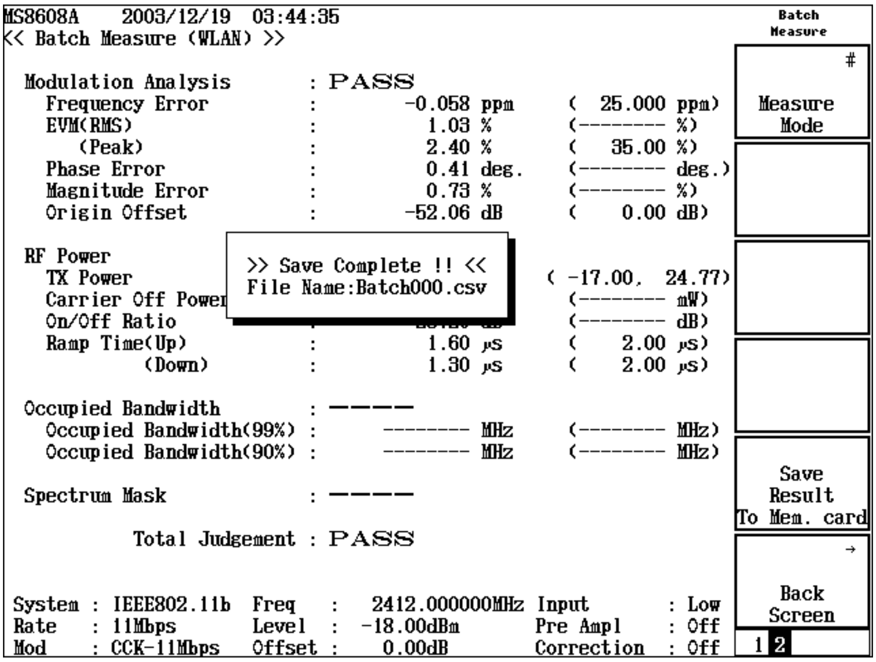
Abort with failure or abnormal status:
Aborts the measurement when the pass/fail judgment for an item results in "FAIL" or a status error such as "Level under" and "Signal abnormal" occurs during measurement.

3.13.14 Saving measurement results

The results of measured items can be saved into a memory card.
Press [ ] (More) on the Batch Measure screen to display the second page of the function label. Then press [F5] (Save Result To Mem. card) to save the measurement results into a memory card.



The following message is displayed when the saving operation is completed.



Measurement results are saved only when Total Judgment is determined after measurement completion. Measurement results of unmeasured items are not saved.

3.14 Saving and Recalling Setting Parameters

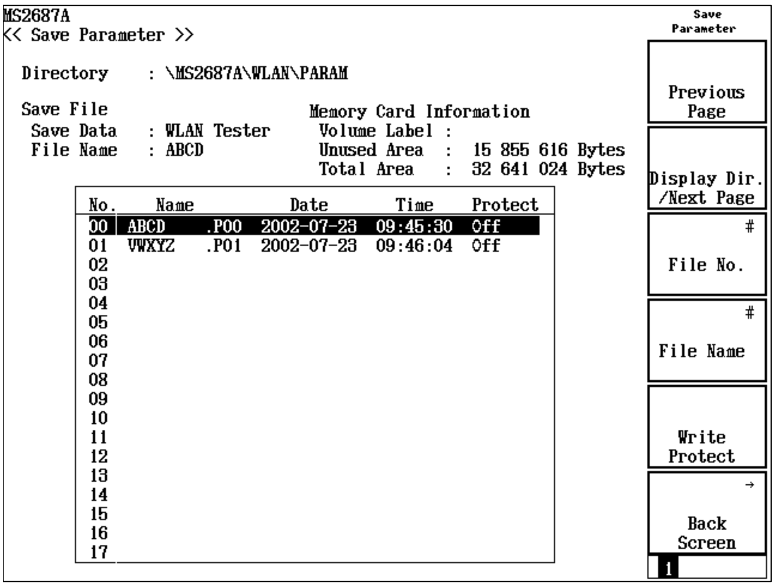
This section explains how to save the set parameter values in a memory card, and how to recall them from the card.
Insert a memory card into the memory-card insertion slot before saving or recalling the set parameter values.
The memory card can be inserted or removed only when the power is on. However, be sure not to insert or remove the memory card when saving or recalling in progress.

A single memory card can hold 100 types of settings (files). These files are saved in file Nos. 0 through 99.
In addition, a file name using alphanumeric characters can also be created if necessary, and write-protect can be set.
Since the file is MS-DOS formatted, the file name can contain up to eight characters, and no differentiation can be made between upper-case and lower-case characters.

3.14.1 Saving parameters (Save)

To save parameters, display the Save Parameter screen by the following procedures.

1. Insert a memory card into the memory-card insertion slot.
2. Press Shift and then press Recall .
3. Press F2 (Display Dir.).



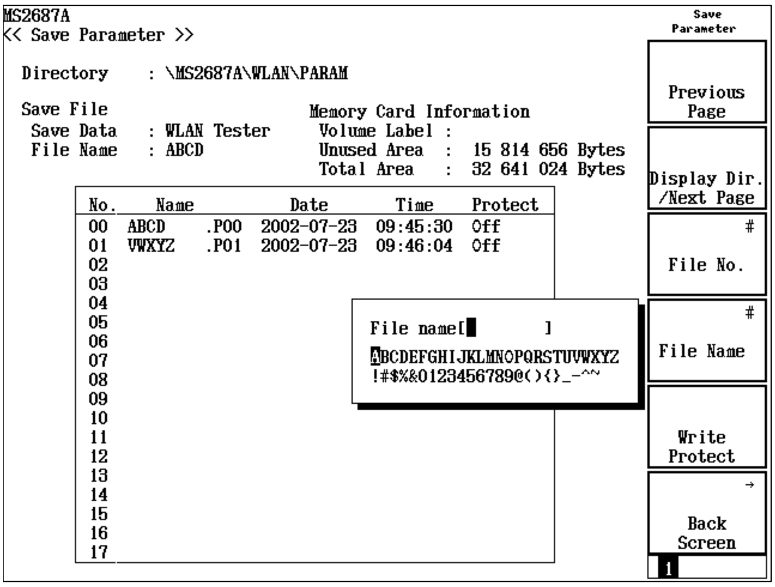
A single memory card can hold 100 types of settings (files). These files are saved in file Nos. 0 through 99.

4. Press ∧ ∨ (Entry keys) or turn the rotary knob to move the cursor and select a file No.
   Or, press F3 (File No.) to open a setting window, and input a file No. using the numeric keypad.
5. Press Set (Entry key).
6. When a confirmation window opens, select “Yes” and press Set .

Through the above procedures, the value set for each parameter is saved into a memory card.
When a file is saved under a new file number, a file name, “PARAM**.P**” (**representing the file No.), is automatically assigned. When a file is saved under a file number already assigned, the file is overwritten under the same name.

3.14.2 Saving file under different name (File Name)

Press [F4] (File Name) as the fourth step of the parameter saving procedure to save a file under a new name.
This section explains how to input a new file name after pressing [F4] (File Name).



- Procedure for inputting file name

1. Turn the rotary knob to move the cursor on the list of characters, and select a character you wish to input.
2. Press [Enter] . The selected character is input into the entry area.
3. Repeat Step 2 above to completely input a file name.
   Alphanumeric characters, A through F, and 0 through 9, can also be input from the numeric keypad directly.
   A file name can contain up to eight characters. Only characters displayed on the list of characters can be used. Other characters cannot be used.
4. Press [Set] when you have finished inputting a file name.
5. When a confirmation window opens, select “Yes” and press [Set] .

Through the above procedures, a file is saved under the new name.

- Rotary knob: Moves the cursor on the list of characters.
- ∧ ∨ : Moves the cursor in the entry area.
- BS : Deletes a character before the cursor in the entry area.
- Enter : Enters a character (located at the cursor position on the list of characters) to the cursor position in the entry area.
- Set : Sets a character string in the entry area as a file name.

3.14.3 Write-protecting file (Write Protect)

This section explains how to set the write-protect on a file.

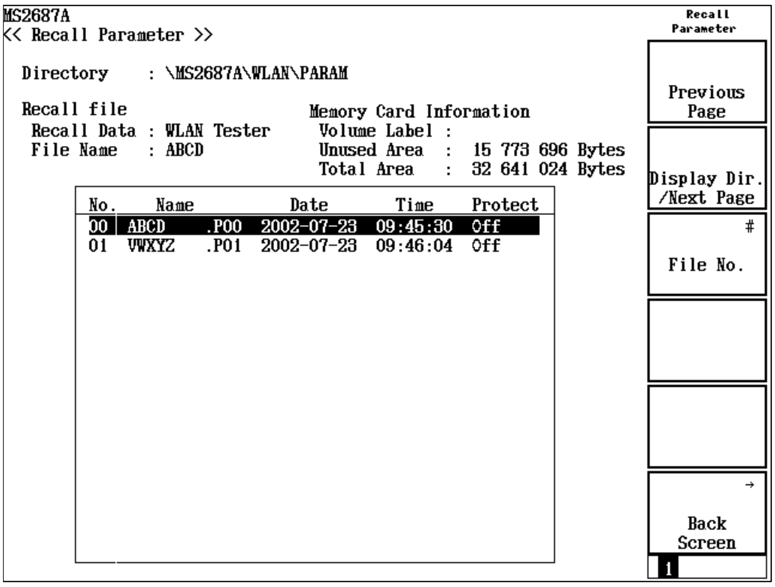
1. Press ∧ ∨ (Entry keys) or turn the rotary knob to move the cursor to the file number you wish to set write-protect on.
2. Press F5 (Write Protect).
3. Every time F5 (Write Protect) is pressed, write-protect is set to On
   or Off, alternatively.

3.14.4 Recalling parameters (Recall)

To recall the saved parameters, display the Recall Parameter screen at first by the following procedures.

Insert a memory card into the memory-card insertion slot, and then perform the followings.

1. Press [Recall] .
2. Press [F2] (Display Dir.).



1. Press [∧] [∨] (Entry keys) or turn the rotary knob to move the cursor and select a file No.
   Or, press [F3] (File No.) to open the setting window, and input a file No. using the numeric keypad.
2. Press [Set] (Entry key).
3. When a confirmation window opens, select "Yes" and press [Set] .

When this procedure is completed, the screen returns to the Setup Common Parameter screen.

Section 4 Performance Test

This section provides explanation of the performance test for the wireless LAN measurement function of the MS268xA Spectrum Analyzer on which the MX268x30A Wireless LAN Measurement Software and MS860xA Digital Mobile Radio Transmitter Tester on which the MX860x30A Wireless LAN Measurement Software is installed.
Refer to the MS268xA/MS860xA Operation Manual for performance test procedures on its spectrum analyzer function.

4.1 When Performance Test Is Required

The performance test is implemented as part of the preventive maintenance against performance deterioration when the MX268*30A Wireless LAN Measurement Software is installed on the MS268*A Spectrum Analyzer or MX860*30A Wireless LAN Measurement Software is installed on the MS860*A Digital Mobile Radio Transmitter. The performance test should be implemented on the MS268*A and MX268*30A, MS860*A and MX860*30A when necessary, for example, at incoming acceptance inspection, regular inspection, and post-repair performance check.

Be sure to periodically implement performance test items deemed important as preventive maintenance. The periodical tests should be implemented about once or twice a year.

Implement the following performance test items:

- Frequency accuracy
- RF power accuracy

If you find an item that does not meet specifications during the performance test, please contact the service division of Anritsu.

4.2 List of Equipment for Performance Test

Test item	Name	Recommended model	Required performance
Frequency accuracy	Vector Signal Generator	E4438C	Up to 6 GHz
	Power Meter	ML2437A	
	Power Sensor	MA2422B	Thermal type, up to 6 GHz
	3 dB Fixed Attenuator	MP721A	
RF power accuracy	Vector Signal Generator	E4438C	Up to 6 GHz
	Power Meter	ML2437A	
	Power Sensor	MA2422B	Thermal type, up to 6 GHz
	3 dB Fixed Attenuator	MP721A	

4.3 Performance Test

Warm up the DUT and measuring equipment for at least 30 minutes unless otherwise specified. We recommend that you pay attention to the following conditions to ensure maximum measurement accuracy:

- Room temperature
- Minimum AC voltage fluctuations
- Any noise, vibration, dust, humidity or other problems

4.3.1 Frequency Accuracy

(1) Specifications

Frequencies: MX268130A
2 to 2.5 GHz (IEEE802.11a, HiperLAN2, HiSWANa)
2.4 to 2.5 GHz (IEEE802.11b, IEEE802.11g)
MX268330A/MX268730A/MX860830A/MX860930A
4.9 to 6.0 GHz (IEEE802.11a, HiperLAN2, HiSWANa)
2.4 to 2.5 GHz (IEEE802.11b, IEEE802.11g)

Level: −10 dBm

Average count: 30

IEEE802.11a, HiperLAN2, HiSWANa
±500 Hz + (Set frequency × Reference frequency oscillator accuracy)

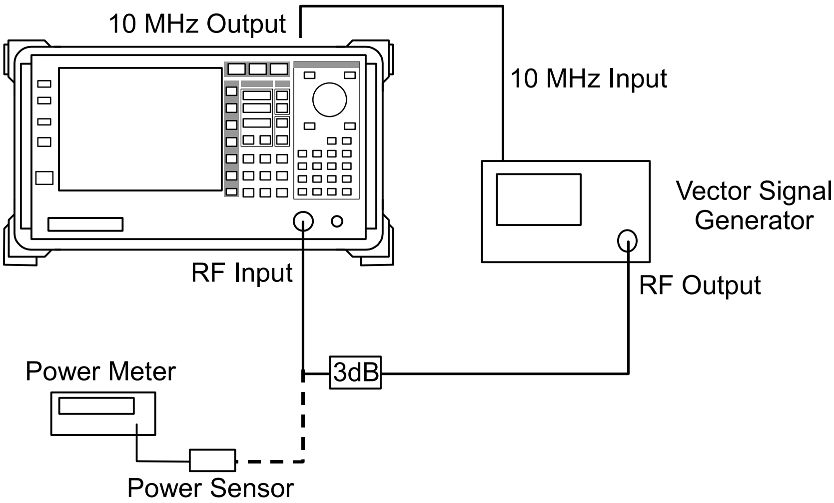
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)
±200 Hz + (Set frequency × Reference frequency oscillator accuracy)

IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)
±500 Hz + (Set frequency × Reference frequency oscillator accuracy)

(2) Measuring instruments used in testing

Name	Recommended model
Vector Signal Generator	E4438C
Power Meter	ML2437A
Power Sensor	MA2422B
3 dB Fixed Attenuator	MP721A

(3) Setup



(4) Test procedure

Step	Operation
1.	The following shows an example of operations to be carried out if the target system is IEEE802.11a. For other systems, carry out the operation according to this example.
2.	Load waveform data conforming to OFDM-64QAM in IEEE802.11a to the arbitrary signal generator.
3.	Set the frequency of the arbitrary signal generator to 4.91 GHz.
4.	Connect the 3 dB fixed attenuator to the power sensor. Measure the output level of the vector signal generator. Adjust the output level of the vector signal generator so that the power within burst is −10 dBm considering burst on/off ratio of output signals for arbitrary signal generator.
5.	Connect the 3 dB fixed attenuator to the RF Input on the analyzer.
6.	Initialize the analyzer. Then set as follows: Target system: IEEE802.11a Reference level: −10 dBm Frequency: 4.91 GHz Modulation method: OFDM-64QAM Transmission rate: 54 MHz Measuring Object: Burst Pre-amplifier: Off No Trace screen Storage mode: Average Averaging count: 30
7.	Press the Single key to perform frequency measurement. The frequency accuracy is obtained as follows: (Frequency accuracy) = (Measured frequency) – (Set frequency)

Step	Operation
8.	Measure the frequency accuracy while varying the target systems and frequencies as shown in the table below.

MX268130A

Target system	Modulation	Frequency (GHz)	Min. value	Measured result	Max. value
IEEE802.11a	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
HiperLAN2	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
HiSWANa	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11b	CCK-11MHz	2.412	−200 Hz	Hz	+200 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (ERP-OFDM)	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (DSSS-OFDM)	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (ERP-DSSS/CCK)	CCK-11MHz	2.412	−200 Hz	Hz	+200 Hz
		2.437		Hz	
		2.483		Hz	

Step	Operation

MX268330A/MX268730A/MX860830A/MX860930A

Target system	Modulation	Frequency (GHz)	Min. value	Measured result	Max. value
IEEE802.11a	OFDM-64QAM	4.91	−500 Hz	Hz	+500 Hz
		5.23		Hz	
		5.805		Hz	
HiperLAN2	OFDM-64QAM	4.91	−500 Hz	Hz	+500 Hz
		5.23		Hz	
		5.805		Hz	
HiSWANa	OFDM-64QAM	4.91	−500 Hz	Hz	+500 Hz
		5.23		Hz	
		5.805		Hz	
IEEE802.11b	CCK-11MHz	2.412	−200 Hz	Hz	+200 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (ERP-OFDM)	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (DSSS-OFDM)	OFDM-64QAM	2.412	−500 Hz	Hz	+500 Hz
		2.437		Hz	
		2.483		Hz	
IEEE802.11g (ERP-DSSS/CCK)	CCK-11MHz	2.412	−200 Hz	Hz	+200 Hz
		2.437		Hz	
		2.483		Hz	

4.3.2 RF Power Accuracy

(1) Specifications

IEEE802.11a, HiperLAN2, HiSWANa

MX268130A

±1.7 dB (2 to 2.5 GHz, −18 to 0 dBm, Average count: 30)

±2.0 dB (2 to 2.5 GHz, −38 to 0 dBm, Pre-amplifier: On, Average count: 30)

MX268330A

±2.7 dB (4.9 to 6 GHz, −18 to 0 dBm, Average count: 30)

MX268730A

±2.9 dB (4.9 to 6 GHz, −26 to 0 dBm, Average count: 30)

MX860830A

±2.7 dB (4.9 to 6 GHz, −18 to 0 dBm, Average count: 30, Low power input)

MX860930A

±2.7 dB (4.9 to 6 GHz, −18 to 0 dBm, Average count: 30)

IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK),
IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

MX268130A

±1.7 dB (2.4 to 2.5 GHz, −18 to 0 dBm, Average count: 30)

±2.0 dB (2.4 to 2.5 GHz, −38 to 0 dBm, Pre-amplifier: On, Average count: 30)

MX268330A

±1.7 dB (2.4 to 2.5 GHz, −18 to 0 dBm, Average count: 30)

±2.0 dB (2.4 to 2.5 GHz, −38 to 0 dBm, Pre-amplifier: On, Average count: 30)

MX268730A

±1.9 dB (2.4 to 2.5 GHz, −26 to 0 dBm, Average count: 30)

MX860830A

±1.7 dB (2.4 to 2.5 GHz, −18 to 0 dBm, Average count: 30, Low power input)

±2.0 dB (2.4 to 2.5 GHz, −38 to 0 dBm, Pre-amplifier: On, Average count: 30, Low power input)

MX860930A

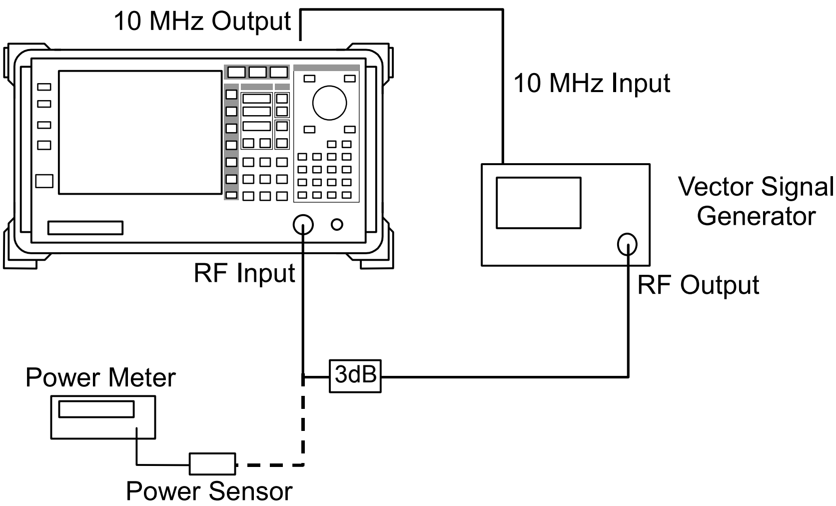
±1.7 dB (2.4 to 2.5 GHz, −18 to 0 dBm, Average count: 30)

±2.0 dB (2.4 to 2.5 GHz, −38 to 0 dBm, Pre-amplifier: On, Average count: 30)

(2) Measuring instruments used in testing

Name	Recommended model
Vector Signal Generator	E4438C
Power Meter	ML2437A
Power Sensor	MA2422B
3dB Fixed Attenuator	MP721A

(3) Setup



(4) Test procedure

Step	Operation
1.	The following shows an example of operation to be carried out if the target system is IEEE802.11a. For other systems, carry out the operation according to this example.
2.	Load waveform data conforming to OFDM-64QAM in IEEE802.11a to the arbitrary signal generator.
3.	Set the frequency of the vector signal generator to 5.23 GHz.
4.	Connect the 3 dB fixed attenuator to the power sensor. Measure the output level of the vector signal generator. Adjust the output level of the vector signal generator so that the power within burst is 0 dBm considering burst on/off ratio of output signals of for vector signal generator.
5.	Connect the 3 dB fixed attenuator to the RF Input on the analyzer.

Step	Operation
6.	Initialize the analyzer. Then set as follows: Target system: IEEE802.11a Reference level: 0 dBm Frequency: 5.23 GHz Modulation method: OFDM-64QAM Transmission rate: 54 MHz Measuring Object: Burst Pre-amplifier: Off RF Power screen Storage mode: Average Averaging count: 30
7.	If the output level of the vector signal generator and the reference level of the analyzer do not match, set the reference level of the analyzer to the nearest value that is greater than the output level of the signal generator.
8.	Press the Single key to perform measurement. The Tx Power (dBm) is obtained as follows: (Level accuracy) = (Measured level) – (Set level)
9.	Measure the level accuracy while varying the target systems and levels as shown in the table below. Turn on the pre-amplifier, if installed, during measurement.

MX268130A

Target system	Frequency (GHz)	Pre-amplifier	Level (dBm)	Min. value	Measured result	Max. value	Measurement uncertainty
IEEE802.11a	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
HiSWANa	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB

Step	Operation

MX268130A (Cont'd)

Target system	Frequency (GHz)	Pre-amplifier	Level (dBm)	Min. value	Measured result	Max. value	Measurement uncertainty
HiperLAN2	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11b	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (ERP-OFDM)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (DSSS-OFDM)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (ERP-DSSS/CCK)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB

Step	Operation

MX268330A/MX860830A/MX860930A

Target system	Frequency (GHz)	Pre-amplifier	Level (dBm)	Min. value	Measured result	Max. value	Measurement uncertainty
IEEE802.11a	5.23	---	0	−2.16 dB	dB	+2.16 dB	±0.54 dB
			−10		dB		
			−18		dB		
HiSWANa	5.23	---	0	−2.16 dB	dB	+2.16 dB	±0.54 dB
			−10		dB		
			−18		dB		
HiperLAN2	5.23	---	0	−2.16 dB	dB	+2.16 dB	±0.54 dB
			−10		dB		
			−18		dB		
IEEE802.11b	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (ERP-OFDM)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (DSSS-OFDM)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB
IEEE802.11g (ERP-DSSS/CCK)	2.437	Off	0	−1.28 dB	dB	+1.28 dB	±0.42 dB
			−10		dB		
			−18		dB		
		On	0	−1.58 dB	dB	+1.58 dB	±0.42 dB
			−18		dB		
			−38	−1.64 dB	dB	+1.64 dB	±0.36 dB

Step	Operation

MX268730A

Target system	Frequency (GHz)	Pre-amplifier	Level (dBm)	Min. value	Measured result	Max. value	Measurement uncertainty
IEEE802.11a	5.23	---	−6	−2.36 dB	dB	+2.36 dB	±0.54 dB
			−16		dB		
			−26		dB		
HiSWANa	5.23	---	−6	−2.36 dB	dB	+2.36 dB	±0.54 dB
			−16		dB		
			−26		dB		
HiperLAN2	5.23	---	−6	−2.36 dB	dB	+2.36 dB	±0.54 dB
			−16		dB		
			−26		dB		
IEEE802.11b	2.437	---	−6	−1.48 dB	dB	+1.48 dB	±0.42 dB
			−16		dB		
			−26	−1.54 dB	dB	+1.54 dB	±0.36 dB
IEEE802.11g (ERP-OFDM)	2.437	---	−6	−1.48 dB	dB	+1.48 dB	±0.42 dB
			−16		dB		
			−26	−1.54 dB	dB	+1.54 dB	±0.36 dB
IEEE802.11g (DSSS-OFDM)	2.437	---	−6	−1.48 dB	dB	+1.48 dB	±0.42 dB
			−16		dB		
			−26	−1.54 dB	dB	+1.54 dB	±0.36 dB
IEEE802.11g (ERP-DSSS/CCK)	2.437	---	−6	−1.48 dB	dB	+1.48 dB	±0.42 dB
			−16		dB		
			−26	−1.54 dB	dB	+1.54 dB	±0.36 dB

MX268130A/330A/730A/
MX860830A/930A
Wireless LAN Measurement Software
(for MS2681A/MS2683A/MS2687A/
MS2687B/MS8608A/MS8609A)
Operation Manual
(Remote Control)

Table of Contents

Section 1 General

This section outlines the remote control and gives examples of system upgrades.

1.1 General

The MS2681A/MS2683A/MS2687A/MS2687B, when combined with an external controller (host computer, personal computer, etc.), can automate your measurement system. For this purpose, the MS2681A/MS2683A/MS2687A/MS2687B is equipped with an RS-232C interface port, and GPIB interface bus (IEEE std 488.2-1987) as standard compositions.
Ethernet interface can be also installed as an option.

1.1.1 Remote control functions

The remote control functions of the MS2681A/MS2683A/MS2687A/MS2687B are used to do the following:

(1) Control all functions except a few like the power switch and [LOCAL] key

(2) Read all parameter settings.

(3) Set the RS-232C interface settings from the panel.

(4) Set the GPIB address from the panel.

(5) Set the IP address for Ethernet interface from the panel. (Optional)

(6) Select the interface port from the panel.

(7) Configure the automatic measurement system when the spectrum analyzer function is combined with a personal computer and other measuring instruments.

1.1.2 Interface port selection functions

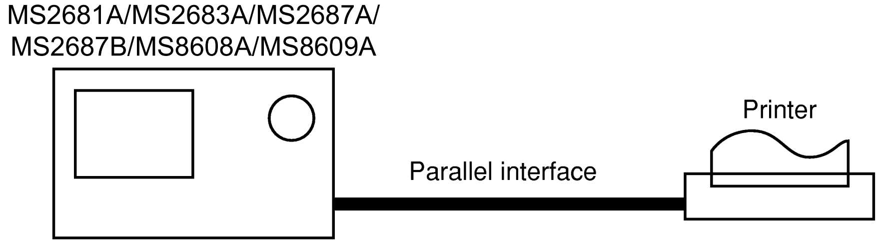
The MS2681A/MS2683A/MS2687A/MS2687B Spectrum Analyzer function has the standard RS-232C interface, GPIB interface bus and parallel (Centronics) interface. It can also have Ethernet interface as an option.
Use the panel to select the interface port to be used to connect external devices as shown below.

Port for the external controller:	Select RS-232C, GPIB or Ethernet (Option).
Port for the printer:	Parallel interface.

1.1.3 Examples of system upgrades using RS-232C and GPIB

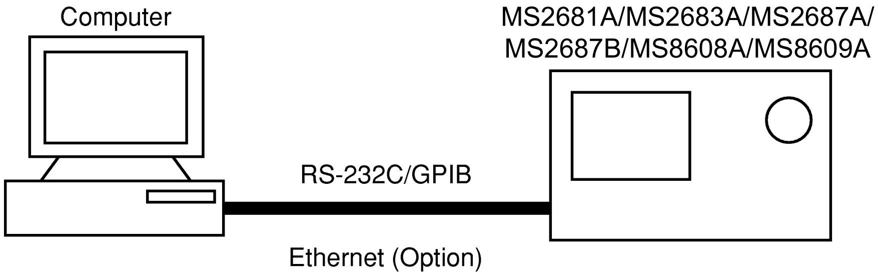
(1) Stand-alone type 1

Waveforms measured with MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A are output to the printer.



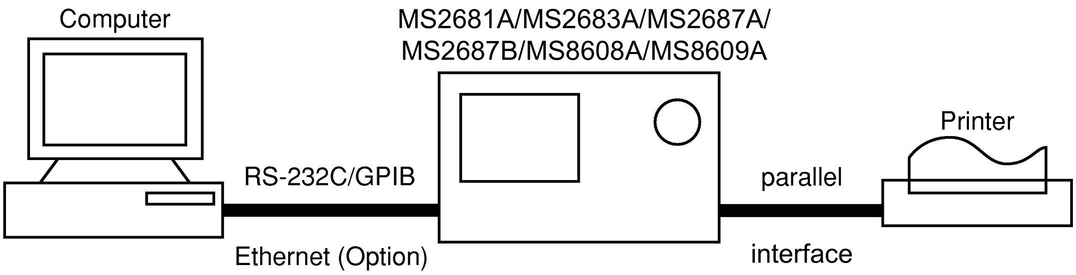
(2) Control by the host computer (1)

The spectrum analyzer is controlled automatically or remotely from the computer.



(3) Control by the host computer (2)

The waveforms measured by controlling analyzer automatically or remotely from the computer are output to the printer.



1.1.4 Specifications of RS-232C

The table below lists the specifications of the RS-232C provided as standard in MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A.

Item	Specification
Function	Control from the external controller (except for power-ON/OFF)
Communication system	Asynchronous (start-stop synchronous system), half-duplex
Communication control system	X-ON/OFF control
Baud rate	1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 k (bps)
Data bits	7 or 8 bits
Parity	Odd number (ODD), even number (EVEN), none (NON)
Start bit	1 bit
Stop bit (bits)	1 or 2 bits
Connector	D-sub 9-pin, male

1.1.5 Specifications of GPIB

The table below lists the specifications of the GPIB provided for MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A.

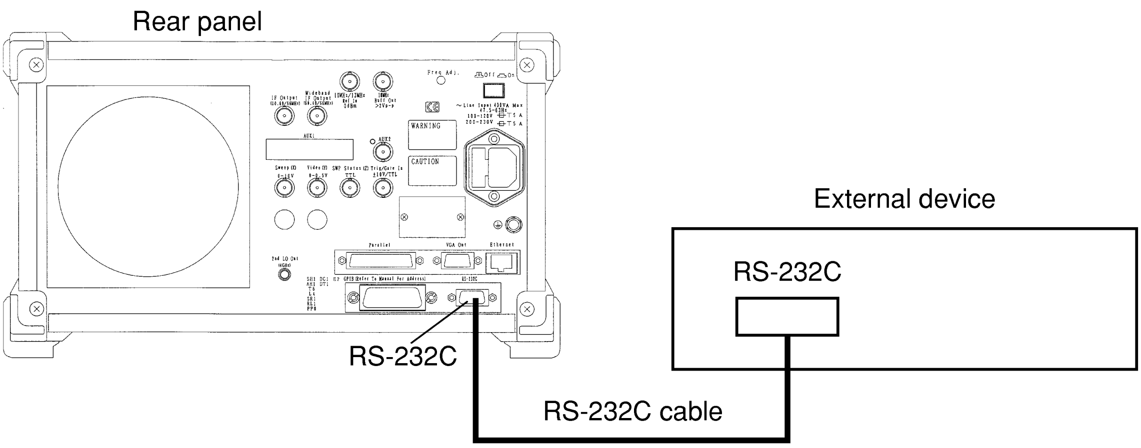
Item	Specification and supplementary explanation
Function	Conforms to IEEE488.2 The spectrum analyzer is controlled from the external controller (except for power-on/off).
Interface function (*1)	SH1: All source handshake functions are provided. Synchronizes the timing of data transmission. AH1: All acceptor handshake functions are provided. Synchronizes the timing of data reception. T6: The basic talker functions and serial poll function are provided. The talk only function is not provided. The talker can be canceled by MLA. L4: The basic listener functions are provided. The listen only function is not provided. The listener can be canceled by MTA. SR1: All service request and status byte functions are provided. RL1: All remote/local functions are provided. The local lockout function is provided. PP0: The parallel poll functions are not provided. DC1: All device clear functions are provided. DT1: Device trigger functions are provided. C0: System controller functions are not provided. E2: Output is tri-state.

Section 2 Connecting Device

This section describes how to connect external devices such as the host computer, personal computer, and printer with RS-232C and GPIB cables. This section also describes how to setup the interfaces of the analyzer function.

2.1 Connecting an External Device with an RS-232C Cable

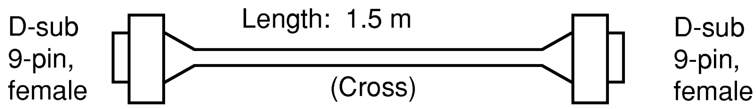
Connect the RS-232C connector (D-sub 9-pin, male) on the rear panel of the Analyzer to the RS-232C connector of the external device with an RS-232C cable.



Notes:

RS-232C connectors with 9 pins and 25 pins are available. When purchasing the RS-232C cable, check the number of pins on the RS-232C connector of the external device. Also, the following RS-232C cable is provided as peripheral parts of the Analyzer.

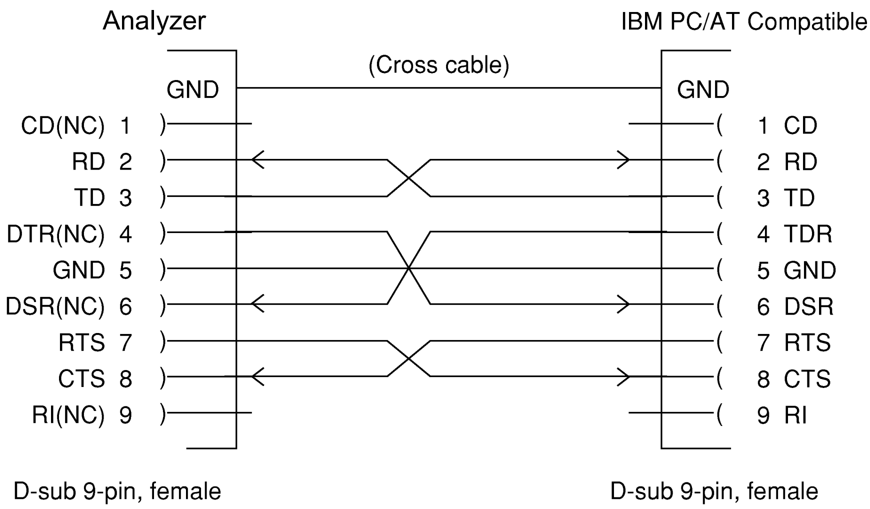
- RS-232C cable (for IBM PC/AT Compatible)
  - Analyzer side AT Compatible personal computer side



2.2 Connection Diagram of RS-232C Interface Signals

The diagram below shows the RS-232C interface signal connections between the Analyzer and devices such as a personal computer.

- Connection with IBM PC/AT Compatible personal computer



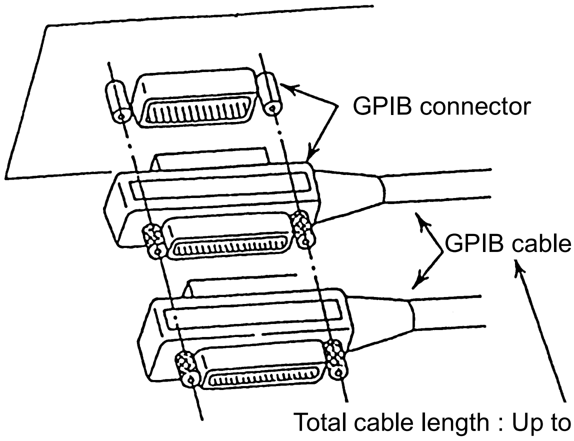
2.3 Connecting a Device with a GPIB Cable

Connect the GPIB connector on the rear panel of this equipment to the GPIB connector of an external device with a GPIB cable.

Note:

Be sure to connect the GPIB cable before turning the equipment power on.

Up to 15 devices, including the controller, can be connected to one system. Connect devices as shown below:



Total cable length : Up to 20 m
Cable length between devices : Up to 4 m
Number of devices that can be connected : Up to 15

2.4 Setting the GPIB Address

Set the GPIB address of this instrument as follows.

Config → Interface → (move cursor) My Address 1 → set

Use the numeric keypad or the rotary knob to enter the GPIB address of this instrument, next press set to confirm address.

Section 3 Device Message Format

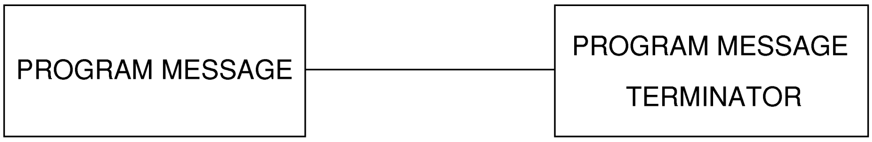
This section describes the format of the device messages transmitted on the bus between a controller (host computer) and the device MS2681A/ MS2683A/MS2687A/MS2687B/MS8608A/MS8609A via the RS-232C GPIB or Ethernet system.

3.1 General Description

The device messages are data messages transmitted between the controller and devices, program messages transferred from the controller to this instrument (device), and response messages input from this instrument (device) to the controller. There are also two types of program commands and program queries in the program message. The program command is used to set this instrument's parameters and to instruct it to execute processing. The program query is used to query the values of parameters and measured results.

3.1.1 Program Message Format

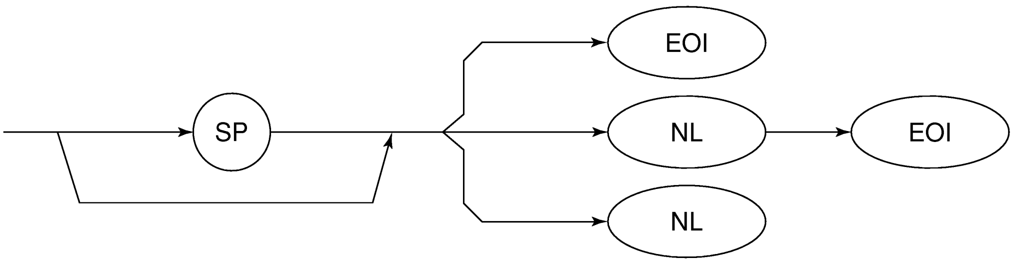
To transfer a program message from the controller program to this instrument using the WRITE statement, the program message formats are defined as follows.




```
WRITE  #1,"CF :1GHZ"
```

PROGRAM MESSAGE: When the program message is transmitted from the controller to this instrument, the specified terminator is attached to the end of the program message to terminate its transmission.

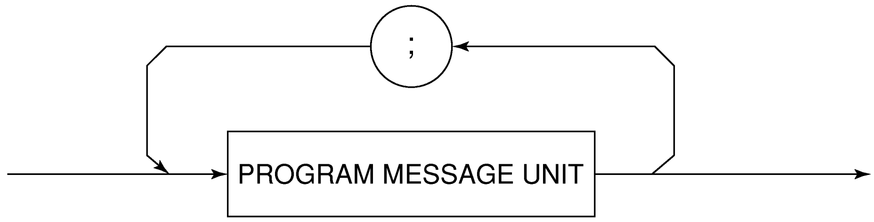
(1) PROGRAM MESSAGE TERMINATOR



NL: Called New line or LF (Line Feed)

Carriage Return (CR) is ignored and is not processed as a terminator.

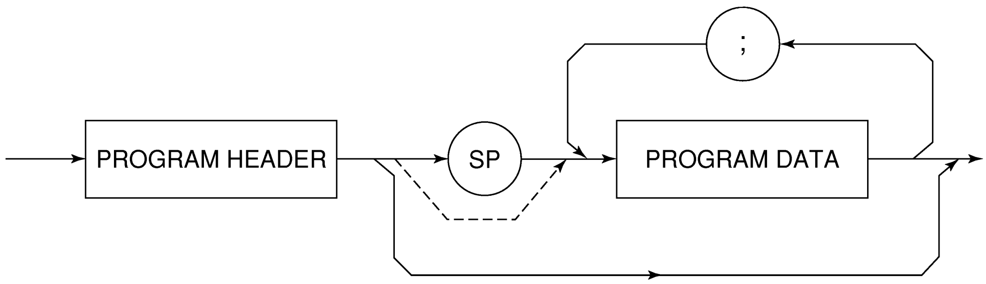
(2) PROGRAM MESSAGE



Multiple program message units can be output sequentially by separating them with a semicolon.

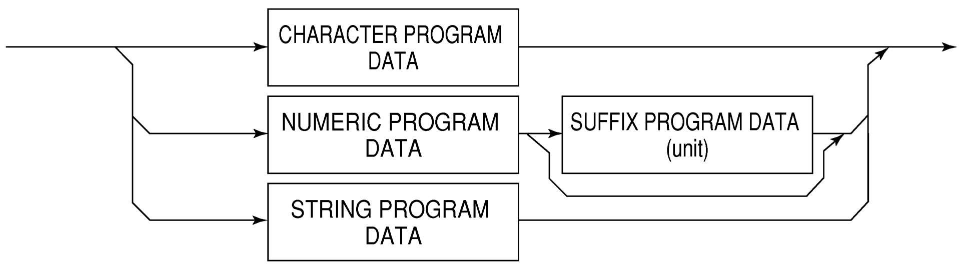
<Example> WRITE #1;"CF 1GHZ;SP 5ØØKHZ

(3) PROGRAM MESSAGE UNIT



- The program header of an IEEE488.2 common command always begins with an asterisk.
- For numeric program data, the between the header and data can be omitted.
- The program header of a program query always ends with a question mark.

(4) PROGRAM DATA



(5) CHARACTER PROGRAM DATA

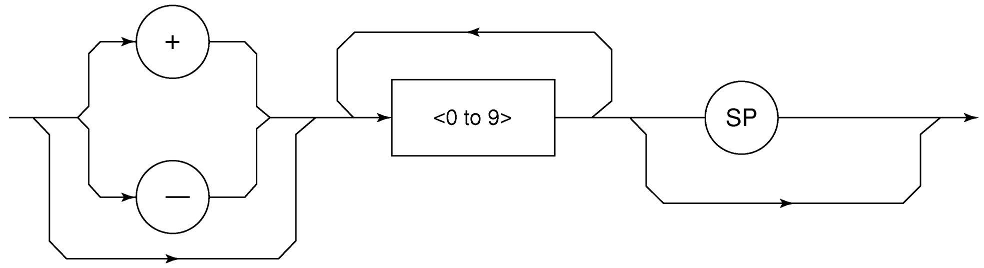
Character program data is specific character string data consisting of the uppercase alphabetic characters from A to Z, lowercase alphabetic characters from a to z, numbers 0 to 9, and underline (_).

<Example> `WRITE #1;"ST AUTO"` ....Sets Sweep Time to AUTO.

(6) NUMERIC PROGRAM DATA

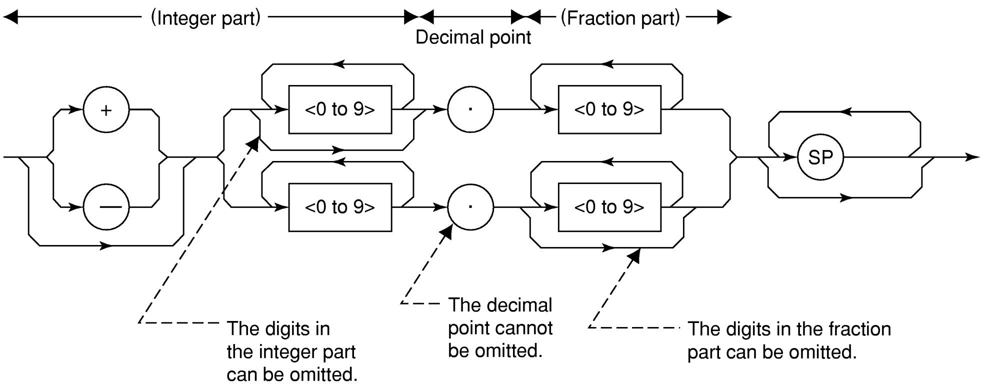
Numeric program data has two types of formats: integer format (NR1) and fixed-point format (NR2).

< Integer format (NR1) >



- Zeros can be inserted at the beginning → 005, +000045
- There must be no spaces between a + or – sign and a number → +5, +△ 5 (×)
- Spaces can be inserted after a number → +5△△△
- The + sign is optional → +5, 5
- Commas cannot be used to separate digits → 1,234,567 (×)

< Fixed-point format (NR2) >



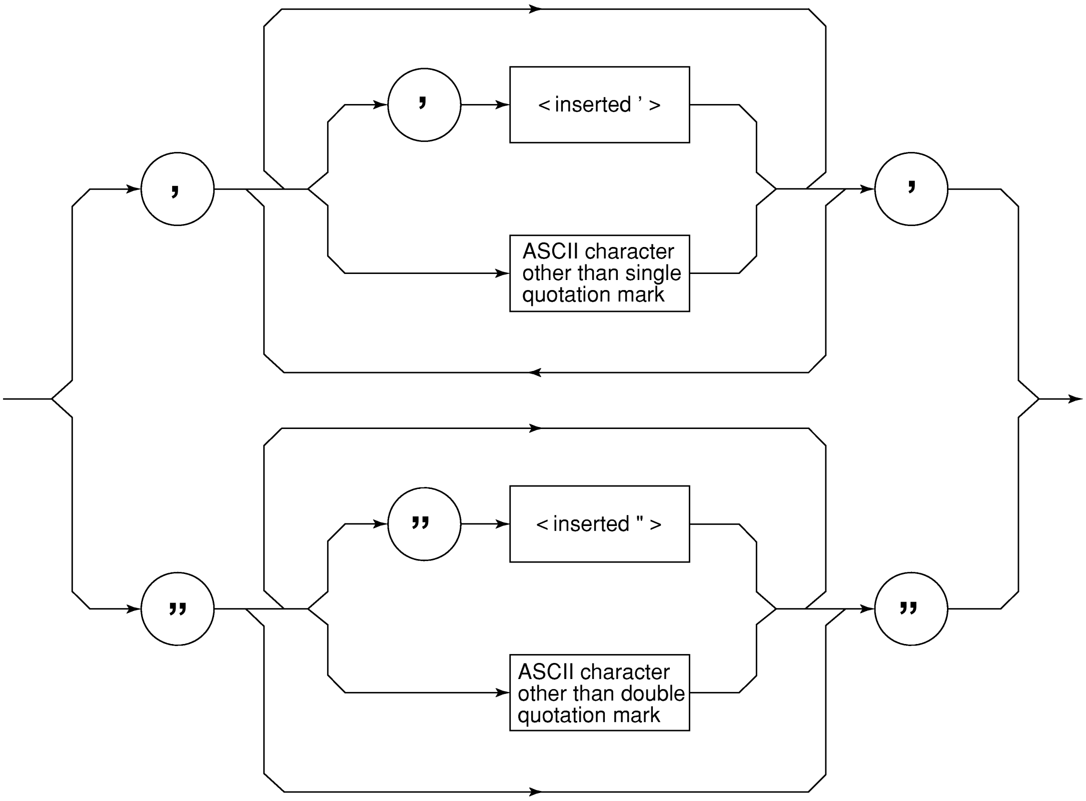
- The numeric expression of the integer format applies to the integer part.
- There must be no spaces between numbers and the decimal point → +753△ .123 (×)
- Spaces can be inserted after the digits in the fraction part → +753.123△△△
- A number need not be placed before the decimal point → .05
- A + or – sign ca be placed before the decimal point → +.05, –.05
- A number can end with a decimal point → 12.

(7) SUFFIX PROGRAM DATA (unit)

The table below lists the suffixes used for MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A.

Classification	Unit	Specification
Frequency	GHz	GHZ, GZ
	MHz	MHZ, MZ
	KHz	KHZ, KZ
	Hz	HZ
	Default	HZ
Time	second	S
	m second	MS
	μ second	US
	Default	MS
Level (dB system)	dB	DB
	dBm	DBM, DM
	dBμV	DBUV
	dBmV	DBMV
	dBμV (emf)	DBUVE
	dBμV/m	DBUVM
	Default	Determined in conformance with the set scale unit
Level (V system)	V	V
	mV	MW
	μV	UV
	Default	UV
Level (W system)	W	W
	mW	MW
	μW	UW
	nW	NW
	pW	PW
	fW	FW
	Default	UW

(8) STRING PROGRAM DATA



• String program data must be enclosed with single quotation marks ('...').

```
WRITE #1:"TITLE'MS2683A'"
```

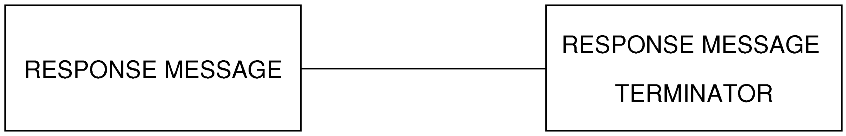
A single quotation mark used within a character string must be repeated as shown in the double quotation marks.

```
WRITE #1;"TITLE'MS2683A''NOISE MEAS'''"
```

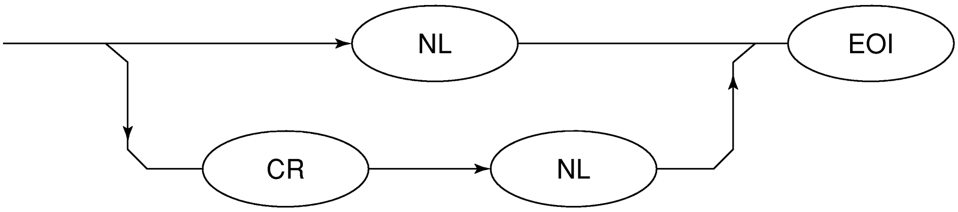
MS2683A 'NOISE MEAS' is set as the title.

3.1.2 Response Message Format

To transfer the response messages from this instrument to the controller using the READ statement, the response message formats are defined as follows:

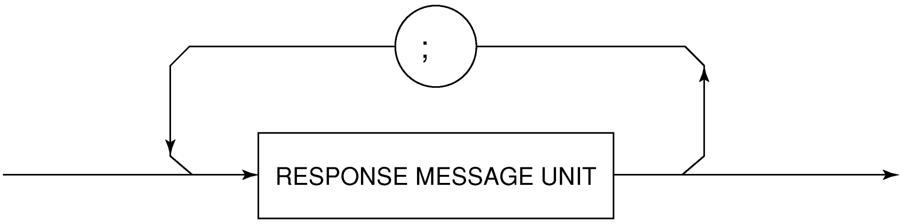


(1) RESPONSE MESSAGE TERMINATOR



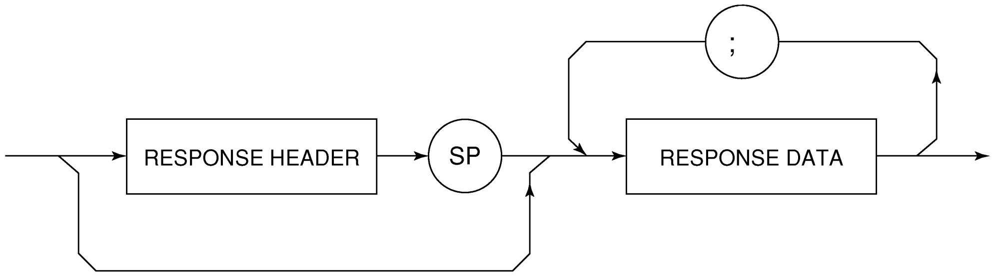
The response message terminator to be used depends on the TRM command specification.

(2) RESPONSE MESSAGE

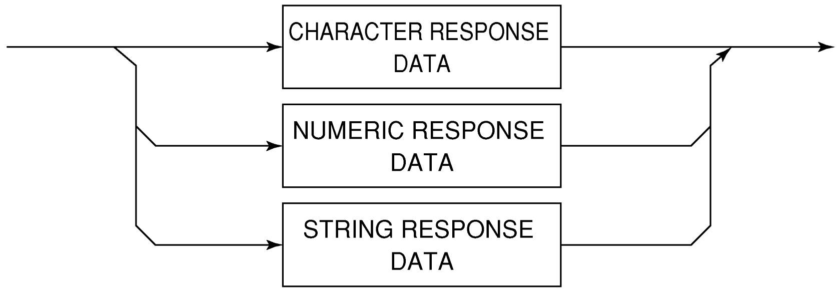


When a query is sent by the WRITE statement with one or more program queries, the response message also consists of one or more response message units.

(3) Usual RESPONSE MESSAGE UNIT



(4) RESPONSE DATA

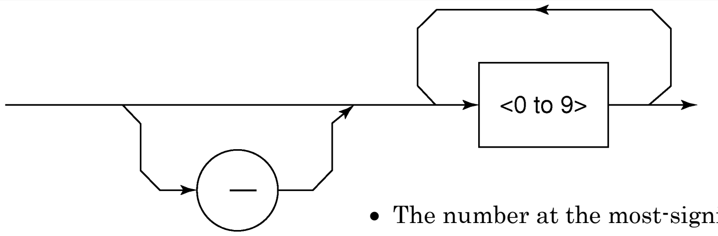


(5) CHARACTER RESPONSE DATA

Character response data is specific character string data consisting of the uppercase alphabetic characters from A to Z, lowercase alphabetic characters from a to z, numbers 0 to 9, and underline (_).

(6) NUMERIC RESPONSE DATA

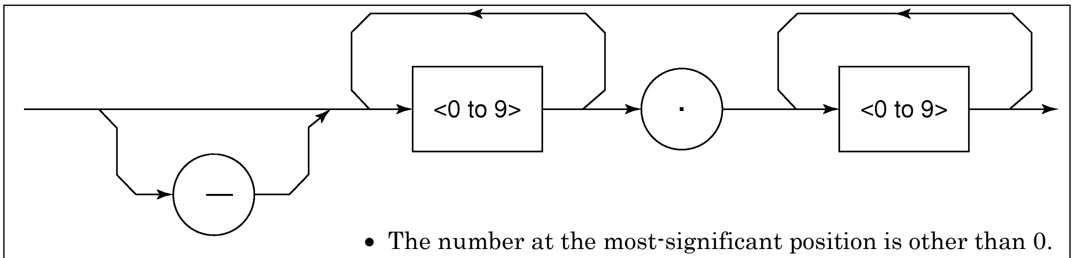
<Integer format (NR1) >



< Example >
123
−1234

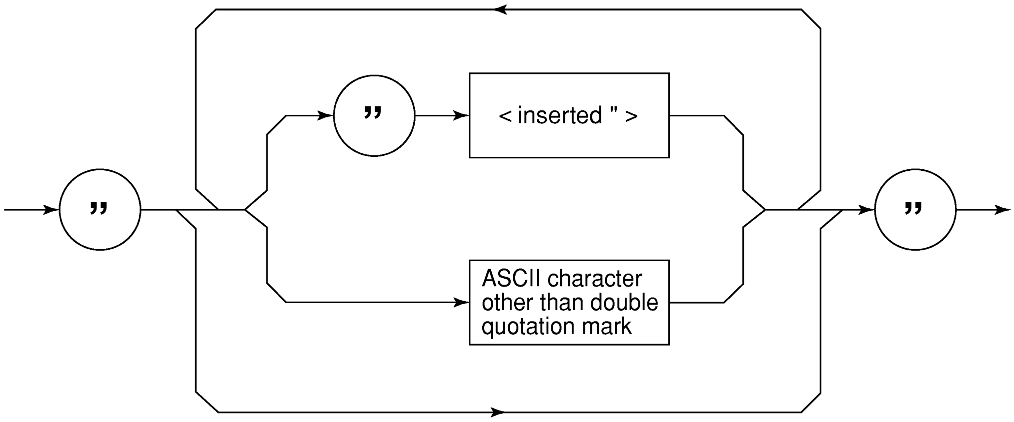
- The number at the most-significant position is other than 0.
- A + sign need not be placed before a positive number.

<Fixed-point format (NR2) >



- The number at the most-significant position is other than 0.
- A + sign need not be placed before a positive number.
- If there are zeros after the decimal point, the numeric data is transmitted in the integer format.

(7) CHARACTER RESPONSE DATA



String response data is transmitted as an ASCII character enclosed with double quotation marks.

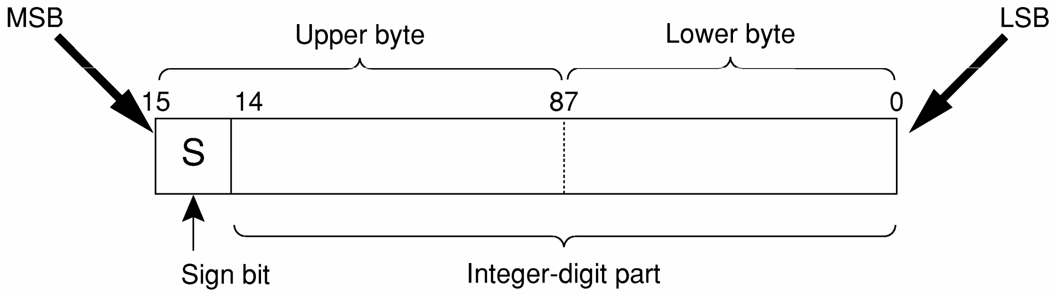
(8) Response message for input of waveform data using binary data

If waveform data is read out in binary format, the data is output prefixed with # (in ASCII format), the number of characters that indicate the byte length of the data (in ASCII format), and then the byte length of the data (in ASCII format).

The waveform binary data is two-byte 65536 integer data from –32768 to 32767, as shown below; and sent in the sequence of upper byte and lower byte.

16-Bit Binary	With Sign	No sign
1000000000000000	–32768	32768
1000000000000000	–32767	32769
1000000000000000	–32766	32770
1111111111111101	–3	65533
1111111111111110	–2	65534
1111111111111111	–1	65535
0000000000000000	0	0
0000000000000001	1	1
0000000000000010	2	2
0000000000000011	3	3
0111111111111101	32765	32765
0111111111111110	32766	32766
0111111111111111	32767	32767

Sign bit: Bit 15(MSB) is used.
Integer-digit part: Bits 0 to 14 are used.
So, 16 bits(two bytes) are used.



Internal Representation of 2-byte Bynary Data

† When a negative number is stored in a numeric variable, the sign bit 1 is set in the MSB to indicate the negative value.
The value is stored in a numeric variable in a 2's complement format.

If 16-byte data is read out in binary format, for example, the response data is output as follows:

```
#216<16 bytes of data>
```

The number 2 following # indicates that two characters that indicate the binary data length follow. The number 16 indicates that 16-byte binary data follows. <16 bytes of data> represents the read 16-byte binary data string.

The specified response message terminator is also added to the response data if waveform data is read out in binary format.

Section 4 Status Structure

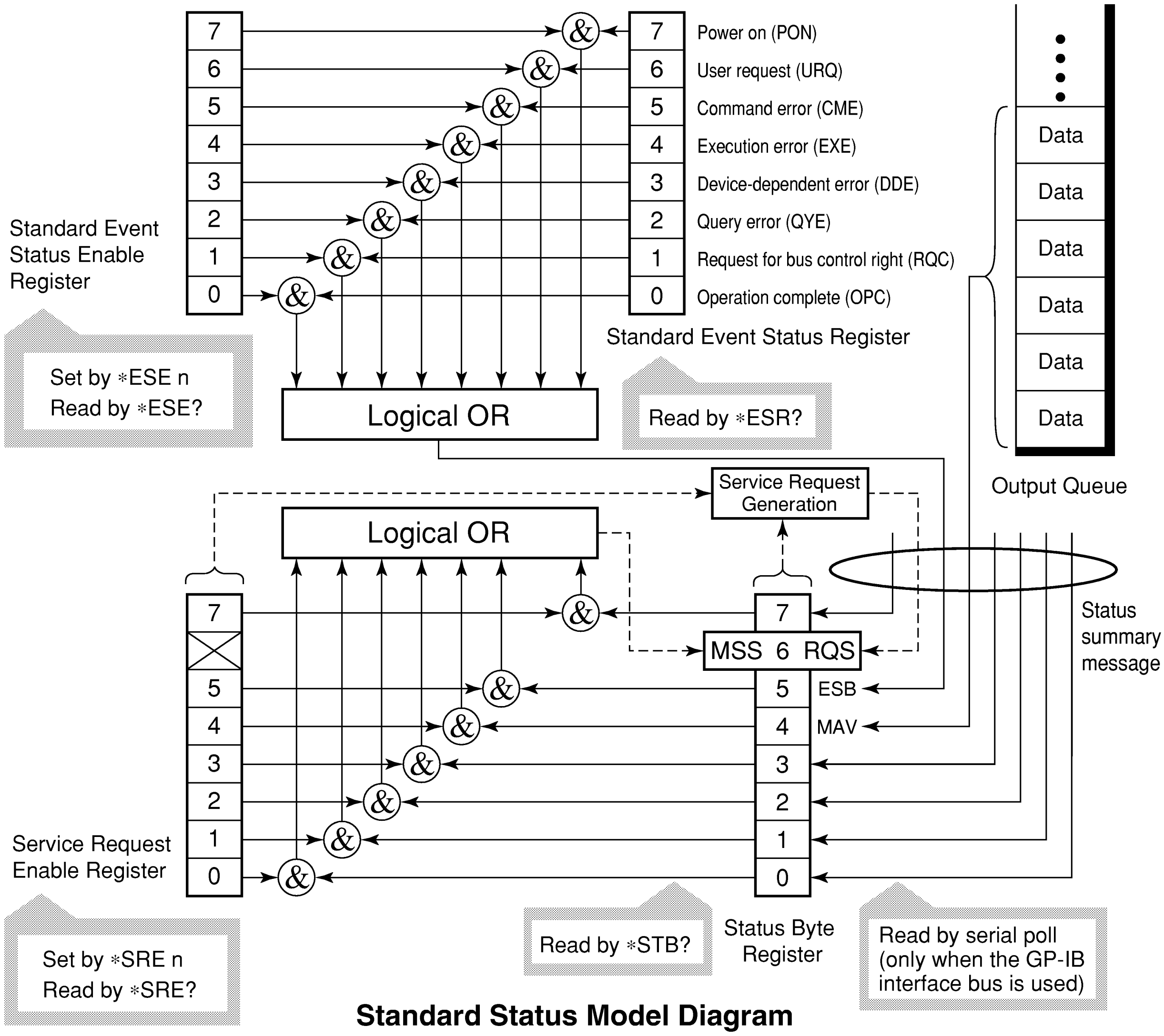
This section describes the device-status reporting and its data structure defined by the IEEE488.2 when the GPIB interface bus is used. This section also describes the synchronization techniques between a controller and device.

These functions are used to control a device from an external controller using the GPIB interface bus. Most of these functions can also be used to control a device from an external controller using the RS-232C or Ethernet interface.

The Status Byte (STB) sent to the controller is based on the IEEE488.1 standard. The bits comprising the STB are called status summary messages because they represent a summary of the current data in registers and queues.

4.1 IEEE488.2 Standard Status Model

The diagram below shows the standard model for the status data structures stipulated in the IEEE488.2 standard.



Standard Status Model Diagram

In the status model, IEEE488.1 status bytes are used for the lowest grade status. This status byte is composed of seven summary message bits from the higher grade status structure. To create these summary message bits, the status data structure is composed of two types of register and queue models.

Register model	Queue model
The register model consists of two registers used for recording events and conditions encountered by a device. These two registers are the Event Status Register and Event Status Enable Register. When the results of the AND operation of both register contents are other than 0, the corresponding bit of the status bit becomes 1. In other cases, the ult of their Logical OR is 1, the summary message bit also becomes 1. If the Logical OR result is 0, the summary message bit also becomes 0.	The queue in the queue model is used to sequentially record the waiting status values or information. If the queue is not empty, the queue structure summary message becomes 1. If the queue is empty, the message becomes 0.

In IEEE488.2, there are three standard models for the status data structure. Two are register models and one is a queue model based on the register model and queue model described above. The three standard models are:

[1] Standard Event Status Register and Standard Event Status Enable Register
[2] Status Byte Register and Service Request Enable Register
[3] Output Queue

Standard Event Status Register	Status Byte Register	Output Queue
The Standard Event Status Register has the same structure as the previously described register model. In this register, the bits for eight types of standard events encountered by a device are set as follows: [1] Power on [2] User request [3] Command error [4] Execution error [5] Device-dependent error [6] Query error [7] Request for bus control right [8] Operation complete The Logical OR output bit is represented by Status Byte Register as a summary message for the Event Status Bit (ESB).	The Status Byte Register is a register in which the RQS bit and the seven summary message bits from the status data structure can be set. This register is used together with the Service Request Enable Register. When the results of the OR operation of both register contents are other than 0, SRQ becomes ON. To indicate this, bit 6 of the Status Byte Register (DIO7) is reserved by the system as the RQS bit. The RQS bit is used to indicate that there is a service request for the external controller. The mechanism of SRQ conforms to the IEEE488.1 standard.	The Output Queue has the structure of the queue model described above. Status Byte Register bit 4 (DIO5) is set as a summary message for Message Available (MAV) to indicate that there is data in the output buffer.

4.2 Status Byte (STB) Register

The STB register consists of the STB and RQS (or MSS) messages of the device.

4.2.1 ESB and MAV summary messages

This paragraph describes the ESB and MAV summary messages.

(1) ESB summary message

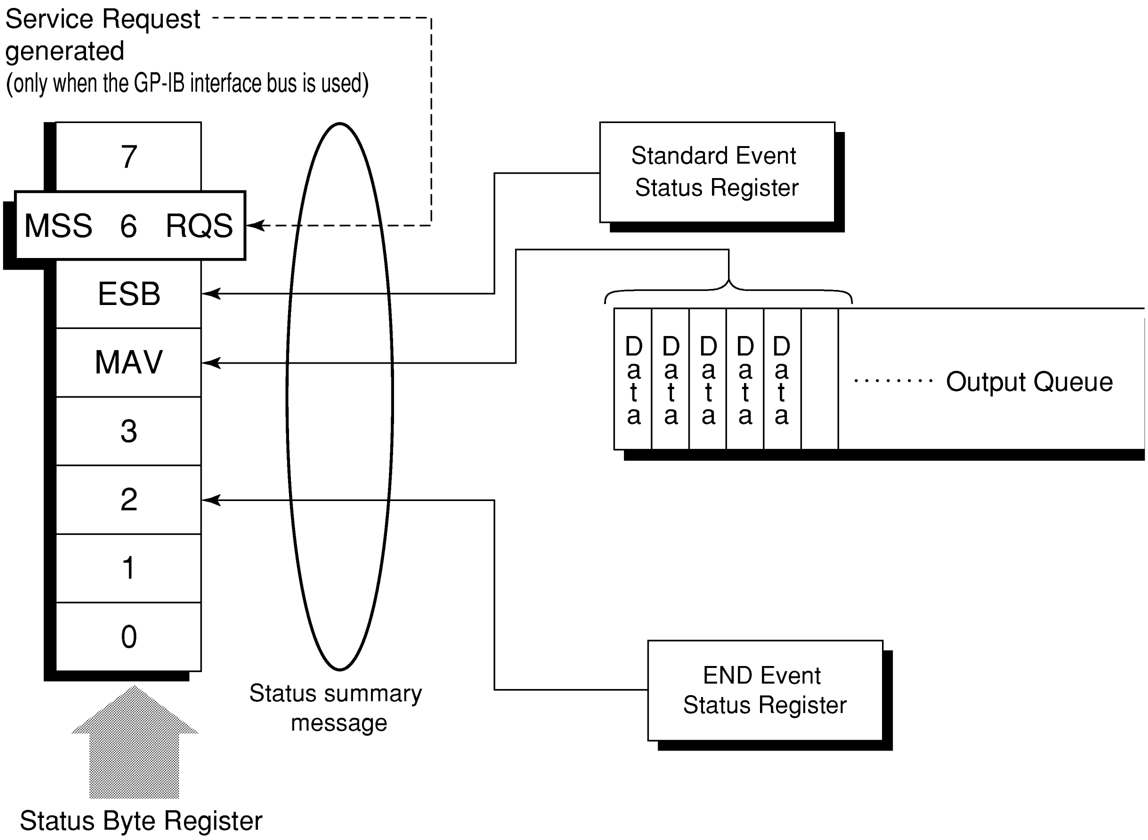
The ESB (Event Summary Bit) is a message defined by IEEE488.2 which uses bit 5 of the STB register. When the setting permits events to occur, the ESB summary message bit becomes 1 if any one of the events recorded in the Standard Status Register becomes 1. Conversely, the ESB summary message bit becomes 0 if one of the recorded events occurs, even if events are set to occur.
This bit becomes 0 when the ESR register is read by the ∗ESR? query or when it is cleared by the ∗CLS command.

(2) MAV summary message

The MAV (Message Available) summary bit is a message defined by IEEE488.2 which uses bit 4 of the STB register. This bit indicates whether the output queue is empty. The MAV summary message bit is set to 1 when a device is ready to receive a request for a response message from the controller. When the output queue is empty, this bit is set to 0. This message is used to synchronize the information exchange with the controller. For example, this message is available when, after the controller sends a query command to a device, the controller waits until MAV becomes 1. While the controller is waiting for a response from the device, other jobs can be processed. Reading the Output Queue without first checking MAV will cause all system bus operations to be delayed until the device responds.

4.2.2 Device-dependent summary messages

As shown in the diagram below, the Spectrum Analyzer does not use bits 0, 1, 3, and 7, and it uses bit 2 as the summary bit of the Event Status Register.



4.2.3 Reading and clearing the STB register

The STB register can be read using serial polling or the *STB? common query. The IEEE488.1 STB message can be read by either method, but the value sent to bit 6 (position) is different for each method.
The STB register contents can be cleared using the *CLS command.

(1) Reading by serial polling (only when the GPIB interface bus is used)

The IEEE488.1 serial polling allows the device to return a 7-bit status byte and an RQS message bit which conforms to IEEE488.1. The value of the status byte is not changed by serial polling. The device sets the RQS message to 0 immediately after being polled.

(2) Reading by the *STB? common query

The *STB? common query requires the devices to send the contents of the STB register and the integer format response messages, including the MSS (Master Summary Status) summary message. Therefore, except for bit 6, which represents the MSS summary message, the response to *STB? is identical to that of serial polling.

(3) Definition of MSS (Master Summary Message)

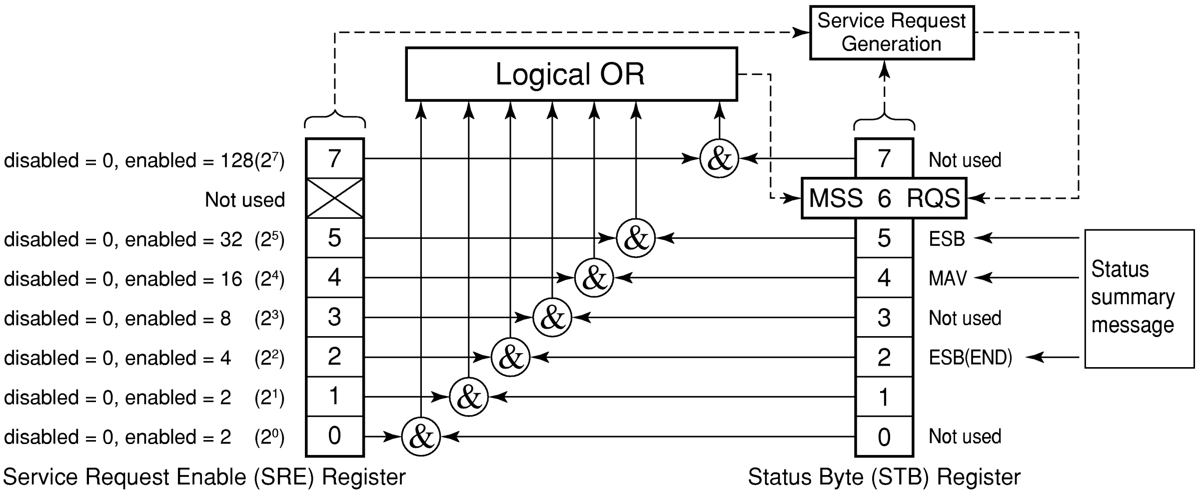
MSS indicates that there is at least one cause for a service request. The MSS message is represented at bit 6 response to an *STB? query, but it is not produced as a response to serial polling. It should not be taken as part of the status byte specified by IEEE488.1. MSS is configured by the overall logical OR in which the STB register and SRQ enable (SRE) register are combined.

(4) Clearing the STB register using the *CLS common command

The *CLS common command clears all status data structures as well as the summary messages corresponding to them.
The *CLS command does not affect the settings in the Enable Register.

4.3 Service Request (SRQ) Enabling Operation

Bits 0 to 7 of the Service Request Enable Register (SRE) determine which bit of the corresponding STB register can generate SRQ.
The bits in the Service Request Enable Register correspond to the bits in the Status Byte Register. If a bit in the Status Byte Register corresponding to an enabled bit in the Service Request Enable Register is set to 1, the device makes a service request to the controller with the RQS bit set to 1.



(1) Reading the SRE register

The contents of the SRE register are read using the ∗SRE? common query. The response message to this query is an integer from 0 to 255 which is the sum of the bit digit weighted values in the SRE register.

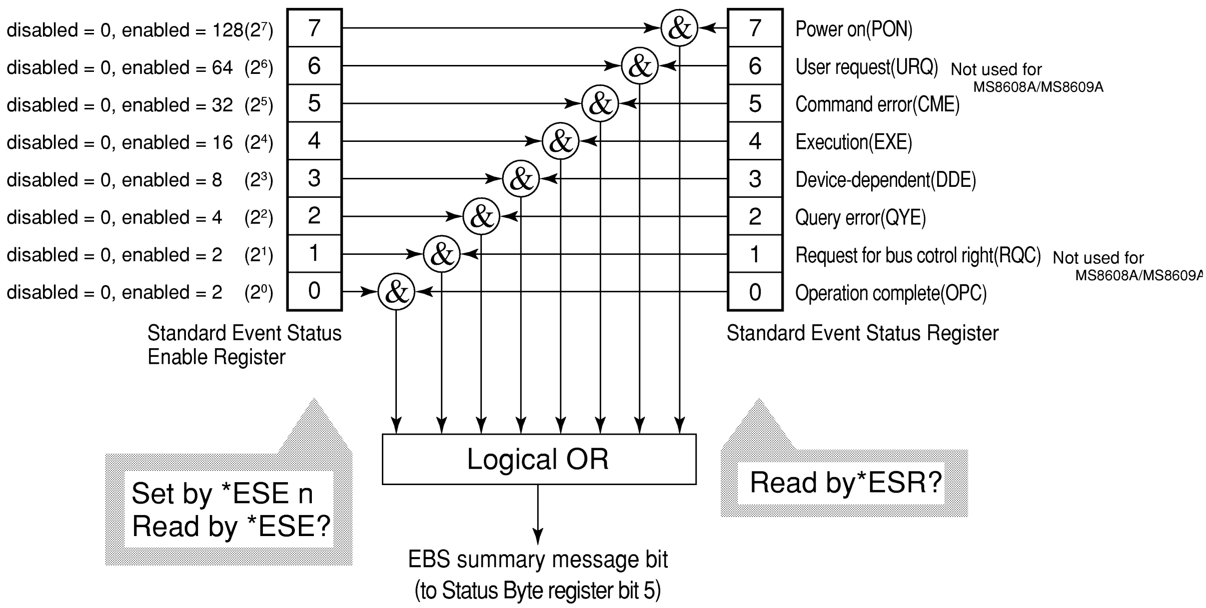
(2) Updating the SRE register

The SRE register is written using the ∗SRE common command. An integer from 0 to 255 is assigned as a parameter to set the SRE register bit to 0 or 1. The value of bit 6 is ignored.

4.4 Standard Event Status Register

4.4.1 Bit definition of Standard Event Status Register

The diagram below shows the operation of the Standard Event Status Register.



The Standard Event Status Enable (ESE) Register on the left is used to select which bits in the corresponding Event Register will cause a TRUE summary message when set.

Bit	Event name	Description
7	Power on (PON-Power on)	A transition from power-off to power-on occurred during the power-up procedure.
6	Not used	
5	Command error (CME-Command Error)	An illegal program message or a misspelled command was received.
4	Execution error (EXE-Execution Error)	A legal but unexecutable program message was received.
3	Device-dependent error (DDE-Device-dependent Error)	An error not caused by CME, EXE, or QYE occurred (parameter error, etc.).
2	Query error (QYE-Query Error)	An attempt was made to read data in the Output Queue when it was empty. Or, the data in the Output Queue was lost before it was read.
1	Not used	
0	Operation complete (OPC-Operation Complete)	This bit becomes 1 when this instrument has processed the *OPC command.

4.4.2 Reading, writing, and clearing the Standard Event Status Register

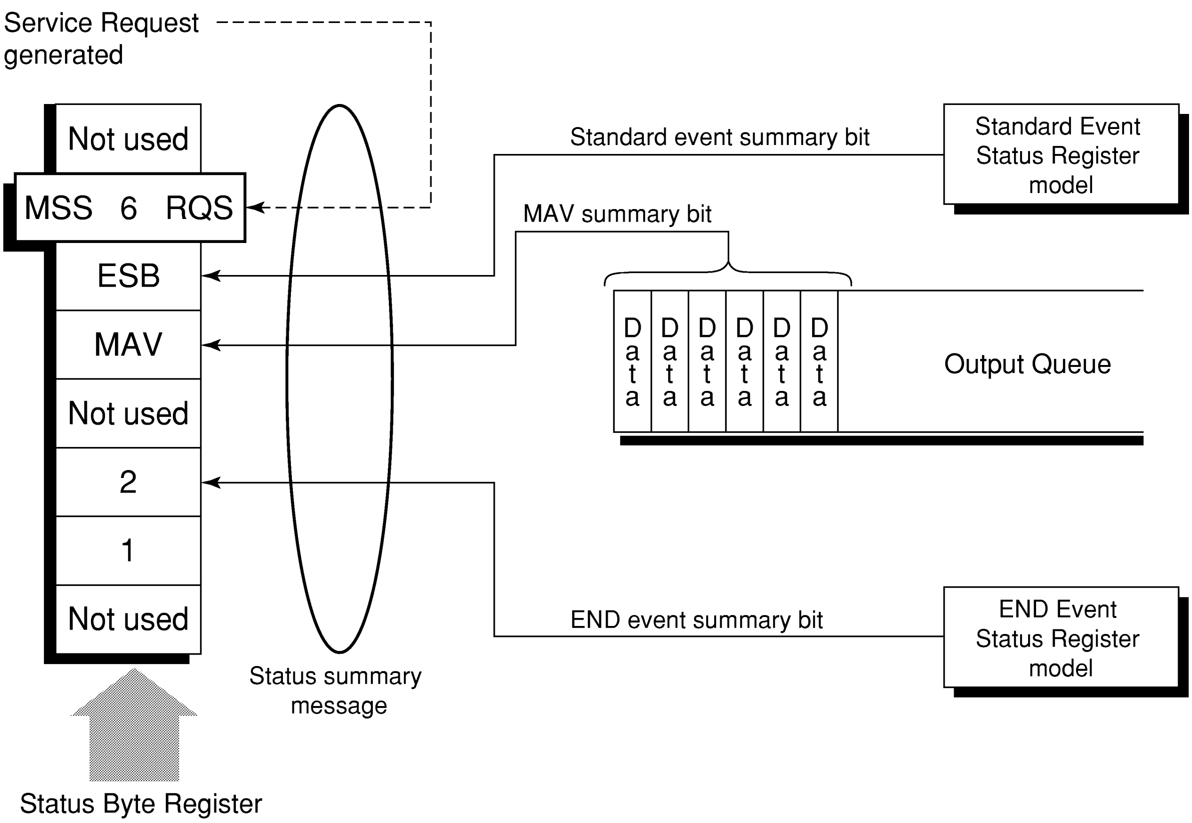
Reading	The register is read using the *ESR? command query. The register is cleared after being read. The response message is integer-format data with the binary weight added to the event bit and the sum converted to decimal.
Writing	With the exception of clearing, data cannot be written to the register from outside.
Clearing	The register is cleared when: [1] A *CLS command is received [2] The power is turned on Bit 7 is set to ON, and the other bits are cleared to 0 [3] An event is read for the *ESR? query command

4.4.3 Reading, writing, and clearing the Standard Event Status Enable Register

Reading	The register is read using the *ESE? command. The response message is integer-format data with the binary weight added to the event bit and the sum converted to decimal.
Writing	The register is written using the *ESE common command.
Clearing	The register is cleared when: [1] An *ESE command with a data value of 0 is received [2] The power is turned on The Standard Event Enable Register is not affected when: [1] The device clear function status of IEEE488.1 is changed [2] An *RST common command is received [3] A *CLS common command is received

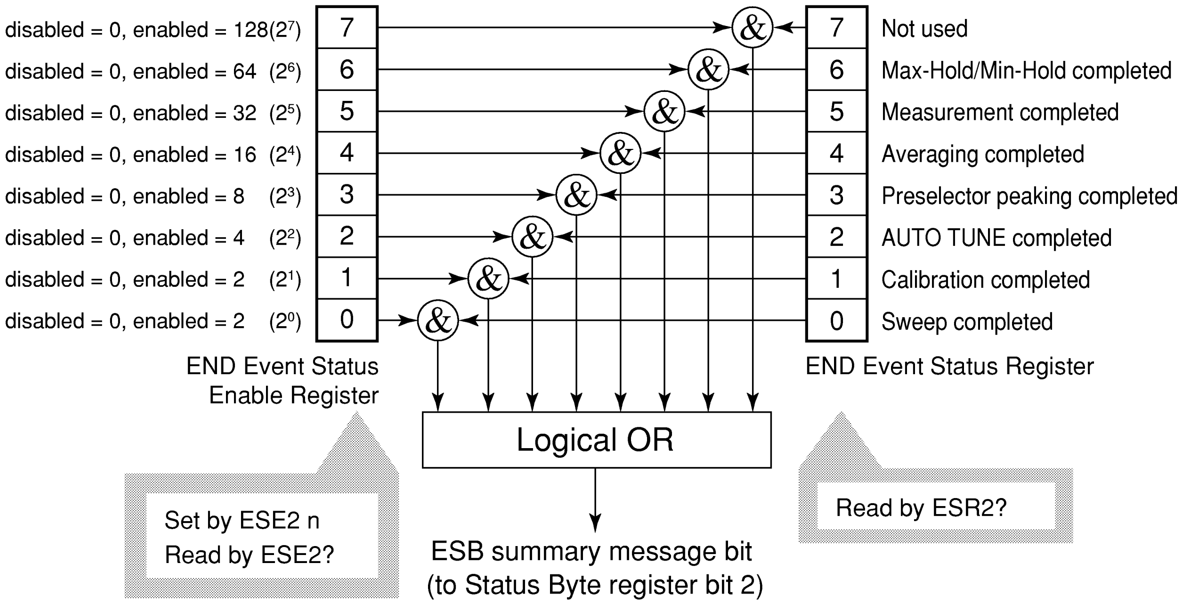
4.5 Extended Event Status Register

For MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A, bits 7, 3, 1, and 0 are unused. Bit 2 is assigned to the END summary bit as the status-summary bit supplied by the extended register model as shown below.



4.5.1 Bit definition of END Event Status Register

The diagram below shows the operation and event-bit names of the END Event Status Register.



The END Event Status Enable Register on the left is used to select which bits in the corresponding Event Register will cause a TRUE summary message when set.

Bit	Event name	Description
7	Not used	Not used
6	Max Hold/Min Hold	Sweeping according to the specified HOLD number has been completed.
5	Measurement completed	Calculation processing for measurements (frequency count, noise, etc.) has been completed.
4	Averaging completed	Sweeping according to the specified AVERAGE number has been completed.
3	Preselector peaking completed	Preselector peaking has been completed.
2	AUTO TUNE completed	AUTO TUNE has been completed.
1	Calibration completed	ALL CAL, LEVEL CAL, or FREQ CAL has been completed.
0	Sweep completed	A single sweep has been completed or is in standby.

4.5.2 Reading, writing, and clearing the Extended Event Status Register

Reading	The ESR? common query is used to read the register. The register is cleared after being read. The response message is integer-format data with the binary weight added to the event bit and the sum converted to decimal.
Writing	With the exception of clearing, data cannot be written to the register from outside.
Clearing	The register is cleared when: [1] A *CLS command is received [2] The power is turned on [3] An event is read for the ESR2? query command

4.5.3 Reading, writing, and clearing the Extended Status Enable Register

Reading	The ESE2? query is used to read the register. The response message is integer-format data with the binary weight added to the event bit and the sum converted to decimals.
Writing	The ESE2 program command is used to write the register. Because bits 0 to 7 of the registers are weighted with values 1, 2, 4, 8, 16, 32, 64, and 128, respectively, the write data is transmitted as integer-format data that is the sum of the required bit digits selected from the weighted value.
Clearing	The register is cleared when: [1] An ESE2 program command with a data value of 0 is received [2] The power is turned on The Extended Event Status Enable register is not affected when: [1] The device clear function status of IEEE488.1 is changed [2] An *RST common command is received [3] A *CLS common command is received

4.6 Synchronizing MS2681A/MS2683A/MS2687A/ MS2687B/MS8608A/MS8609A with a Controller

MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A usually treats program messages as sequential commands that do not process newly-received commands until they complete the processing of the previous command. Therefore, no special consideration is necessary for pair-synchronization between MS2681A/MS2683A/MS2687A/MS2687B/ MS8608A/MS8609A and the controller.

If the controller controls and synchronizes with one or more devices, after all the commands specified for MS2681A/MS2683A/MS2687A/MS2687B/ MS8608A/MS8609A have been processed, the next commands must be sent to other devices.

There are two ways of synchronizing MS2681A/MS2683A/MS2687A/ MS2687B/MS8608A/MS8609A with the controller:

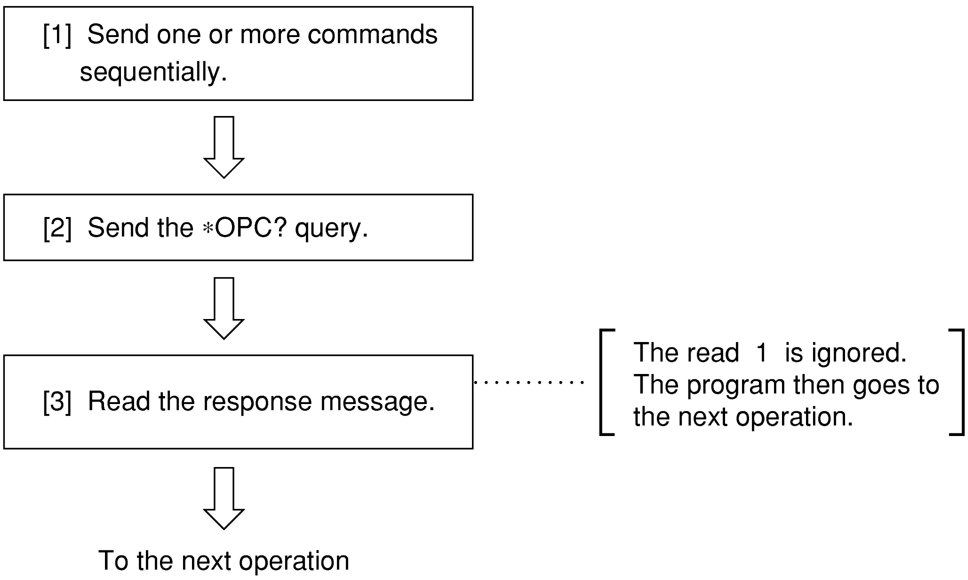
[1] Wait for a response after the ∗OPC? query is sent.

[2] Wait for SRQ after ∗OPC is sent.

4.6.1 Wait for a response after the ∗OPC? query is sent.

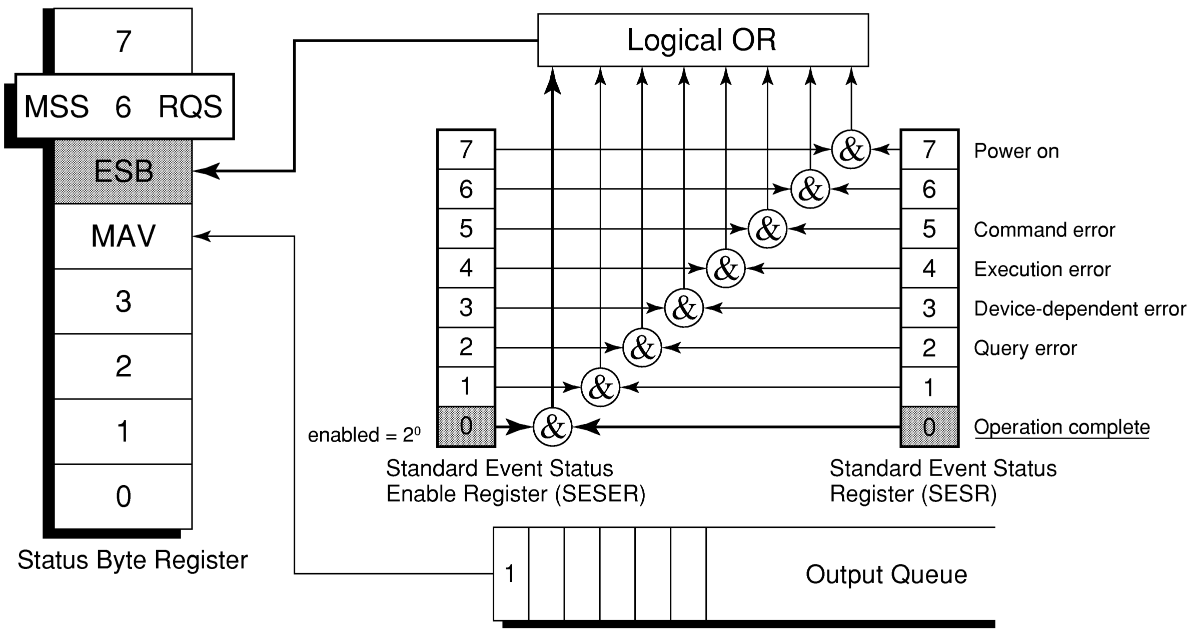
MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A outputs “1” as the response message when executing the ∗OPC? query command. The controller is synchronized with MS2681A/MS2683A/MS2687A/MS2687B/ MS8608A/MS8609A by waiting for the response message to be entered.

< Controller program >



4.6.2 Wait for a service request after ∗OPC is sent (only when the GPIB interface bus is used).

The MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A sets the operation-complete bit (bit 0) to 1 when executing the ∗OPC command. The controller is synchronized with the Spectrum Analyzer for SRQ when the operation-complete bit is set for SRQ.



■ < Controller program >

[1] Enable the 2^0 bit of the Standard Event Status Enable Register. `PRINT @1;"*ESE 1"`

⇩

[2] Enable the 2^5 bit of the Service Request Enable Register. `PRINT @1;"*SRE 32"`

⇩

[3] Make the device execute the specified operation.

⇩

[4] Send the ∗OPC command. `PRINT @1;"*OPC"`

⇩

[5] Wait for the SRQ interrupt (ESB summary message). ···Value of status byte: $2^6 + 2^5 = 96$

Section 5 Initial Settings

The MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A initializes the GPIB interface system at three levels in accordance with the IEEE488.2 specifications. This section describes how these three levels of initialization are processed, and how to instruct initialization from the controller.

In the IEEE488.2 standard, there are three levels of initialization. The first level is "bus initialization," the second level is "initialization for message exchange," and the third level is "device initialization." This standard also stipulates that a device must be set to a known state when the power is turned on.

Level	Initialization type	Description	Level combination and sequence
1	Bus initialization	The IFC message from the controller initializes all interface functions connected to the bus.	Level 1 can be combined with other levels, but must be executed before level 2.
2	Initialization for message exchange	Message exchanges of all devices and specified devices on the GP-IB are initialized using the SDC and DCL GP-IB bus commands, respectively. These commands also nullify the function that reports operation completion to the controller.	Level 2 can be combined with other levels, but must be executed before level 3.
3	Device initialization	The *RST or INI/IP command returns a specified device to a known device-specific state, regardless of the conditions under which it was being used.	Level 3 can be combined with other levels, but must be executed after levels 1 and 2.

When using the RS-232C (standard)/Ethernet (Option) interface port to control the MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A from the controller, the level-3 device initialization function of can be used, and the level-2 initialization function cannot be used. When using the GPIB (Standard) interface bus to control the MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A from the controller, the initialization functions of levels 1, 2, and 3 can be used.

The following paragraph describes the commands for initialization at levels 1, 2, and 3 and the items that are initialized. This paragraph also describes the known state that is set when the power is turned on.

5.1 Bus Initialization Using the IFC Statement

■ Example

```
board% = 0
CALL SendIFC (board%)
```

■ Explanation

This function can be using when using the GPIB interface bus is used to control the spectrum analyzer function from the controller.

The IFC statement initializes the interface functions of all devices connected to the GPIB bus line.

The initialization of interface functions involves clearing the interface function states of devices set by the controller, and resetting them to their initial states. In the table below, ○ indicates the functions that are initialized, and △ indicates the functions that are partially initialized.

No	Function	Symbol	Initialization by IFC
1	Source handshake	SH	○
2	Acceptor handshake	AH	○
3	Talker or extended talker	T or TE	○
4	Listener or extended listener	L or LT	○
5	Service request	SR	△
6	Remote/local	RL	
7	Parallel poll	PP	
8	Device clear	DC	
9	Device trigger	DT	
10	Controller	C	○

Bus initialization by the IFC statement does not affect the device operating state (frequency settings, LED on/off, etc.).

5.2 Initialization for Message Exchange by DCL and SDC Bus Commands

■ Example

Initializes all devices on the bus for message exchange (sending DCL).

```
board% = 0
addresslist% = NOADDR
CALL DevClearList(board%, addresslist%)
```

Initializes only the device at address 3 for message exchange (sending SDC).

```
board% = 0
address% = 3
CALL DevClear (board%, address%)
```

■ Explanation

This function is available when the GPIB interface is used to control the Spectrum Analyzer from the controller.

This statement executes initialization for message exchange of all devices or a specified device on the GPIB having the specified select code.

■ Items to be initialized for message exchange

When the Spectrum Analyzer accepts the DCL or SDC bus command, it does the following:

[1]	Input buffer and Output Queue:	Clears them and also clears the MAV bit.
[2]	Parser, Execution Controller, and Response Formatter:	Resets them.
[3]	Device commands including *RST:	Clears all commands that prevent these commands from being executed.
[4]	Processing of the *OPC command:	Puts a device in OCIS (Operation Complete Command Idle State). As a result, the operation complete bit cannot be set in the Standard Event Status Register.
[5]	Processing of the *OPC? query:	Puts a device in OQIS (Operation Complete Query Idle State). As a result, the operation complete bit 1 cannot be set in the Output Queue.
[6]	Device functions:	Puts all functions associated with message exchange in the idle state. The device continues to wait for a messagefrom the controller.

CAUTION ⚠

The following are not affected even if the DCL and SDC commands are processed.

[1] Current data set or stored in the device
[2] Front panel settings
[3] Status of status byte other than MAV bit
[4] A device operation in progress

5.3 Device Initialization Using the ∗RST Command

■ Syntax

```
∗RST
```

■ Example

For RS-232C/Ethernet

`WRITE #1," *RST"` ....Initializes the spectrum analyzer function at address 1 at level 3.

For GPIB

```
SPA%=1
CALL Send(0,SPA," *RST",NLend)
```

■ Explanation

The ∗RST (Reset) command is an IEEE488.2 common command that resets a device at level 3.

The ∗RST (Reset) command is used to reset a device (spectrum analyzer function) to a specific initial state.

Note:

The ∗RST command does not affect the following.

[1] IEEE488.1 interface state

[2] Device address

[3] Output Queue

[4] Service Request Enable register

[5] Standard Event Status Enable register

[6] Power-on-status-clear flag setting

[7] Calibration data affecting device specifications

[8] Parameters preset for control of external device, etc.

5.4 Device Initialization Using the INI/IP Command

■ Syntax

```
INI
IP
```

■ Example (program message)

For RS-232C/Ethernet

```
WRITE #1,"INI"
```
.... Initializes the device (spectrum analyzer function) at address 1 at level 3.

For GPIB

```
SPA%=1
CALL Send(0,SPA%,"INI",NLend)
```

■ Explanation

The INI and IP commands are the analyzer device-dependent messages that initialize a device at level 3.

For the spectrum analyzer function, the measurement control parameters to be initialized for the spectrum analyzer function are initialized by sending this command.

5.5 Device Status at Power-on

When the power is turned on:

[1] The device is set to the status it was in at power-off.

[2] The Input Buffer and Output Queue are cleared.

[3] The Parser, Execution Controller, and Response Formatter are initialized.

[4] The device is put into OCIS (Operation Complete Command Idle State).

[5] The device is put into OQIS (Operation Complete Query Idle State).

[6] The Standard Event Status and Standard Event Status Enable Registers are cleared. Events can be recorded after the registers have been cleared.

Section 6 Command List

This section lists the external control commands to be used by MX268130A/330A/730A/MX860830A/930A wireless LAN Measurement Software.

This list of commands is described for each measurement screen of the MS2681A/MS2683A/MS2687A/MS2687B/MS8608A/MS8609A.

Refer to Section 7 “Detailed Explanations of Commands,” for more information on each command.

6.1 List of Commands on Each Measurement Screen

The following pages show a list of commands (device messages) for each item on the wireless LAN Measurement Software measurement screen.

■ Meanings of device message character strings

(a) Uppercase character: Reserved word

(b) Numeric value: Reserved word (Numerical code)

(c) Lowercase character: Parameter (Argument)

Parameter	Meaning	Value/Form	Unit/Suffix code
f	frequency	Real or integer number with a decimal point	GHZ, MHZ, KHZ, HZ, GZ, MZ, KZ, When omitted: HZ
t	time	Real or integer number with a decimal point	S, SC, MS, US, None : MS
l	level	Real or integer number with a decimal point	DB, DBM, DM, DBMV, DBUV, DBUVE, V, MV, UV, W, MW, UW, NW, When omitted : (default unit)
n	Integer number with no unit, or integer number with a specified unit	Decimal integer	None or specified
o	Integer number with no unit	Octal integer	None
h	Integer number with no unit	Hexadecimal integer	None
r	Integer number with no unit, or integer number with a specified unit	Real number	None or specified
j	Numeric value judgement	PASS (Passable)/ FAIL (Outside the specified range)	None
s	Binary judgement	ON/OFF	None
u	Unit specification	DB, DBM, DM, DBMV, DBUV, DBUVE, V, MV, UV, W, MW, UW, NW	None

6.2 Commands Commonly Used on All Measurement Screens

This section lists the commands used on all the measurement screens for wireless LAN Measurement software.

For more information on external control commands commonly used in all the measurement modes for the MS2681A/MS2683A/MS2687A/MS2687B/ MS8608A/MS8609A, refer to MS2681A/MS2683A/MS2687A/MS2687B Spectrum Analyzer Operation Manual or MS8608A/MS8609A Digital Mobile Radio Transmitter Tester Operation Manual.

Measurement mode switching

Function	Item	Program Message	Query Message	Response Message	Remarks
Spectrum Analyzer		PNLMD SPECT	PNLMD?	SPECT	
Signal Analysis		PNLMD SYSTEM	PNLMD?	SYSTEM	
Config		PNLMD CONFIG	PNLMD?	CONFIG	

Measurement system switching

Function	Item	Program Message	Query Message	Response Message	Remarks
System - 1 (F1)		SYS 1	SYS?	1	
System - 2 (F2)		SYS 2	SYS?	2	
System - 3 (F3)		SYS 3	SYS?	3	

Output data format

Function	Item	Program Message	Query Message	Response Message	Remarks
Binary code		BIN ON	BIN?	ON	
		BIN 1	BIN?	ON	
ASCII character string		BIN OFF	BIN?	OFF	
		BIN 0	BIN?	OFF	

Initialization

Function	Item	Program Message	Query Message	Response Message	Remarks
Preset		PRE	—	—	
		INI	—	—	
		IP	—	—	

Measurement screen switching

Function	Item	Program Message	Query Message	Response Message	Remarks
Setup Common Parameter		DSPL SETCOM	DSPL?	SETCOM	
Modulation Analysis		DSPL MODANAL	DSPL?	MODANAL	
RF Power		DSPL RFPWR	DSPL?	RFPWR	
Occupied Bandwidth		DSPL OBW	DSPL?	OBW	
Adjacent Channel Power	SPECT1	DSPL ADJ,SPECT1	DSPL?	ADJ,SPECT1	
	SPECT2	DSPL ADJ,SPECT2	DSPL?	ADJ,SPECT2	
Spectrum Mask	Mask	DSPL SMASK	DSPL?	SMASK	
	Set Template	DSPL SETTEMP_SMASK	DSPL?	SETTEMP_SMASK	
Spurious Emissions	Spot	DSPL SPURIOUS,SPOT	DSPL?	SPURIOUS,SPOT	
	Search	DSPL SPURIOUS,SEARCH	DSPL?	SPURIOUS,SEARCH	
	Sweep	DSPL SPURIOUS,SWEEP	DSPL?	SPURIOUS,SWEEP	
Setup Table	Spot	DSPL SETTBL_SPU,SPOT	DSPL?	SETTBL_SPU,SPOT	
	Sweep	DSPL SETTBL_SPU,SWEEP	DSPL?	SETTBL_SPU,SWEEP	
CCDF	CCDF	DSPL CCDF,CCDF	DSPL?	CCDF,CCDF	
	APD	DSPL CCDF,APD	DSPL?	CCDF,APD	
Symbol Rate Error		DSPL SRERR	DSPL?	SRERR	
Chip Clock Error		DSPL CCERR	DSPL?	CCERR	
IQ Level		DSPL IQLVL	DSPL?	IQLVL	
Power Meter		DSPL PWRMTR	DSPL?	PWRMTR	
Batch Measurement	Batch	DSPL BATCH	DSPL?	BATCH	
	Setup Table	DSPL SETTBL_BCH	DSPL?	SETTBL_BCH	
Back Screen		BS	---	---	

Measurement error reading

Function	Item	Program Message	Query Message	Response Message	Remarks
Normal		—	MSTAT?	0	
RF Level Limit		—	MSTAT?	1	
Level Over		—	MSTAT?	2	
Level Under		—	MSTAT?	3	
Signal Abnormal		—	MSTAT?	4	
No Synchronization		—	MSTAT?	5	
Trigger Timeout		—	MSTAT?	6	
No Measure		—	MSTAT?	9	
Un-detection of preamble		—	MSTAT?	10	

Measurement start

Function	Item	Program Message	Query Message	Response Message	Remarks
Single	No Sync	SNGLS	—	—	
		S2	—	—	
	Sync	SWP	—	—	
		TS	—	—	
Continuous	No Sync	CONTS	—	—	
		S1	—	—	
Measurement status	END	—	SWP?	SWP 0	
	Measuring	—	SWP?	SWP 1	

Measurement screen switching + Measurement starting

Function	Item	Program Message	Query Message	Response Message	Remarks
Setup Common Parameter		MEAS SETCOM	MEAS?	SETCOM	
Modulation Analysis		MEAS MODANAL	MEAS?	MODANAL	
RF Power		MEAS RFPWR	MEAS?	RFPWR	
Occupied Bandwidth		MEAS OBW	MEAS?	OBW	
Adjacent Channel Power	SPECT1	MEAS ADJ,SPECT1	MEAS?	ADJ,SPECT1	
	SPECT2	MEAS ADJ,SPECT2	MEAS?	ADJ,SPECT2	
Spectrum Mask		MEAS SMASK	MEAS?	SMASK	
Spurious Emissions	Spot	MEAS SPURIOUS,SPOT	MEAS?	SPURIOUS,SPOT	
	Search	MEAS SPURIOUS,SEARCH	MEAS?	SPURIOUS,SEARCH	
	Sweep	MEAS SPURIOUS,SWEEP	MEAS?	SPURIOUS,SWEEP	
Setup Table	Spot	MEAS SETTBL_SPU,SPOT	MEAS?	SETTBL_SPU,SPOT	
	Sweep	MEAS SETTBL_SPU,SWEEP	MEAS?	SETTBL_SPU,SWEEP	
CCDF	CCDF	MEAS CCDF,CCDF	MEAS?	CCDF,CCDF	
	APD	MEAS CCDF,APD	MEAS?	CCDF,APD	
Symbol Rate Error		MEAS SRERR	MEAS?	SRERR	
Chip Clock Error		MEAS CCERR	MEAS?	CCERR	
IQ Level		MEAS IQLVL	MEAS?	IQLVL	
Power Meter		MEAS PWRMTR	MEAS?	PWRMTR	
Back Screen		BS	---	---	
Switch Connector	RF Input: High	RFINPUT HIGH	RFINPUT?	HIGH	For Main body MS8608A
	RF Input: Low	RFINPUT LOW		LOW	

Pre Ampl (Option 08)

Function	Item	Program Message	Query Message	Response Message	Remarks
On		PREAMP ON	PREAMP?	ON	
Off		PREAMP OFF	PREAMP?	OFF	

Correction

Function	Item	Program Message	Query Message	Response Message	Remarks
Off		CORR 0	CORR?	0	
Table 1		CORR 1	CORR?	1	
Table 2		CORR 2	CORR?	2	
Table 3		CORR 3	CORR?	3	
Table 4		CORR 4	CORR?	4	
Table 5		CORR 5	CORR?	5	

6.3 Setup Common Parameter

The list below shows the correspondence between the external control commands and the setting items on the Setup Common Parameter screen.

Correction

Function	Item	Program Message	Query Message	Response Message	Remarks
Terminal	RF	TERM RF	TERM?	RE	
	IQ-DC	TERM IQDC	TERM?	IQDC	
	IQ-AC	TERM IQAC	TERM?	IQAC	
	IQ-Balance	TERM IQBAL	TERM?	IQBAL	
Impedance	50 Ω	IQINZ 50	IQINZ?	50	
	1 MΩ	IQINZ 1M	IQINZ?	1M	
Reference Level		RFLVL l	RFLVL?	l	l: (MS2681A/MS2683A) Pre ampl: On (−46 + offset) to (26 + offset) dBm Pre ampl: Off (−26 + offset) to (26 + offset) dBm (MS2687A/MS2687B) (−26 + offset) to (24 + offset) dBm (MS8608A) High Power Input Pre ampl: On (−26 + offset) to (38 + offset) dBm Pre ampl: Off (−6 + offset) to (38 + offset) dBm Low Power Input Pre ampl: On (−46 + offset) to (18 + offset) dBm Pre ampl: Off (−26 + offset) to (18 + offset) dBm (MS8609A) Pre ampl: On (−46 + offset) to (18 + offset) dBm Pre ampl: Off (−26 + offset) to (18 + offset) dBm
Reference Level Offset		RFLVLOFS l	RFLVLOFS?	l	1: −99.99 to +99.99 dB
Carrier Frequency		FREQ f	FREQ?	f	f: (MS2681A) 100 MHz to 3.0 GHz (MS2683A/MS2687A/MS2687B/MS8608A/MS8609A) 100 MHz to 6.0 GHz

Setup Common Parameter (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Target System	IEEE802.11a	TGTSY 11A	TGTSY?	11A	
	HiperLAN2	TGTSY HLAN2	TGTSY?	HLAN2	
	HiSWANa	TGTSY HISWAN	TGTSY?	HISWAN	
	IEEE802.11b	TGTSY 11B	TGTSY?	11B	
	IEEE802.11g (ERP-DSSS/CCK)	TGTSY 11G_CCK	TGTSY?	11G_CCK	
	IEEE802.11g (ERP-OFDM)	TGTSY 11G_EOFDM	TGTSY	11G_EOFDM	
	IEEE802.11g (DSSS-OFDM)	TGTSY 11G_DOFDM	TGTSY	11G_DOFDM	
Measuring Object	Burst	MEASOBJ BURST	MEASOBJ?	BURST	
	BC_Burst	MEASOBJ BC_BURST	MEASOBJ?	BC_BURST	*1
	DL_Burst	MEASOBJ DL_BURST	MEASOBJ?	DL_BURST	*1
	UL_Burst	MEASOBJ UL_BURST	MEASOBJ?	UL_BURST	*1
	Burst(All)	MEASOBJ ALL_BURST	MEASOBJ?	ALL_BURST	*1
	Continuous	MEASOBJ CONT	MEASOBJ?	CONT	
Data Rate		DATRATE r	DATRATE?	r	r: (IEEE802.11a, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)) 6, 9, 12, 18, 24, 36, 48, 54, AUTO (HiperLAN2) 6, 9, 12, 18, 27, 36, 54 (HiSWANa) 6, 9, 12, 18, 27, 36, 54,AUTO (IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)) 1, 2, 5.5, 11, AUTO
Modulation	OFDM-BPSK	MODTYPE OFBPSK	MODTYPE?	OFBPSK	
	OFDM-QPSK	MODTYPE OFQPSK	MODTYPE?	OFQPSK	
	OFDM-16QAM	MODTYPE OF16QAM	MODTYPE?	OF16QAM	
	OFDM-64QAM	MODTYPE OF64QAM	MODTYPE?	OF64QAM	
	DBPSK	MODTYPE DBPSK	MODTYPE?	DBPSK	
	DQPSK	MODTYPE DQPSK	MODTYPE?	DQPSK	
	CCK 5.5Mbps	MODTYPE CCK5_5M	MODTYPE?	CCK5_5M	
	CCK 11Mbps	MODTYPE CCK11M	MODTYPE?	CCK11M	
Filter	Off	FILTER OFF	FILTER?	OFF	
	Rectangular	FILTER RECT	FILTER?	RECT	
	Gaussian	FILTER GAUSS	FILTER?	GAUSS	
	Root Raised Cosine	FILTER RRC	FILTER?	RRC	

Setup Common Parameter (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
BT		GAUSSBT r	GAUSSBT?	r	r: 0.3 to 1.0
α		ROLLOFF r	ROLLOFF?	r	r: 0.30 to 1.00
Trigger	Free Run	TRG FREE	TRG?	FREE	*
	External	TRG EXT	TRG?	EXT	*
	Wide IF	TRG WIDEIF	TRG?	WIDEIF	*
Trigger Edge	Rise	TRGEDGE RISE	TRGEDGE?	RISE	*
	Fall	TRGEDGE FALL	TRGEDGE?	FALL	*
Trigger Delay		TRGDLY t	TRGDLY?	t	* t: −1000.0 to +10000.0 usec
Trigger Level	High	TRGLVL HIGH	TRGLVL?	HIGH	*
	Middle	TRGLVL MIDDLE	TRGLVL?	MIDDLE	*
	Low	TRGLVL LOW	TRGLVL?	LOW	*

* Valid only for CCDF measurement.

*1 Valid only for HiSWANa

6.4 Modulation Analysis

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the Modulation Analysis screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Trace Format	No Trace	TRFORM NON	TRFORM?	NON	
	Constellation	TRFORM CONSTEL	TRFORM?	CONSTEL	
	Constellation(BPSK)	TRFORM CONSTEL_BPSK	TRFORM?	CONSTEL _BPSK	*3
	Constellation(QPSK)	TRFORM CONSTEL_QPSK	TRFORM?	CONSTEL _QPSK	*3
	Constellation(16QAM)	TRFORM CONSTEL_16QAM	TRFORM?	CONSTEL _16QAM	*3
	Constellation(64QAM)	TRFORM CONSTEL_64QAM	TRFORM?	CONSTEL _64QAM	*3
	Eye Diagram	TRFORM EYE	TRFORM?	EYE	*1
	EVM vs. Symbol	TRFORM EVMSYM	TRFORM?	EVMSYM	*2
	EVM vs. Chip	TRFORM EVMSYM	TRFORM?	EVMSYM	*1
	Phase Error vs. Chip	TRFORM PHASE	TRFORM?	PHASE	*1
	Phase Error vs. Symbol	TRFORM PHASE	TRFORM?	PHASE	*2
	EVM vs. Sub-carrier	TRFORM EVMSUB	TRFORM?	EVMSUB	*2
	EVM vs. Sub-carrier (BPSK)	TRFORM EVMSUB_BPSK	TRFORM?	EVMSUB _BPSK	*3
	EVM vs. Sub-carrier (QPSK)	TRFORM EVMSUB_QPSK	TRFORM?	EVMSUB _QPSK	*3
	EVM vs. Sub-carrier (16QAM)	TRFORM EVMSUB_16QAM	TRFORM?	EVMSUB _16QAM	*3
	EVM vs. Sub-carrier (64QAM)	TRFORM EVMSUB_64QAM	TRFORM?	EVMSUB _64QAM	*3
	EVM vs. Sub-carrier (TOTAL)	TRFORM EVMSUB_TOTAL	TRFORM?	EVMSUB _TOTAL	*3
	Spectrum Flatness	TRFORM SPFLAT	TRFORM?	SPFLAT	*2
View Selection	All	CONSTVIEW ALL	CONSTVIEW?	ALL	*2
	First Symbol	CONSTVIEW FIRST	CONSTVIEW?	FIRST	*2
	Last Symbol	CONSTVIEW LAST	CONSTVIEW?	LAST	*2
	Pilot only	CONSTVIEW PILOT	CONSTVIEW?	PILOT	*2
	One Sub-carrier	CONSTVIEW ONE n	CONSTVIEW? ONE	n	*2 n: −26 to −1, 1 to 26
	Outside Pair	CONSTVIEW OUT	CONSTVIEW?	OUT	*2
Flatness Measurement		FLATMEAS ON	FLATMEAS?	ON	
		FLATMEAS OFF	FLATMEAS?	OFF	

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Storage Mode	Normal	STRG_MOD NRM	STRG_MOD?	NRM	
	Average	STRG_MOD AVG	STRG_MOD?	AVG	
	Overwrite	STRG_MOD OVER	STRG_MOD?	OVER	
Average Count		AVR_MOD n	AVR_MOD?	n	n:2 to 999
Refresh Interval	Every	INTVAL_MOD EVERY	INTVAL_MOD?	EVERY	
	Once	INTVAL_MOD ONCE	INTVAL_MOD?	ONCE	
Analysis Length		ANLYLEN n	ANLYLEN?	n	n: (IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)) 1 to 1367 (IEEE802.11b, IEEE802.11g (ERP-DSSS/ CCK)) 256 to 4096
Analysis Start		ANLYSTART n	ANLYSTART?	n	*3
EVM Threshold	OFF	EVM_THRES OFF	EVM_THRES?	OFF	*3
	ON	EVM_THRES ON	EVM_THRES?	ON	
Threshold Level		THREHOLD n	THREHOLD?	n	*3 n:5～20
Error Scale	5%	ERRSC 5	ERRSC?	5	
	10%	ERRSC 10	ERRSC?	10	
	20%	ERRSC 20	ERRSC?	20	
	35%	ERRSC 35	ERRSC?	35	
	OFF	ERRSC OFF	ERRSC?	OFF	

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, HiSWANa, HiperLAN2, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

*3: HiSWANa

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Vertical Scale	5 [%, deg, dB]	VSCALE 5	VSCALE?	5	
	10 [%, deg, dB]	VSCALE 10	VSCALE?	10	
	20 [%, deg, dB]	VSCALE 20	VSCALE?	20	
	50 [%, deg, dB]	VSCALE 50	VSCALE?	50	
	100 [%, deg, dB]	VSCALE 100	VSCALE?	100	
Adjust Range		ADJRNG	—	—	
Calibration	Level Calibration	LVLCAL	—	—	
	Pre-selector Tuning	PSLTUNE	—	—	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
	Calibration Status	—	CALSTAT? LVL	n1, n2, n3, n4, n5, n6, n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
		—	CALSTAT? PSL CALSTAT? PWR	n1, n2, n3, n4, n5, n6, n7, n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)
Marker Mode	Normal	MKR_MOD NRM	MKR_MOD?	NRM	
	Off	MKR_MOD OFF	MKR_MOD?	OFF	
Marker Position		MKP_MOD SYM,n	MKP_MOD? SYM	n	*2 n: 1 to 1367
		MKP_MOD SUB,n	MKP_MOD? SUB	n	*2 n: −26 to −1, 1 to 26
		MKP_MOD n1,n2	MKP_MOD?	n1,n2	*2 n1: 1 to 1367 n2: −26 to −1, 1 to 26
		MKP_MOD n	MKP_MOD?	n	*1 n: 0 to 4095
Marker Level	Constellation Eye Diagram	—	MKL_MOD? I	r	
		—	MKL_MOD? Q	r	
	Other than Constellation Eye Diagram	—	MKL_MOD?	r	
Marker Symbol		—	MKSSYM?	r	
		—	MKSSYM? SYM	r	*2
		—	MKSSYM? SUB	r	*2
Measure Result	Carrier Frequency	—	CARRF?	f	Hz
	Carrier Frequency Error	—	CARRFERR?	f	
		—	CARRFERR? HZ	f	Hz
		—	CARRFERR? PPM	r	ppm
	RMS EVM	—	VECTERR?	r	%
		—	VECTERR? DB	r	dB
	EVM (View Selection)	—	VECTERR? VIEW	r	*2 %
	Peak EVM	—	PVECTERR?	r	%
	Phase Error	—	PHASEERR?	r	degree
	Magnitude Error	—	MAGTDERR?	r	*1 %
	Origin Offset	—	ORGOFS?	r	*1 dB
	Modulation Type	—	RSLTMODTYPE?	a	
	Signal Length	—	RSLTANALYLEN?	n	

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Measure Result	The Latest Bursts	—	NUMSYM_BST? a		*3
	Total	—	NUMSYM_TOTAL? a		*3
	Number of Measured Burst	—	NUMBST? a		*3
	Carrier Leak	—	CARRLK?	r	*2 dB
	PHY Burst	—	PHY_BURST?	phy	*3 BC,DL,UL_Burst
	Flatness (Outside)	—	FLATOUT?	r1.n1,r2,n2	
	Flatness (Inside)	—	FLATIN?	r1.n1,r2,n2	

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, HiSWANa, HiperLAN2, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

*3: HiSWANa

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Wave Data	I Phase Data (Constellation)	—	ICONST? na,nb	nc(1),nc(2),....,nc(nb)	na: 0 to 71083 (Data reading address) nb: 1 to 71084 (reading point number) nc: −32767 to +32767 (reading data ideal signal "1" = 1000)
	Q Phase Data (Constellation)	—	QCONST? na,nb	nc(1),nc(2),....,nc(nb)	na: 0 to 71083 (Data reading address) nb: 1 to 71084 (reading point number) nc: −32767 to +32767 (reading data ideal signal "1" = 1000)
	I Phase Data (Eye Diagram)	—	ICONST? EYE,na,nb	nc(1),nc(2),….,nc(nb)	*1 na: 0 to 71083 (Data reading address) nb: 1 to 71084 (Reading point number) nc: −32767 to +32767 (Reading data ideal signal "1" =1000)
	Q Phase Data (Eye Diagram)	—	QCONST? EYE,na,nb	nc(1),nc(2),….,nc(nb)	*1 na: 0 to 71083 (Data reading address) nb: 1 to 71084 (Reading point number) nc: −32767 to +32767 (Reading data ideal signal "1" = 1000)
	Phase vs. Chip	—	PHSYM? na,nb	nc(1),nc(2),….,nc(nb)	*1 na: 1 to 1367 (Data reading address) nb: 1 to 1367 (Reading point number) nc: −32767 to +32767 (Reading data ideal signal "1" = 100)
	EVM vs. Chip	—	EVMSYM? na,nb	nc(1),nc(2),….,nc(nb)	*1 na: 1 to 1367 (Data reading address) nb: 1 to 1367 (Reading point number) nc: 0 to 32767 (Reading data ideal signal "1" = 100)

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, HiSWANa, HiperLAN2, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

Modulation Analysis (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Wave Data	EVM vs. Symbol	—	EVMSYM? na,nb	nc(1),nc(2),....,nc(nb)	*2 na: 0 to 4095 (Reading start-symbol) nb: 1 to 4096 (Reading point number) nc: 0 to 32768 (Reading data 1% = 100)
	EVM vs. Sub-carrier	—	EVMSUB? na,nb	nc(1),nc(2),....,nc(nb)	*2 na: 0 to 51 (Data reading address) nb: 1 to 52 (Reading point number) nc: 0 to 32768 (Reading data 1% = 100)
	Phase Error vs. Symbol	—	PHSYM? na,nb	nc(1),nc(2),....,nc(nb)	*2 na: 0 to 4095 (Reading start-symbol) nb: 1 to 4096 (Reading point number) nc: −32767 to +32767 (Reading data 1 deg. = 100)
	Spectrum Flatness	—	SPFLAT? na, nb	nc(1),nc(2),....,nc(nb)	*2 na: 0 to 51 (Reading start address) nb: 1 to 52 (Reading point number) nc: −32767 to +32767 (Reading data 1 dB=100)

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, HiSWANa, HiperLAN2, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

6.5 RF Power

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the RF Power screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Trace Format	Slot	TRFORM_RFPWR SLOT	TRFORM_RFPWR?	SLOT	
	Transient	TRFORM_RFPWR TRNSNT	TRFORM_RFPWR?	TRNSNT	
Display Ref. Level	Max	DISP_REFLVL MAX	DISP_REFLVL?	MAX	
	Average	DISP_REFLVL AVE	DISP_REFLVL?	AVE	
Transient Time Scale		TRANSSCALE n	TRANSSCALE?	N	n: 8 to 40
Transient Ref.Power		TRANSREFPWR TOTAL	TRANSREFPWR?	TOTAL	
		TRANSREFPWR RAMP	TRANSREFPWR?	RAMP	
Smoothing Filter	On	SMOFLT ON	SMOFLT?	ON	
	Off	SMOFLT OFF	SMOFLT?	OFF	
Storage Mode	Normal	STRG_RFPWR NRM	STRG_RFPWR?	NRM	
	Average	STRG_RFPWR AVG	STRG_RFPWR?	AVG	
	Overwrite	STRG_RFPWR OVER	STRG_RFPWR?	OVER	
Average Count		AVR_RFPWR n	AVR_RFPWR?	n	n: 2 to 999
Refresh Interval	Every	INTVAL_RFPWR EVERY	INTVAL_RFPWR?	EVERY	
	Once	INTVAL_RFPWR ONCE	INTVAL_RFPWR?	ONCE	
Analysis Length		ANLYLEN_RFPWR n	ANLYLEN_ RFPWR?	n	n: 1 to 1367 (IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM)) 1 to 1300 (IEEE802.11g (DSSS-OFDM)) 256 to 4096 (IEEE802.11b, IEEE802.11g (ERP- DSSS/CCK))
Ramp-down Detection	On	RMPDET ON	RMPDET?	ON	
	Off	RMPDET OFF	RMPDET?	OFF	
Preamble Search	On	PRMBL_SRCH ON	PRMBL_SRCH?	ON	
	Off	PRMBL_SRCH OFF	PRMBL_SRCH?	OFF	
Detection Level		BRST_DETLVL r	BRST_DETLVL?	r	r: −20 to 0

RF Power (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Detection Offset		BRST_DETOFFSET t	BRST_ DETOFFSET?	t	t: −2 to +2
Unit	dB	UNIT_RFPWR DB	UNIT_RFPWR?	DB	
	dBm	UNIT_RFPWR DBM	UNIT_RFPWR?	DBM	
	%	UNIT_RFPWR PC	UNIT_RFPWR?	PC	
Adjust Range		ADJRNG	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3, n4,n5,n6, n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3, n4,n5,n6, n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)
Marker Mode	Normal	MKR_RFPWR NRM	MKR_RFPWR?	NRM	
	Off	MKR_RFPWR OFF	MKR_RFPWR?	OFF	

RF Power (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Marker Position		MKP_RFPWR n	MKP_RFPWR?	n	n: −20 to (signal length + 20) μsec [Trace Format: Slot] −4 to +4, (signal length–4) [Trace Format: Transient]
Marker Level		---	MKL_RFPWR?	l	
Measure Result	TX Power	---	TXPWR?	l, u	
	Maximum Power	---	MAXPWR? DBM	l	dBm
		---	MAXPWR? WATT	l	W
		---	MAXPWR? DB	l	dB
		---	MAXPWR? PC	l	%
	Carrier Off Power	---	OFFPWR?	l1,l2	l1: dBm l2: W
	On/Off Ratio	---	RATIO?	l	dB
Transient Time		---	TRANSTIME?	t1,t2	t1: Ramp-on t2: Ramp-down
Wave Data	TX Power vs. Time	---	PWRTIME? na,nb	nc(1),nc(2), ...nc(nb)	na: 0 to 55279 (Data reading address) nb: 1 to 55280 (Reading point number) nc: −32767 to +32767 (Reading data ideal signal “1” = 100)

6.6 Occupied Bandwidth

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the Occupied Bandwidth screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Adjust Range		ADJRNG	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3,n4,n5,n6,n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3,n4,n5,n6,n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)

Occupied Bandwidth (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
TELEC Standard	Indoor Standard	TBLSTD_OBW STDIN	---	---	
	Outdoor Standard	TBLSTD_OBW STDOUT	---	---	
	Standard	TBLSTD_OBW STD	---	---	
Storage Mode	Normal	STRG_OBW NRM	STRG_OBW?	NRM	
	Average	STRG_OBW AVG	STRG_OBW?	AVG	
Average Count		AVR_OBW n	AVR_OBW?	n	n: 2 to 999
Refresh Interval	Every	INTVAL_OBW EVERY	INTVAL_OBW?	EVERY	
	Once	INTVAL_OBW ONCE	INTVAL_OBW?	ONCE	
ATT, Ref Level Mode	Auto	ATTRLMD_OBW AUTO	ATTRLMD_OBW?	AUTO	
	Manual	ATTRLMD_OBW MAN	ATTRLMD_OBW?	MAN	
Ref Level		RL_OBW l	RL_OBW?	l	l: −120 to +40 dBm (Pre ampl: Off) −140 to +20 dBm (Pre ampl: On)
Attenuator		ATT_OBW l	ATT_OBW?	l	l: 0 to 70 (MS2687A/MS2687B) 0 to 62 (other than above)
Attenuator Mode	Auto	ATTMD_OBW AUTO	ATTMD_OBW?	AUTO	
	Manual	ATTMD_OBW MAN	ATTMD_OBW?	MAN	
RBW		RBW_OBW f	RBW_OBW?	f	f: 300 Hz to 20 MHz (Normal) 10 Hz to 1 MHz (Digital)
RBW Type	Normal	RBD_OBW NRM	RBD_OBW?	NRM	
	Digital	RBD_OBW DGTL	RBD_OBW?	DGTL	
VBW		VBW_OBW f	VBW_OBW?	f	f: 0 (OFF) to 3000000 Hz
VBW Mode	Auto	VBM_OBW AUTO	VBM_OBW?	AUTO	
	Manual	VBM_OBW MAN	VBM_OBW?	MAN	
VBW/RBW Ratio		VBR_OBW r	VBR_OBW?	r	r: 0.0001 to 100
Sweep Time		SWT_OBW t	SWT_OBW?	t	t: 10 to 1000000 ms (setting) 1000 to 100000000 μs (response)
Sweep Time Mode	Auto	STM_OBW AUTO	STM_OBW?	AUTO	
	Manual	STM_OBW MAN	STM_OBW?	MAN	
Data Points	1001	DPTS_OBW 1001	DPTS_OBW?	1001	
	501	DPTS_OBW 501	DPTS_OBW?	501	

Occupied Bandwidth (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Detection	Positive Peak	DET_OBW POS	DET_OBW?	POS	
	Sample	DET_OBW SMP	DET_OBW?	SMP	
	Negative Peak	DET_OBW NEG	DET_OBW?	NEG	
	Average	DET_OBW AVG	DET_OBW?	AVG	
	RMS	DET_OBW RMS	DET_OBW?	RMS	Valid only when the Option04 is installed while RBW Mode is Digital.
Span		SPAN_OBW f	SPAN_OBW?	f	f: 20 to 200 MHz
Span	Span Width	---	FSPAN_OBW?	f	Hz
Occupied Bandwidth	OBW (99%)	---	OCCBW?	f	Hz
		---	OCCBW? 99	f	Hz
		---	OBW?	f	Hz
		---	OBW? 99	f	Hz
	OBW (90%)	---	OCCBW? 90	f	Hz
		---	OBW? 90	f	Hz
Upper Limit		---	OBWFREQ? UPPER	f	Hz
		---	OBWFREQ? +	f	Hz
Lower Limit		---	OBWFREQ? LOWER	f	Hz
		---	OBWFREQ? –	f	Hz
Center (Upper + Lower) / 2		---	OBWFREQ? CENTER	f	Hz
Wave Data	Spectrum	---	SPECT_OBW? na,nb	l1,l2,…., ln	na: 0 to 1000 (Data reading address, Data Point: 1001 0 to 500 (Data reading address, Data Point: 501) nb: 1 to 1001 (Reading point number, Data Point: 1001) 1 to 501 (Reading point number, Data Point: 501) ln: n-th frequency axis sweep waveform data (Reading data 1 dB=100)

6.7 Adjacent Channel Power

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the Adjacent Channel Power screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Adjust Range		ADJRNG	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3, n4,n5,n6, n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3, n4,n5,n6, n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)

Adjacent Channel Power (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Spectrum Mask	TELEC (Indoor)	TLCSTD_ADJ IN	TLCSTD_ADJ?	IN	
	TELEC (Outdoor)	TLCSTD_ADJ OUT	TLCSTD_ADJ?	OUT	
	Standard	TBLSTD_ADJ STD	---	---	
Storage Mode	Normal	STRG_ADJ NRM	STRG_ADJ?	NRM	
	Average	STRG_ADJ AVG	STRG_ADJ?	AVG	
Average Count		AVR_ADJ n	AVR_ADJ?	n	n: 2 to 999
Refresh Interval	Every	INTVAL_ADJ EVERY	INTVAL_ADJ?	EVERY	
	Once	INTVAL_ADJ ONCE	INTVAL_ADJ?	ONCE	
ATT, Ref Level Mode	Auto	ATTRLMD_ADJ AUTO	ATTRLMD_ADJ?	AUTO	
	Manual	ATTRLMD_ADJ MAN	ATTRLMD_ADJ?	MAN	
Ref Level		RL_ADJ l	RL_ADJ?	l	l: −120 to +40 dBm (Pre ampl: Off) −140 to +20 dBm (Pre ampl: On)
Attenuator		ATT_ADJ l	ATT_ADJ?	l	l: 0 to 70 (MS2687A/MS2687B) 0 to 62 (other than above)
Attenuator Mode	Auto	ATTMD_ADJ AUTO	ATTMD_ADJ?	AUTO	
	Manual	ATTMD_ADJ MAN	ATTMD_ADJ?	MAN	
RBW		RBW_ADJ f	RBW_ADJ?	f	f: 300 Hz to 20 MHz (Normal) 10 Hz to 1 MHz (Digital)
RBW Type	Normal	RBD_ADJ NRM	RBD_ADJ?	NRM	
	Digital	RBD_ADJ DGTL	RBD_ADJ?	DGTL	
VBW		VBW_ADJ f	VBW_ADJ?	f	f: 0 (OFF) to 3000000 Hz
VBW Mode	Auto	VBM_ADJ AUTO	VBM_ADJ?	AUTO	
	Manual	VBM_ADJ MAN	VBM_ADJ?	MAN	
VBW/RBW Ratio		VBR_ADJ r	VBR_ADJ?	r	r: 0.0001 to 100
Sweep Time		SWT_ADJ t	SWT_ADJ?	t	t: 10 to 1000000 ms (setting) 1000 to 100000000 μs (response)
Sweep Time Mode	Auto	STM_ADJ AUTO	STM_ADJ?	AUTO	
	Manual	STM_ADJ MAN	STM_ADJ?	MAN	
Data Points	1001	DPTS_ADJ 1001	DPTS_ADJ?	1001	
	501	DPTS_ADJ 501	DPTS_ADJ?	501	

Adjacent Channel Power (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Detection	Positive Peak	DET_ADJ POS	DET_ADJ?	POS	
	Sample	DET_ADJ SMP	DET_ADJ?	SMP	
	Negative Peak	DET_ADJ NEG	DET_ADJ?	NEG	
	Average	DET_ADJ AVG	DET_ADJ?	AVG	
	RMS	DET_ADJ RMS	DET_ADJ?	RMS	Valid only when the Option04 is installed while RBW Mode is Digital.
Unit	dBm	UNIT_ADJ DBM	UNIT_ADJ?	DBM	
	mW	UNIT_ADJ MW	UNIT_ADJ?	MW	
	uW	UNIT_ADJ UW	UNIT_ADJ?	UW	
	nW	UNIT_ADJ NW	UNIT_ADJ?	NW	
	dB	UNIT_ADJ DB	UNIT_ADJ?	DB	
Marker	Marker Mode	MKR_ADJ NRM	MKR_ADJ?	NRM	
		MKR_ADJ OFF	MKR_ADJ?	OFF	
	Marker Position	MKP_ADJ n	MKP_ADJ?	n	n: 45 to 455 (501) 90 to 910 (1001)
		MKRS_ADJ f	MKRS_ADJ?	f	f: −41 to +41 MHz
		MKN_ADJ f	MKN_ADJ?	f	f: −41 to +41 MHz
Adjacent Channel Power	Low2	---	ADJCH? LOW2	l	
		---	ADJCH? LOW2,u	l	
	Low1	---	ADJCH? LOW1	l	
		---	ADJCH? LOW1,u	l	
	Up1	---	ADJCH? UP1	l	
		---	ADJCH? UP1,u	l	
	Up2	---	ADJCH? UP2	l	
		---	ADJCH? UP2,u	l	
	Low2	---	CHPWR? LOW2	l	
		---	CHPWR? LOW2,u	l	
	Low1	---	CHPWR? LOW1	l	
		---	CHPWR? LOW1,u	l	
	Up1	---	CHPWR? UP1	l	
		---	CHPWR? UP1,u	l	
	Up2	---	CHPWR? UP2	l	
		---	CHPWR? UP2,u	l	
Marker Level	Spectrum	---	MKL_ADJ?	l	
		---	MKL_ADJ? u	l	

Adjacent Channel Power (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Wave Data	Spectrum (All)	---	SPECT_ADJALL? na,nb	l 1,l2…,ln	na: 0 to 1000 (Data reading address, Data Point: 1001 0 to 500 (Data reading address, Data Point: 501 nb: 1 to 1001 (Reading point number, Data Point: 1001) 1 to 501 (Reading point number, Data Point: 501) ln: n-th frequency axis sweep waveform data (Reading data 1 dB = 100)
	Spectrum (Separate)	---	SPECT_ADJSEP? na,nb	l 1,l2…,ln	na: 0 to 5004 (Data reading address, Data Point: 1001 0 to 2504 (Data reading address, Data Point: 501 nb: 1 to 5005 (Reading point number, Data Point: 1001) 1 to 2505 (Reading point number, Data Point: 501) ln: n-th frequency axis sweep waveform data (Reading data 1 dB = 100)
	Integral	---	INTEG_ADJ? na,nb	l 1,l2…,ln	na: 90 to 910 (Data reading address, Data Point: 1001 45 to 455 (Data reading address, Data Point: 501 nb: 1 to 821 (Reading point number, Data Point: 1001) 1 to 411 (Reading point number, Data Point: 501) ln: n-th frequency axis sweep waveform data (Reading data 1 dB = 100)

6.8 Spectrum Mask

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the Spectrum Mask screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Adjust Range		ADJRNG	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
Standard		TBLSTD_SMASK STD	---	---	
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3,n4,n5,n6,n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3,n4,n5,n6,n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)

Spectrum Mask (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Select Template	Standard	SLCTTEMP_SMASK STD	SLCTTEMP_SMASK?	STD	
	User	SLCTTEMP_SMASK USER	SLCTTEMP_SMASK?	USER	
Display Data Type	Level	DISPTYPE_SMASK LVL	DISPTYPE_SMASK?	LVL	
	Margin	DISPTYPE_SMASK MARGIN	DISPTYPE_SMASK?	MARGIN	
Storage Mode	Normal	STRG_SMASK NRM	STRG_SMASK?	NRM	
	Average	STRG_SMASK AVG	STRG_SMASK?	AVG	
Average Count		AVR_SMASK n	AVR_SMASK?	n	n: 2 to 999
Refresh Interval	Every	INTVAL_SMASK EVERY	INTVAL_SMASK?	EVERY	
	Once	INTVAL_SMASK ONCE	INTVAL_SMASK?	ONCE	
ATT, Ref Level Mode	Auto	ATTRLMD_SMASK AUTO	ATTRLMD_SMASK?	AUTO	
	Manual	ATTRLMD_SMASK MAN	ATTRLMD_SMASK?	MAN	
Ref Level		RL_SMASK l	RL_SMASK?	l	l: −120 to +40 dBm (Pre ampl: Off) −140 to +20 dBm (Pre ampl: On)
Attenuator		ATT_SMASK l	ATT_SMASK?	l	l: 0 to 70 (MS2687A/ MS2687B) 0 to 62 (other than above)
Attenuator Mode	Auto	ATTMD_SMASK AUTO	ATTMD_SMASK?		
	Manual	ATTMD_SMASK MAN	ATTMD_SMASK?		
RBW		RBW_SMASK f	RBW_SMASK?	f	f: 300 Hz to 20 MHz (Normal) 10 Hz to 1 MHz (Digital)
RBW Type	Normal	RBD_SMASK NRM	RBD_SMASK?		
	Digital	RBD_SMASK DGTL	RBD_SMASK?		
VBW		VBW_SMASK f	VBW_SMASK?	f	f: 0 (OFF) to 3000000 Hz
VBW Mode	Auto	VBM_SMASK AUTO	VBM_SMASK?		
	Manual	VBM_SMASK MAN	VBM_SMASK?		
VBW/RBW Ratio		VBR_SMASK r	VBR_SMASK?	r	r: 0.0001 to 100
Sweep Time		SWT_SMASK t	SWT_SMASK?	t	t: 10 to 1000000 ms (setting) 1000 to 100000000 μs (response)
Sweep Time Mode	Auto	STM_SMASK AUTO	STM_SMASK?	AUTO	
	Manual	STM_SMASK MAN	STM_SMASK?	MAN	

Spectrum Mask (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Detection	Positive Peak	DET_SMASK POS	DET_SMASK?	POS	
	Sample	DET_SMASK SMP	DET_SMASK?	SMP	
	Negative Peak	DET_SMASK NEG	DET_SMASK?	NEG	
	Average	DET_SMASK AVG	DET_SMASK?	AVG	
	RMS	DET_SMASK RMS	DET_SMASK?	RMS	Valid only when the Option04 is installed while RBW Mode is Digital.
Setup Template	Level at 30 MHz offset	TEMPLVL_SMASK 1,l	TEMPLVL_SMASK? 1	l	
	Level at 20 MHz offset	TEMPLVL_SMASK 2,l	TEMPLVL_SMASK? 2	l	
	Level at 11 MHz offset	TEMPLVL_SMASK 3,l	TEMPLVL_SMASK? 3	l	
	Line1	TEMPLVL_SMASK 1,l	TEMPLVL_SMASK? 1	l	
	Line2	TEMPLVL_SMASK 2,l	TEMPLVL_SMASK? 2	l	
Unit	dBm	UNIT_SMASK DBM	UNIT_SMASK?	DBM	
	mW	UNIT_SMASK MW	UNIT_SMASK?	MW	
	uW	UNIT_SMASK UW	UNIT_SMASK?	UW	
	nW	UNIT_SMASK NW	UNIT_SMASK?	NW	
	dB	UNIT_SMASK DB	UNIT_SMASK?	DB	
Peak Data	Peak Data	---	PEAK_SMASK? Ln,u	f,l,j	
			PEAK_SMASK? Un,u		
			PEAK_SMASK? PEAK,u		
			PEAK_SMASK? ALL,u	f1,l1,j1,f2, l2,j2, … f4, l4,j4	
Peak Level	Peak Level	---	PEAK_SMASK?	l	
Template	Template Judgement	---	TEMPPASS_SMASK?	j	
Marker Level	Spectrum	---	MKL_SMASK?	l	
			MKL_SMASK? u		
Marker Mode	Normal	MKR_SMASK NRM	MKR_SMASK?	NRM	
	Off	MKR_SMASK OFF	MKR_SMASK?	OFF	

Spectrum Mask (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Marker Position	Point	MKP_SMASK n	MKP_SMASK?	n	n: 0 to 1000
	Frequency	MKRS_SMASK f	MKRS_SMASK?	f	f: −30 to +30 MHz (IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)) −40 to +40 MHz (other than above)
	Frequency	MKN_SMASK f	MKN_SMASK?	f	f: −30 to +30 MHz (IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)) –40 to +40 MHz (other than above)
Wave Data	Spectrum	---	SPECT_SMASK? na,nb	l 1,l2…,ln	na: 0 to 1000 (Data reading address) nb: 1 to 1001 (Reading point number) ln: n-th waveform data (Reading data 1 dB = 100)

6.9 Spurious Emission

The list below shows the correspondence between the external control commands and the reading of the setting items and measured results on the Spurious Emission screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Adjust Range		ADJRNG	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3,n4, n5,n6,n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3,n4, n5,n6,n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]

Spurious Emission (continued.)

Function		Item	Program Message	Query Message	Response Message	Remarks
Calibration Value			CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)
Spurious Mode		Spot	DSPL SPURIOUS,SPOT	DSPL?	SPURIOUS, SPOT	
		Search	DSPL SPURIOUS, SEARCH		SPURIOUS, SEARCH	
		Sweep	DSPL SPURIOUS,SWEEP		SPURIOUS, SWEEP	
View Select		RBW,VBW, SWT (Search)	VIEW_SPU BWSWT	VIEW_SPU?	BWSWT	
		REF_LVL, ATT	VIEW_SPU REFATT		REFATT	
		Judgement	VIEW_SPU JDG		JDG	
		RBW, VBW, SWT (Meas)	VIEW_SPU LVLMS		LVLMS	
Waveform Display		Off	WAVEFORM_SPU OFF	WAVEFORM_ SPU?	OFF	
		On	WAVEFORM_SPU ON		ON	
Waveform Frq Tbl No			WAVETBLNO_SPU Fn	WAVETBLNO _SPU?	Fn	Fn: F1 to F15
Storage Mode		Normal	STRG_SPU NRM	STRG_SPU?	NRM	
		Average	STRG_SPU AVG		AVG	
Average Count			AVR_SPU n	AVR_SPU?	n	n: 2 to 999
Refresh Interval		Every	INTVAL_SPU EVERY	INTVAL_SPU?	EVERY	
		Once	INTVAL_SPU ONCE		ONCE	
Unit		dBm	UNIT_SPU DBM	UNIT_SPU?	DBM	
		dB	UNIT_SPU DB		DB	
		xW/MHz	UNIT_SPU W_MHZ		W_MHZ	
		xW	UNIT_SPU W		W	
Pre-selector		Normal	BAND 0	BAND?	0	
		Spurious	BAND 1		1	
Spot	Table	Frequency	TBLFREQ_SPU SPOT,Fn,f	TBLFREQ_ SPU? SPOT,Fn	f	F: 9 kHz to upper limit frequency of main unit
		Harmonics	TBLFREQ_SPU SPOT,HRM			
	RBW		TBLRBW_SPU SPOT,Fn,f	TBLRBW_SPU? SPOT,Fn	f	F: 300 Hz to 20 MHz

Spurious Emission (continued.)

Function		Item	Program Message	Query Message	Response Message	Remarks
Spot	RBW Mode	Auto	TBLRBWMD_SPU SPOT,AUTO	TBLRBWMD_SPU? SPOT	AUTO	
		Manual	TBLRBWMD_SPU SPOT,MAN		MAN	
	RBW Type	Normal	TBLRBWTP_SPU SPOT,NRM	TBLRBWTP_SPU? SPOT	NRM	
		Digital	TBLRBWTP_SPU SPOT,DGTL		DGTL	
	VBW		TBLVBW_SPU SPOT,Fn,f	TBLVBW_SPU? SPOT,Fn	f	F: 0 Hz to 3 MHz
	VBW Mode	Auto	TBLVBWMD_SPU SPOT,AUTO	TBLVBWMD_SPU? SPOT	AUTO	
		Manual	TBLVBWMD_SPU SPOT,MAN		MAN	
	VBW/RBW Ratio		TBLVBWRT_SPU SPOT,r	TBLVBWRT_SPU? SPOT	r	R: 0.0001 to 100
	Sweep Time		TBLSWT_SPU SPOT,Fn,t	TBLSWT_SPU? SPOT,Fn	t	T: 10 ms to 1000 s
	Sweep Time Mode	Auto	TBLSWTMD_SPU SPOT,AUTO	TBLSWTMD_SPU? SPOT	AUTO	
		Manual	TBLSWTMD_SPU SPOT,MAN		MAN	
	Ref Level		TBLRL_SPU SPOT,Fn,l	TBLRL_SPU? SPOT,Fn	l	L: −120 to +40 dBm
	Attenuator		TBLATT_SPU SPOT,Fn,l	TBLATT_SPU? SPOT,Fn	l	L: 0 to 70 dB (MS2687A/MS2687B) 0 to 62 dB (other than above)
	ATT & Rel Level Mode	Auto	TBLATTRLMD_SPU SPOT,AUTO	TBLATTRLMD_SPU? SPOT	AUTO	
		Manual	TBLATTRLMD_SPU SPOT,MAN		MAN	
	Attenuator Mode	Auto	TBLATTMD_SPU SPOT,AUTO	TBLATTMD_SPU? SPOT	AUTO	
		Manual	TBLATTMD_SPU SPOT,MAN		MAN	
	Detection	Positive Peak	DET_SPU SPOT,POS	DET_SPU? SPOT	POS	
		Sample	DET_SPU SPOT,SMP		SMP	
		Negative	DET_SPU SPOT,NEG		NEG	
		Average	DET_SPU SPOT,AVG		AVG	
		RMS	DET_SPU SPOT,RMS		RMS	

Spurious Emission (continued.)

<table>
<tr><th colspan="2">Function</th><th>Item</th><th>Program Message</th><th>Query Message</th><th>Response Message</th><th>Remarks</th></tr>
<tr><td rowspan="17">Spot</td><td rowspan="2">Limit</td><td>Absolute</td><td>SPULMT SPOT,Fn,l,ABS,u</td><td>SPULMT? SPOT,Fn,ABS,u</td><td>l</td><td>L: −100 to +100 dBm
0.001 to 999.999 xW/MHz</td></tr>
<tr><td>Relative</td><td>SPULMT SPOT, Fn,l,REL,DB</td><td>SPULMT? SPOT,Fn,REL,DB</td><td>l</td><td>Fn: F1 to F15</td></tr>
<tr><td rowspan="4">View Select</td><td>RBW,VBW,SWT</td><td>TBLVIEW_SPU SPOT,BWSWT</td><td rowspan="4">TBLVIEW_ SPU? SPOT</td><td>BWSWT</td><td></td></tr>
<tr><td>Ref_Level, Att</td><td>TBLVIEW_SPU SPOT,REFATT</td><td>REFATT</td><td></td></tr>
<tr><td>Limit (dB)</td><td>TBLVIEW_SPU SPOT,LMTDB</td><td>LMTDB</td><td></td></tr>
<tr><td>Limit (xW)</td><td>TBLVIEW_SPU SPOT,LMTW</td><td>LMTW</td><td></td></tr>
<tr><td rowspan="2">Judgement Unit</td><td>dB</td><td>JUDGUNIT_SPU DB</td><td rowspan="2">JUDGUNIT_ SPU?</td><td>DB</td><td></td></tr>
<tr><td>xW/MHz</td><td>JUDGUNIT_SPU W_MHZ</td><td>W_MHZ</td><td></td></tr>
<tr><td rowspan="5">Judgement</td><td rowspan="2">Absolute</td><td>JUDGUNIT_SPTBL ABS</td><td rowspan="5">JUDGUNIT_ SPTBL?</td><td rowspan="2">ABS</td><td></td></tr>
<tr><td>JUDGUNIT_SPTBL ON</td><td></td></tr>
<tr><td rowspan="2">Relative</td><td>JUDGUNIT_SPTBL REL</td><td rowspan="2">REL</td><td></td></tr>
<tr><td>JUDGUNIT_SPTBL OFF</td><td></td></tr>
<tr><td>Relative& Absolute</td><td>JUDGUNIT_SPTBL RELABS</td><td>RELABS</td><td></td></tr>
<tr><td rowspan="3">Margin</td><td>Absolute (xW, xW/ MHz)</td><td>MRGN_SPU SPOT,ABS_W, l</td><td>MRGN_SPU? SPOT,ABS_W</td><td>l</td><td rowspan="3">l: 0.00 to 10.00 dB</td></tr>
<tr><td>Absolute (dBm)</td><td>MRGN_SPU SPOT,ABS_DBM, l</td><td>MRGN_SPU? SPOT,ABS_DBM</td><td>l</td></tr>
<tr><td>Relative (dBm)</td><td>MRGN_SPU SPOT,REL, l</td><td>MRGN_SPU? SPOT,REL</td><td>l</td></tr>
</table>

Spurious Emission (continued.)

Function		Item	Program Message	Query Message	Response Message	Remarks
Search & Sweep	Frequency	Start	TBLFREQ_SPU START,Fn,f	TBLFREQ_ SPU? START,Fn	f	f: 9 kHz to (upper limit frequency of main unit −1 kHz)
		Stop	TBLFREQ_SPU STOP,Fn,f	TBLFREQ_ SPU? STOP,Fn	f	f: 10 kHz to upper limit frequency of main unit
	RBW (Freq. Search)		TBLRBW_SPU SWEEP,Fn,f	TBLRBW_ SPU? SWEEP,Fn	f	f: 300 Hz to 20 MHz
	RBW (Level Meas.)		TBLRBWLM_SPU SWEEP,Fn,f	TBLRBWLM_ SPU? SWEEP,Fn	f	f: 300 Hz to 20 MHz
	RBW Mode	Auto	TBLRBWMD_SPU SWEEP,AUTO	TBLRBWMD_ SPU? SWEEP	AUTO	
		Manual	TBLRBWMD_SPU SWEEP,MAN		MAN	
	RBW Type	Normal	TBLRBWTP_SPU SWEEP,NRM	TBLRBWTP_ SPU? SWEEP	NRM	
		Digital	TBLRBWTP_SPU SWEEP,DGTL		DGTL	
	VBW (Freq. Search)		TBLVBW_SPU SWEEP,Fn,f	TBLVBW_ SPU? SWEEP,Fn	f	f: 0 Hz to 3 MHz
	VBW (Level Meas.)		TBLVBWLM_SPU SWEEP,Fn,f	TBLVBWLM_ SPU? SWEEP,Fn	f	f: 0 Hz to 3 MHz
	VBW Mode	Auto	TBLVBWMD_SPU SWEEP,AUTO	TBLVBWMD_ SPU? SWEEP	AUTO	
		Manual	TBLVBWMD_SPU SWEEP,MAN		MAN	
	VBW/RBW Ratio		TBLVBWRT_SPU SWEEP,r	TBLVBWRT_ SPU? SWEEP	r	r: 0.0001 to 100
	Sweep Time (Freq. Search)		TBLSWT_SPU SWEEP,Fn,t	TBLSWT_SPU? SWEEP,Fn	t	t: 10 ms to 1000 s
	Sweep Time (Level Meas.)		TBLSWTLM_SPU SWEEP,Fn,t	TBLSWTLM_ SPU? SWEEP,Fn	t	t: 10 ms to 1000 s

Spurious Emission (continued.)

Function		Item	Program Message	Query Message	Response Message	Remarks
Search & Sweep	Sweep Time Mode	Auto	TBLSWTMD_SPU SWEEP,AUTO	TBLSWTMD_SPU? SWEEP	AUTO	
		Manual	TBLSWTMD_SPU SWEEP,MAN		MAN	
	Ref Level		TBLRL_SPU SWEEP,Fn,l	TBLRL_SPU? SWEEP,Fn	l	l: −120 to +40 dBm (Pre ampl: Off) −140 to +20 dBm (Pre ampl: On)
	Attenuator		TBLATT_SPU SWEEP,Fn,l	TBLATT_SPU? SWEEP,Fn	l	l: 0 to 70 dB (MS2687A/MS2687B) 0 to 62 dB (other than above)
	ATT & Rel Level Mode	Auto	TBLATTRLMD_SPU SWEEP,AUTO	TBLATTRLMD_SPU? SWEEP	AUTO	
		Manual	TBLATTRLMD_SPU SWEEP,MAN		MAN	
	Attenuator Mode	Auto	TBLATTMD_SPU SWEEP,AUTO	TBLATTMD_SPU? SWEEP	AUTO	
		Manual	TBLATTMD_SPU SWEEP,MAN		MAN	
	Detection (Search)	Positive Peak	DET_SPU SEARCH, POS	DET_SPU? SEARCH	POS	
		Sample	DET_SPU SEARCH, SMP		SMP	
		Negative	DET_SPU SEARCH, NEG		NEG	
		Average	DET_SPU SEARCH, AVG		AVG	
		RMS	DET_SPU SEARCH, RMS		RMS	Valid only when the Option04 is installed while RBW Mode is Digital.
	Detection (Sweep)	Positive Peak	DET_SPU SWEEP, POS	DET_SPU? SWEEP	POS	
		Sample	DET_SPU SWEEP, SMP		SMP	
		Negative	DET_SPU SWEEP, NEG		NEG	
		Average	DET_SPU SWEEP, AVG		AVG	
		RMS	DET_SPU SWEEP, RMS		RMS	Valid only when the Option04 is installed while RBW Mode is Digital.

Spurious Emission (continued.)

Function		Item	Program Message	Query Message	Response Message	Remarks
Search & Sweep	Limit	Absolute	SPULMT SWEEP,Fn,l,ABS,u	SPULMT? SWEEP,Fn, ABS,u	l	l: −100 to +100 dBm 0.001 to 999.999 xW/MHz
		Relative	SPULMT SWEEP,Fn,l,REL,DB	SPULMT? SWEEP, Fn,REL,DB	l	
	View Select	RBW, VBW, SWT	TBLVIEW_SPU SWEEP,BWSWT	TBLVIEW_ SPU? SWEEP	BWSWT	
		Ref_Level, Att	TBLVIEW_SPU SWEEP,REFATT		REFATT	
		Limit (dB)	TBLVIEW_SPU SWEEP,LMTDB		LMTDB	
		Limit (xW)	TBLVIEW_SPU SWEEP,LMTW		LMTW	
		RBW, VBW, SWT	TBLVIEW_SPU SWEEP,BWSWTLM		BWSWTLM	
	Judgement Unit	dB	JUDGUNIT_SWU DB	JUDGUNIT_ SWU?	DB	
		xW/MHz	JUDGUNIT_ SWU W_MHZ		W_MHZ	
	Judgement	xW/MHz	JUDGUNIT_ SWTBL s	JUDGUNIT_ SWTBL?	s	
		Absolute	JUDGUNIT_ SWTBL ABS		ABS	
		Relative	JUDGUNIT_ SWTBL REL		REL	
		Relative & Absolute	JUDGUNIT_ SWTBL RELABS		RELABS	
	Margin	Absolute (xW, xW/MHz)	MRGN_SPU SWEEP,ABS_W, l	MRGN_SPU? SWEEP,ABS_W	l	l: 0.00 to 10.00 dB
		Absolute (dBm)	MRGN_SPU SWEEP,ABS_DBM, l	MRGN_SPU? SWEEP, ABS_DBM	l	
		Relative (dBm)	MRGN_SPU SWEEP,REL, l	MRGN_SPU? SWEEP,REL	l	
	Standard		TBLSTD_SPU n	---	---	n: 1 to 13, 98, 99

Spurious Emission (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Spurious Emissions	Frequency	---	SPUFREQ? a,n	f(a),f(a+1),…, f(a+n-1)	a: F1 to F15 n: 1 to 15
	Level	---	SPULVL? a,n	l(a),l(a+1),…, l(a+n-1)	a: F1 to F15 n: 1 to 15
			SPULVL? a,n,u	l(a),l(a+1),…, l(a+n-1)	a: F1 to F15 n: 1 to 15 u: DB,DBM,W, W_MHz
	Frequency and Level	---	SPUFREQLVL? a,n SPUFREQLVL? a,n,u	f(a),l(a),…, f(a+n-1), l(a+n-1)	a: F1 to F15 n: 1 to 15 u: DB,DBM,W, W_MHz
	Judgement	---	SPUPASS? a	jn	
			SPUPASS? ALL	j1,j2,…,j15	
	Total Judgement	---	SPUJDG?	j	
	All	---	SPUALL? a,n,u	f(a),l(a),r(a), v(a),t(a),rl(a), at(a),…, f(a+n-1), l(a+n-1), r(a+n-1), v(a+n-1), t(a+n-1), rl(a+n-1), at(a+n-1)	a: F1 to F15 n: 1 to 15 u: DB,DBM,W, W_MHz
Marker	Marker Position	MKP_SPU n	MKP_SPU?	n	n: 0 to 500 (501) 0 to 1000 (1001)
Marker Level	Spectrum	---	MKL_SPU? a	l	a: F1 to F15
			MKL_SPU? a,u	l	a: F1 to F15 u: DB,DBM,W, W_MHz
Wave Data	Time Domain	---	SPECT_SPUT? a,b,n	l(b),l(b+1),…, l(b+n-1)	a: F1 to F15 b: 0 to 500 (501) 0 to 1000 (1001) n: 1 to 501 (501) 1 to 1001(1001)
	Frequency Domain	---	SPECT_SPUF? a,b,n	l(b),l(b+1),…, l(b+n-1)	a: F1 to F15 b: 0 to 500 (501) 0 to 1000 (1001) n: 1 to 501 (501) 1 to 1001(1001)

6.10 CCDF

The list below shows the correspondence between the external commands and the setting items on the CCDF screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Measure Method	CCDF	DSPL CCDF,CCDF	DSPL?	CCDF,CCDF	
	APD	DSPL CCDF,APD	DSPL?	CCDF,APD	
Trace Format	Positive	TRFORM_CCDF POS	TRFORM_CCDF?	POS	
	Negative	TRFORM_CCDF NEG	TRFORM_CCDF?	NEG	
	Positive & Negative	TRFORM_CCDF POSNEG	TRFORM_CCDF?	POSNEG	
Horizontal Scale	2 dB	HSCALE_CCDF 2	HSCALE_CCDF?	2	
	5 dB	HSCALE_CCDF 5	HSCALE_CCDF?	5	
	10 dB	HSCALE_CCDF 10	HSCALE_CCDF?	10	
	20 dB	HSCALE_CCDF 20	HSCALE_CCDF?	20	
	50 dB	HSCALE_CCDF 50	HSCALE_CCDF?	50	
Display Data Type	Probability	DISPTYPE_CCDF PROB	DISPTYPE_CCDF?	PROB	
	Distribution	DISPTYPE_CCDF DSTRBT	DISPTYPE_CCDF?	DSTRBT	
Reference Trace	Off	REFTR_CCDF OFF	REFTR_CCDF?	OFF	
	Save	REFTR_CCDF SAVE	REFTR_CCDF?	SAVE	
	Gaussian	REFTR_CCDF GAUSS	REFTR_CCDF?	GAUSS	
	Save & Gaussian	REFTR_CCDF SAVEGAUSS	REFTR_CCDF?	SAVEGAUSS	
Save Trace		SAVETR_CCDF	SAVETR_CCDF?	s	
Filter Type	22 MHz	RBW_CCDF 22MHZ	RBW_CCDF?	22MHZ	
	20 MHz	RBW_CCDF 20MHZ	RBW_CCDF?	20MHZ	
	10 MHz	RBW_CCDF 10MHZ	RBW_CCDF?	10MHZ	
	5 MHz	RBW_CCDF 5MHZ	RBW_CCDF?	5MHZ	
	3 MHz	RBW_CCDF 3MHZ	RBW_CCDF?	3MHZ	
	3.84 MHz (RRC)	RBW_CCDF RRC	RBW_CCDF?	RRC	
	3.84 MHz (RC)	RBW_CCDF RC	RBW_ CCDF?	RC	
Data Count		DCOUNT_CCDF n	DCOUNT_CCDF?	n	n: 10000 to 2000000000
Analysis Length		ANLYLEN_CCDF t	ANLYLEN_CCDF?	t	t:1 to 100000
Adjust Range		ADJRNG	—	—	
Marker Mode	Normal	MKR_CCDF NRM	MKR_CCDF?	NRM	
	Off	MKR_CCDF OFF	MKR_CCDF?	OFF	
Marker Position		MKP_CCDF n	MKP_CCDF?	n	n: 0.0001 to 100 (Probability) 0 to 50 (Distribution)

CCDF (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Power		—	POWER_CCDF?	la,lb,lc,ld,le	
Power at x %		—	PROBPWR_CCDF?	la,lb,lc,ld,le,lf	
Distribution at grid		—	PWRPROB_CCDF?	la,lb,lc,ld,le	
Marker		—	MKL_CCDF? n, PROB	la	n: 0,1
		—	MKL_CCDF? n, DSTRBT	lb	n: 0,1
		—	MKL_CCDF? ALL,PROB		
		—	MKL_CCDF? ALL,DSTRBT		
Dalta Marker		—	DELTAMKR_CCDF?	l	
Wave Data		—	CCDFDSTRBT? la,lb,lc	ld	la: −50.0 to +50.0 (APD) 0.0 to 50.0 (CCDF) lb: 1 to 1001 (APD) 1 to 501 (CCDF) lc: 0,1,2

6.11 Symbol Rate Error

The list below shows the correspondence between the external commands and the setting items on the Symbol Rate Error screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Analysis Length		ANLYLEN_SRERR n	ANLYLEN_SRERR?	n	*2 n: 250 to 1000
Storage Mode	Normal	STRG_SRERR NRM	STRG_SRERR?	NRM	*2
	Average	STRG_SRERR AVG	STRG_SRERR?	AVG	*2
Average Count		AVR_SRERR n	AVR_SRERR?	n	*2 n: 2 to 999
Refresh Interval	Every	INTVAL_SRERR EVERY	INTVAL_SRERR?	EVERY	*2
	Once	INTVAL_SRERR ONCE	INTVAL_SRERR?	ONCE	*2

Symbol Rate Error (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00 to +10.00
	Level Calibration	---	CALSTAT? LVL	n1,n2,n3,n4, n5,n6,n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Pre-selector Tuning Level Calibration using PM	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3,n4, n5,n6,n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)
Adjust Range		ADJRNG	---	---	
Measure Result	Symbol Rate Error	---	SRERR?	l	*2 l: −60.0 to +60.0

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

6.12 Chip Clock Error

The list below shows the correspondence between the external commands and the setting items on the Chip Clock Error screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Analysis Length		ANLYLEN_CCERR n	ANLYLEN_CCERR?	n	*1 n: 11000 to 44000
Storage Mode	Normal	STRG_CCERR NRM	STRG_CCERR?	NRM	*1
	Average	STRG_CCERR AVG	STRG_CCERR?	AVG	*1
Average Count		AVR_CCERR n	AVR_CCERR?	n	*1 n: 2 to 999
Refresh Interval	Every	INTVAL_CCERR EVERY	INTVAL_CCERR?	EVERY	*1
	Once	INTVAL_CCERR ONCE	INTVAL_CCERR?	ONCE	*1

Chip Clock Error (continued.)

<table>
<tr><th>Function</th><th>Item</th><th>Program Message</th><th>Query Message</th><th>Response Message</th><th>Remarks</th></tr>
<tr><td rowspan="4">Calibration</td><td>Level Calibration</td><td>LVLCAL</td><td>---</td><td>---</td><td></td></tr>
<tr><td>Level Calibration using PM</td><td>PWRCAL</td><td>PWRCAL?</td><td>l</td><td>l: −10.00 to +10.00</td></tr>
<tr><td>Level Calibration</td><td>---</td><td>CALSTAT? LVL</td><td>n1,n2,n3,n4, n5,n6,n7</td><td>n1:
0: Normal termination
8: Calibration failure
9: Not calibrated
n2, n3, n4:
Calibration date
n5, n6, n7:
Calibration time</td></tr>
<tr><td>Level Calibration using PM</td><td>---</td><td>CALSTAT? PWR</td><td>n1,n2,n3,n4, n5,n6,n7,n8</td><td>n1:
0: Normal termination
1: Input limit
4: Abnormal signal
7: No input signal
8: Calibration failure
9: Not calibrated
n2, n3, n4:
Calibration date
n5, n6, n7:
Calibration time
n8:
Calibration frequency [MHz]</td></tr>
<tr><td colspan="2">Calibration Value</td><td>CALVAL l</td><td>CALVAL?</td><td>n,l</td><td>n: mode
(0: Not calibrated,
1: Internal Calibration,
2: External writing
l: −10.00 to 10.00)</td></tr>
<tr><td colspan="2">Adjust Range</td><td>ADJRNG</td><td>---</td><td>---</td><td></td></tr>
<tr><td>Measure Result</td><td>Chip Clock Frequency Error</td><td>---</td><td>CCERR?</td><td>l</td><td>*1
l: −60.0 to +60.0</td></tr>
</table>

*1: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

*2: IEEE802.11a, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

6.13 IQ Level

The list below shows the correspondence between the external commands and the setting items on the IQ Level screen.

Function	Item		Program Message	Query Message	Response Message	Remarks
Storage Mode	Normal		STRG_IQL NRM	STRG_IQL?	NRM	
	Average		STRG_IQL AVG	STRG_IQL?	AVG	
Average count			AVR_IQL n	AVR_IQL?	n	n: 2 to 999
Refresh Interval	Every		INTVAL_IQL EVERY	INTVAL_IQL?	EVERY	
	Once		INTVAL_IQL ONCE	INTVAL_IQL?	ONCE	
Unit	mV		UNIT_IQL MV	UNIT_IQL?	MV	
	dBmV		UNIT_IQL DBMV	UNIT_IQL?	DBMV	
Measure Result	Level	All	---	IQLVL?	la,lb,lc,ld	la: I Level(rms) lb: Q Level(rms) lc: I p-p ld: Q p-p
			---	IQLVL? MV	la,lb,lc,ld	la: I Level(rms) lb: Q Level(rms) lc: I p-p ld: Q p-p
			---	IQLVL? DBMV	la,lb,lc,ld	la: I Level(rms) lb: Q Level(rms) lc: I p-p ld: Q p-p
		I (rms)	---	ILVL?	l	
			---	ILVL? MV	l	
			---	ILVL? DBMV	l	
		Q (rms)	---	QLVL?	l	
			---	QLVL? MV	l	
			---	QLVL? DBMV	l	
		I p-p	---	IPPLVL?		
			---	IPPLVL? MV		
			---	IPPLVL? DBMV		
		Q p-p	---	QPPLVL?		
			---	QPPLVL? MV		
			---	QPPLVL? DBMV		
	I/Q Phase difference		---	IQPHASE?	r	unit: deg

6.14 Power Meter

The list below shows the correspondence between the external commands and the setting items on the Power Meter screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Zero Set		ZEROSET	---	---	
		ZAJ	---	---	
Range Up		RNG UP	---	---	
Range Down		RNG DN	---	---	
Adjust Range		ADJRNG	---	---	
Range1		RNG1	---	---	
Range2		RNG2	---	---	
Range3		RNG3	---	---	
Range4		RNG4	---	---	
Range5		RNG5	---	---	
Set Relative		SETREL	---	---	
Measure Result	Power	---	POWER? DBM	l	
		---	POWER? WATT	l	
		---	POWER? DB	l	

6.15 Batch Measurement

The list below shows the correspondence between the external commands and the setting items on the Batch Measurement screen.

Function	Item	Program Message	Query Message	Response Message	Remarks
Adjust Range		ADJRNG?	---	---	
Calibration	Level Calibration	LVLCAL	---	---	
	Pre-selector Tuning	PSLTUNE	---	---	
	Level Calibration using PM	PWRCAL	PWRCAL?	l	l: −10.00～10.00
Calibration Status	Level Calibration	---	CALSTAT? LVL	n1,n2,n3,n4,n5,n6,n7	n1: 0: Normal termination 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time
	Level Calibration using PM, Pre-selector Tuning	---	CALSTAT? PSL CALSTAT? PWR	n1,n2,n3,n4,n5,n6,n7,n8	n1: 0: Normal termination 1: Input limit 4: Abnormal signal 7: No input signal 8: Calibration failure 9: Not calibrated n2, n3, n4: Calibration date n5, n6, n7: Calibration time n8: Calibration frequency [MHz]
Calibration Value		CALVAL l	CALVAL?	n,l	n: mode (0: Not calibrated, 1: Internal Calibration, 2: External writing l: −10.00 to 10.00)

Batch Measurement (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Start/Stop	Start	START_BCH	START_BCH?	n	
	Stop	STOP_BCH	STOP_BCH?	n	
Measure Mode	Normal	MODE_BCH, NRM	MODE_BCH?	NRM	
	Abort with failure	MODE_BCH, FAIL		FAIL	
	Abort with abnormal state	MODE_BCH, ABN		ABN	
	Abort with failure or abnormal state	MODE_BCH, ABRT		ABRT	
Pass/Fail	Modulation Analysis	---	JUDGE_BCH? MOD	a	
	RF Power	---	JUDGE_BCH? PWR	a	
	OBW	---	JUDGE_BCH? OBW	a	
	Adjust Channel Power	---	JUDGE_BCH? ACP	a	
	Spectrum Mask	---	JUDGE_BCH? MSK	a	
	Spurious Emission 1	---	JUDGE_BCH? SPR 1	a	
	Spurious Emission 2	---	JUDGE_BCH? SPR 2	a	
	Total Result	---	JUDGE_BCH? TTL	a	
	Select Items	---	JUDGE_BCH? n	a1,...am	
Setup Table	Parameter	SETTBL_BCH, PAR	SETTBL_BCH?	PAR	
	Limit	SETTBL_BCH, LMT		LMT	
On/Off	Modulation Analysis	MEAS_BCH MOD, a	MEAS_BCH?, MOD	a	
	RF Power	MEAS_BCH PWR, a	MEAS_BCH?, PWR	a	
	OBW	MEAS_BCH OBW, a	MEAS_BCH?, OBW	a	
	Adjacent Channel Power	MEAS_BCH ACP, a	MEAS_BCH?, ACP	a	
	Spectrum Mask	MEAS_BCH MSK, a	MEAS_BCH?, MSK	a	
	Spurious Emission	MEAS_BCH SPR, a	MEAS_BCH?, SPR	a	
	Flatness	MEAS_BCH FLT, a	MEAS_BCH?, FLT	a	

Batch Measurement (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Measure Count	Modulation Analysis	MEAS_BCH MOD, n	CNT_BCH?, MOD	n	
	RF Power	CNT_BCH PWR, n	CNT_BCH?, PWR	n	
	OBW	CNT_BCH OBW, n	CNT_BCH?, OBW	n	
	Adjacent Channel Power	CNT_BCH ACP, n	CNT_BCH?, ACP	n	
	Spectrum Mask	CNT_BCH MSK, n	CNT_BCH?, MSK	n	
Parameter	Set parameter to default	DEFLTPAR_BCH	---	---	
	Spurious Table	SPRTBL_BCH tbl,n	SPRTBL_BCH? tbl	n	
Limit Value	Frequency Error	LMTFRERR_BCH b,a	LMTFRERR_BCH? b	a	
	EVM	LMTEVM_BCH RMS b,a	LMTEVM_BCH? b	a,	
	Phase Error	LMTPHERR_BCH p	LMTPHERR_BCH?	p	
	Magnitude Error	LMTMGERR_BCH a	LMTMGERR_BCH?	a	
	Origin Offset	LMTORG_BCH a	LMTORG_BCH?	a	
	Carrier Leak	LMTLEAK_BCH a	LMTLEAK_BCH?	a	
	Flatness	LMTFLT_BCH b,a	LMTFLT_BCH? b	a	
	TX Power	LMTPWR_BCH b,a	LMTPWR_BCH? b	a	
	Carrier Off Power	LMTOFPWR_BCH b,a	LMTOFPWR_BCH? b	a	
	On/Off Ratio	LMTRATIO_BCH a	LMTRATIO_BCH?	a	
	Ramp Time	LMTRAMP_BCH a	LMTRAMP_BCH?	a	
	OBW	LMTOBW_BCH b,a	LMTOBW_BCH? b	a	
	Adjacent CH Power	LMTACP_BCH b,a	LMTACP_BCH? b	a	
View Select		VIEW_BCH a	VIEW_BCH?	a	
Select Table	Select Mask Template	SLCTTEMP_SMASK_BCH a	SLCTTEMP_SMASK_BCH?	a	
	Select Standard	TBLSTD_SMASK_BCH a	TBLSTD_SMASK_BCH?	a	
		TBLSTD_OBW_BCH a	TBLSTD_OBW_BCH?	a	
		TBLSTD_ADJ_BCH a	TBLSTD_ADJ_BCH?	a	
Save	Save Result to Mem.-Card	SAVE2MCARD	---	---	

Batch Measurement (continued.)

Function	Item	Program Message	Query Message	Response Message	Remarks
Result	Frequency	---	SPUFREQ_BCH?a,b,n	f(b),f(b+1),…, f(b+n–1)	a: SPR1, SPR2 b: F1 to F15 n: 1 to 15
	Level	---	SPULVL_BCH?a,b,n,u	l(b),l(b+1),…, l(b+n–1)	a: SPR1, SPR2 b: F1 to F15 n: 1 to 15 u: DB, DBM, W, W_MHz
	Frequency and Level	---	SPUFREQLVL_BCH? a,b,n,u	f(b),l(b),…, f(b+n–1), l(b+n–1)	a: SPR1, SPR2 b: F1 to F15 n: 1 to 15 u: DB, DBM, W, W_MHz
	Judgement	---	SPUPASS_BCH?a,n	j(b)	a: SPR1, SPR2 n: F1 to F15
			SPUPASS_BCH?All	j1,j2,…,j15	
	Total Judgement	---	SPUJDG_BCH?a	j	a: SPR1, SPR2

Section 7 Detailed Explanations of Commands

This section provides the detailed explanation of the external control commands that can be used by the MX268x30A/MX860x30A wireless LAN Measurement Software for the MS2681A/MS2683A/MS2687A/ MS2687B/MS8608A/MS8609A, in alphabetical order.
Refer to "Section 6 Command List" for list of these messages.

7.1 Detailed Explanation of External Control Commands in Alphabetical Order

This section provides the detailed specifications of the external control commands in alphabetical order. Refer to Section 6 “Command List” to search a command for a desired function.

■ Description of the detailed explanation for each command

[1] FREQ

[2] ■ Function

Carrier Frequency

Sets the carrier frequency of the measured signal.

[3] ■ Syntax

Program Message	Query Message	Response Message
FREQ *freq*	FREQ?	*freq*

[4] ■ Parameter

freq

Carrier frequency

Range	Model Name	Resolution	Initial value	Unit
100000000 to 3000000000	MS2681A	1	2412000000	Hz
100000000 to 6000000000	MS2883A/87A	1	5170000000	Hz

□ Suffix code

None : Hz

HZ : Hz

KHZ, KZ : kHz

MHZ, MZ : MHz

GHZ, GZ : GHz

[5] ■ Restrictions

• The “Terminal” must be set to “RF” before hand (*cf.* TERM).

[6] ■ Initialization command

*RST

[7] ■ Use examples

Sets the carrier frequency to 1 GHz.

<Program>

TERM RF

FREQ 1GHZ

FREQ?

<Response>

1000000000

[1] A command name. In this section, the command name is taken from the header of each device message.

[2] ■ Function: The command for setting the measuring instrument is the function of the Program Message, while the command for reading out the measured results is the function of the Response Message.

[3] ■ Syntax: Shows how to create a device message. A single space character comes between the message header and parameter (shown in italics).

[4] ■ Parameter: Shows the meaning for the device message argument.
The character string shown in the "Value" field is substituted for the parameter during item setting.
Likewise, the numeric value shown in the "Range" field is substituted for the parameter during numeric setting.
"Resolution" shows a step value set for both the program message and the query message, or shows the resolution of the measured results for the response message.

[5] ■ Restrictions: Shows the precautions in using the command. The restrictions concern commands marked "*cf.*".

[6] ■ Initialization command: Shows the command that initializes the item targeted to be set by this command.

[7] ■ Use example: Shows the basic order for this command's use. The value of <Response> shown in the command example that reads out the measured result is different from an actual value.

ADJCH

■ Function

Adjacent Channel Power

Reads out the result of Adjacent Channel Power measurement.

This command functions the same as the CHPWR command.

■ Syntax

Program Message	Query Message	Response Message
---	ADJCH? *offset*	*level*
---	ADJCH? *offset, unit*	*level*
---	ADJCH? ALL	*low2, low1, up1, up2*
---	ADJCH? ALL, *unit*	*low2, low1, up1, up2*

■ Parameter

offset

Offset frequency

Value	Offset Frequency
LOW2	−40 MHz
LOW1	−20 MHz
UP1	20 MHz
UP2	40 MHz

unit

Unit

Value	Offset Frequency
None	Set value for unit
DB	dB
DBM	dBm
MW	mW
UW	uW
NW	nW

level

Level at the frequency specified by the offset.

Resolution	Unit
0.01	Set value for unit

low2

Level at −40 MHz

Resolution	Unit
0.01	Set value for unit

low1
Level at −20 MHz

Resolution	Unit
0.01	Set value for unit

up1
Level at 20 MHz

Resolution	Unit
0.01	Set value for unit

up2
Level at 40 MHz

Resolution	Unit
0.01	Set value for unit

■ Use example
Reads out the level at the offset frequency 20 MHz during Adjacent Channel Power measurement.
<Program>
DSPL ADJ
SWP
ADJCH? UP1,DB

<Response>
−30.34

ADJRNG

■ Function

Adjust Range

Executes Adjust Range.

■ Syntax

Program Message	Query Message	Response Message
ADJRNG	---	---

■ Restrictions

- This command cannot be executed when the measurement screen is Setup Common Parameter (*cf.* DSPL).

■ Example of Use

Executes Adjust Range.

<Program>

ADJRNG

ANLYLEN

■ Function

Analysis Length

Sets the analysis length of the modulated signal.

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN *symbol*	ANLYLEN?	*symbol*

■ Parameter

symbol

Number of analyzed symbols

Target System	Range	Resolution	Initial value	Unit
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	1 to 1367	1	10	symbol
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	256 to 4096	1	1000	chip

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the analysis length to 100 symbols.

<Program>

TGTSY 11A

DSPL MODANAL

ANLYLEN 100

ANLYLEN?

<Response>

100

ANLYLEN_CCDF

■ Function

Analysis Length for CCDF
Sets the analysis length to execute measurement once on the CCDF screen.
The list below shows the relationship of the analysis data number for the minimum analysis time (1 μsec.).

Filter (Hz)	Analysis Data Number
22 MHz	64
20 MHz	64
10 MHz	32
5 MHz	32
3 MHz	32
3.84 MHz (RC)	32
3.84 MHz (RRC)	32

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN_CCDF *a*	ANLYLEN_CCDF?	*a*

■ Parameter

a

Analysis length

Range	Resolution	Initial value	Unit
1 to 100000	1	500	μsec

□ Suffix code

None: μsec
S: sec
MS: msec
US: μsec

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the analysis length to 1 msec.

<Program>

```
DSPL CCDF,CCDF
ANLYLEN_CCDF 1MS
ANLYLEN_CCDF?
```

<Response>

```
1000
```

ANLYLEN_CCERR

■ Function

Analysis Length for Chip Clock Error

Sets the analysis length in Chip Clock Error measurement.

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN_CCERR *chip*	ANLYLEN_CCERR?	*chip*

■ Parameter

chip

Analysis length

Range	Resolution	Initial value	Unit
11000 to 44000	1	11000	chip

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the analysis length to 20000 chips in Chip Clock Error measurement.

<Program>

DSPL CCERR

ANLYLEN_CCERR 20000

ANLYLEN_CCERR?

<Response>

20000

ANLYLEN_RFPWR

■ Function

Analysis Length for RF Power
Sets analysis length of signal analysis for RF Power.

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN_RFPWR *symbol*	ANLYLEN_RFPWR?	*symbol*

■ Parameter

symbol
Analysis Length

Target System	Range	Resolution	Initial Value	Unit
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM)	1 to 1367	1	10	symbol
IEEE802.11g (DSSS-OFDM)	1 to 1300	1	10	symbol
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	256 to 4096	1	1000	chip

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets analysis length in 1000 at RF Power measurement.
<Program>
DSPL RFPWR
ANLYNLEN_RFPWR 1000
ANLYNLEN_RFPWR?

<Response>
1000

ANLYLEN_SRERR

■ Function

Analysis Length for Symbol Rate Error

Sets the analysis length in Symbol Rate Error measurement.

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN_SRERR *symbol*	ANLYLEN_SRERR?	*symbol*

■ Parameter

symbol

Analysis length

Range	Resolution	Initial value	Unit
250 to 1000	1	250	Symbol

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the analysis length to 300 symbols in Symbol Rate Error measurement.

<Program>

DSPL SRERR

ANLYLEN_SRERR 300

ANLYLEN_SRERR?

<Response>

300

ANLYSTART

■ Function

Analysis Start

Sets the start position which analyzes the modulated signal.

■ Syntax

Program Message	Query Message	Response Message
ANLYSTART *symbol*	ANLYSTART?	*symbol*

■ Parameter

symbol

Start position which analyzes

Range	Resolution	Initial value	Unit
1 to (1367－(Analysis Length)+1)	1	1	symbol

■ Restrictions

- When Target System is HiSWANa and Data Rate is Auto is enabled.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the start position which analyzes to 100 symbols.

<Program>

TGTSY HISWAN

DSPL MODANAL

ANLYSTART 100

ANLYSTART?

<Response>

100

ATT_ADJ

■ Function

Attenuator for Adjacent Channel Power
Sets Attenuator at Adjacent Channel Power measurement

■ Syntax

Program Message	Query Message	Response Message
ATT_ADJ *att*	ATT_ADJ?	*att*

■ Parameter

att
Attenuator

Model name	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	0 to 70	20	10	dB
Other than the above	0 to 62	18	2	dB

□ Suffix code
None: dB
DB: dB

■ Restrictions

- The range setting for Attenuator is switched corresponding to Reference Level (*cf.* RL_ADJ).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Attenuator to 10 dB at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
ATT_ADJ MAN 10
ATT_ADJ?

<Response>
10

ATTMD_ADJ

■ Function

Attenuator Mode: Manual/Auto for Adjacent Channel Power

Sets whether Attenuator for Spectrum Analyzer is set automatically or manually at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTMD_ADJ *mode*	ATTMD_ADJ?	*mode*

■ Parameter

mode

Mode

Value	Description	Initial value
AUTO	Sets the Attenuator setting mode to automatic mode	*
MAN	Sets the Attenuator setting mode to manual mode	

■ Restrictions

- If Attenuator is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator is automatically set when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Attenuator setting mode to manual mode at Adjacent Channel Power measurement.

<Program>
DSPL ADJ
ATTMD_ADJ MAN
ATTMD_ADJ?

<Response>
MAN

ATTMD_OBW

■ Function

Attenuator Mode: Manual/Auto for Occupied Bandwidth

Sets whether Attenuator for Spectrum Analyzer is set automatically or manually at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTMD_OBW *mode*	ATTMD_OBW?	*mode*

■ Parameter

mode

Mode

Value	Description	Initial value
AUTO	Sets the Attenuator setting mode to automatic mode	*
MAN	Sets the Attenuator setting mode to manual mode	

■ Restrictions

- If Attenuator is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator is automatically set when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Attenuator setting mode to manual mode at Occupied Bandwidth measurement.

<Program>
DSPL OBW
ATTMD_OBW MAN
ATTMD_OBW?

<Response>
MAN

ATTMD_SMASK

■ Function

Attenuator Mode: Manual/Auto for Spectrum Mask

Sets whether Attenuator for Spectrum Analyzer is set automatically or manually at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTMD_SMASK *mode*	ATTMD_SMASK?	*mode*

■ Parameter

mode

Mode

Value	Description	Initial value
AUTO	Sets the Attenuator setting mode to automatic mode	*
MAN	Sets the Attenuator setting mode to manual mode	

■ Restrictions

- If Attenuator is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator is automatically set when the setting mode is Auto.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the Attenuator setting mode to manual mode at Spectrum Mask measurement.

<Program>

DSPL SMASK

ATTMD_SMASK MAN

ATTMD_SMASK?

<Response>

MAN

ATT_OBW

■ Function

Attenuator for Occupied Bandwidth
Sets Attenuator at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
ATT_OBW *att*	ATT_OBW?	*att*

■ Parameter

att
Attenuator

Model name	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	0 to 70	20	10	dB
Other than the above	0 to 62	18	2	dB

□ Suffix code
None: dB
DB: dB

■ Restrictions

- The range setting for Attenuator is switched corresponding to Reference Level (*cf.* RL_OBW).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Attenuator to 10 dB at Occupied Bandwidth measurement.
<Program>
DSPL OBW
ATT_OBW 10
ATT_OBW?

<Response>
10

ATTRLMD_ADJ

■ Function

Attenuator Ref Level Mode: Manual/Auto for Adjacent Channel Power
Sets whether Attenuator and Ref Level for Spectrum Analyzer are set automatically or manually at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTRLMD_ADJ *mode*	ATTRLMD_ADJ?	*mode*

■ Parameter

mode
Mode

Value	Description	Initial value
AUTO	Sets the Attenuator and Ref Level setting modes to automatic mode	*
MAN	Sets the Attenuator and Ref Level setting modes to manual mode	

■ Restrictions

- If Attenuator or Ref Level is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator and Ref Level are automatically set when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Attenuator and Ref Level setting modes to manual mode at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
ATTRLMD_ADJ MAN
ATTRLMD_ADJ?

<Response>
MAN

ATTRLMD_OBW

■ Function

Attenuator Ref Level Mode: Manual/Auto for Occupied Bandwidth

Sets whether Attenuator and Ref Level for Spectrum Analyzer are set automatically or manually at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTRLMD_OBW *mode*	ATTRLMD_OBW?	*mode*

■ Parameter

mode

Mode

Value	Description	Initial value
AUTO	Sets the Attenuator and Ref Level setting modes to automatic mode	*
MAN	Sets the Attenuator and Ref Level setting modes to manual mode	

■ Restrictions

- If Attenuator or Ref Level is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator and Ref Level are automatically set when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Attenuator and Ref Level setting modes to manual mode at Occupied Bandwidth measurement.

<Program>
DSPL OBW
ATTRLMD_OBW MAN
ATTRLMD_OBW?

<Response>
MAN

ATTRLMD_SMASK

■ Function

Attenuator Ref Level Mode: Manual/Auto for Spectrum Mask
Sets whether Attenuator and Ref Level for Spectrum Analyzer are set automatically or manually at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
ATTRLMD_SMASK *mode*	ATTRLMD_SMASK?	*mode*

■ Parameter

mode
Mode

Value	Description	Initial value
AUTO	Sets the Attenuator and Ref Level setting modes to automatic mode	*
MAN	Sets the Attenuator and Ref Level setting modes to manual mode	

■ Restrictions

- If Attenuator or Ref Level is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Attenuator and Ref Level are automatically set when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Attenuator and Ref Level setting modes to manual mode at Spectrum Mask measurement.
<Program>
DSPL SMASK
ATTRLMD_SMASK MAN
ATTRLMD_SMASK?

<Response>
MAN

ATT_SMASK

■ Function

Attenuator for Spectrum Mask
Sets Attenuator at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
ATT_SMASK *att*	ATT_SMASK?	*att*

■ Parameter

att
Attenuator

Model name	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	0 to 70	20	10	dB
Other than the above	0 to 62	18	2	dB

□ Suffix code
None: dB
DB: dB

■ Restrictions

- The range setting for Attenuator is switched corresponding to Reference Level (*cf.* RL_SMASK).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Attenuator to 10 dB at Spectrum Mask measurement.
<Program>
DSPL SMASK
ATT_SMASK 10
ATT_SMASK?

<Response>
10

AVR_ADJ

■ Function

Average Count for Adjacent Channel Power

Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_ADJ *count*	AVR_ADJ?	*count*

■ Parameter

count

Average count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Average Count to 500 at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

STRG_ADJ AVG

AVR_ADJ 500

AVR_ADJ?

<Response>

500

AVR_CCERR

■ Function

Average Count for Chip Clock Error

Sets the average (measurement) count when Storage Mode is set to Average in Chip Clock Error measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_CCERR *count*	AVR_CCERR?	*count*

■ Parameter

count

Average (measurement) count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Average Count in Chip Clock Error measurement to 10.

<Program>
DSPL CCERR
STRG_CCERR AVG
AVR_CCERR 10
AVR_CCERR?

<Response>
10

AVR_IQL

■ Function

Average Count for IQ Level

Sets the average (measurement) count when Storage Mode is set to Average in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_IQL *count*	AVR_IQL?	*count*

■ Parameter

count

Average (measurement) count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Average Count to 500.

<Program>
DSPL IQLVL
STRG_IQL AVG
AVR_IQL 500
AVR_IQL?

<Response>
500

AVR_MOD

■ Function

Average Count for Modulation Analysis

Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_MOD *count*	AVR_MOD?	*count*

■ Parameter

count

Average (measurement) count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Average Count to 500.

<Program>

DSPL MODANAL

STRG_MOD AVG

AVR_MOD 500

AVR_MOD?

<Response>

500

AVR_OBW

■ Function

Average Count for Occupied Bandwidth

Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_OBW *count*	AVR_OBW?	*count*

■ Parameter

count

Average count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Average Count to 500 at Occupied Bandwidth measurement.

<Program>

DSPL OBW

STRG_OBW AVG

AVR_OBW 500

AVR_OBW?

<Response>

500

AVR_RFPWR

■ Function

Average Count for RF Power

Sets the average (measurement) count when the Storage Mode is Average at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_RFPWR *count*	AVR_RFPWR?	*count*

■ Parameter

count

Average (measurement) count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Average Count to 500.

<Program>
DSPL RFPWR
STRG_RFPWR AVG
AVR_RFPWR 500
AVR_RFPWR?

<Response>
500

AVR_SRERR

■ Function

Average Count for Symbol Rate Error

Sets the average (measurement) count when Storage Mode is set to Average in Symbol Rate Error measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_SRERR *count*	AVR_SRERR?	*count*

■ Parameter

count

Average (measurement) count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Average Count in Symbol Rate Error measurement to 10.

<Program>
DSPL SRERR
STRG_SRERR AVG
AVR_SRERR 10
AVR_SRERR?

<Response>
10

AVR_SMASK

■ Function

Average Count for Spectrum Mask

Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_SMASK *count*	AVR_SMASK?	*count*

■ Parameter

count

Average count

Range	Resolution	Initial value
2 to 999	1	2

■ Initialization command

PRE
INI
IP
∗RST

■ Use example

Sets Average Count to 500 at Spectrum Mask measurement.

<Program>
DSPL SMASK
STRG_ SMASK AVG
AVR_ SMASK 500
AVR_ SMASK?

<Response>
500

AVR_SPU

■ Function

Average Count for Spurious Emission

Sets the average (measurement) count (number of averaging processes) when storage mode is set to Average at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_SPU *count*	AVR_SPU?	*count*

■ Parameter

count

Average count

Range	Resolution	Initial Value
2 to 999	1	2

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Average Count to 500 at Spurious Emission measurement.

<Program>

DSPL SPURIOUS, SWEEP

STRG_SPU AVG

AVR_SPU 500

AVR_SPU?

<Response>

500

BAND

■ Function

Preselector

Sets signal path.

■ Syntax

Program Message	Query Message	Response Message
BAND *pre*	BAND?	*pre*

■ Parameter

pre

Preselector setting

Value	Preselector Setting	Initial Value
0	Normal	*
1	Spurious	

■ Initialization command

*RST

■ Use example

Sets Preselector to Spurious.

<Program>

BAND 1

BAND?

<Response>

1

■ Note

This function is optional.

BIN

■ Function

Sets ASCII or binary format to read the waveform data.

■ Syntax

Program Message	Query Message	Response Message
BIN *format*	BIN?	*format*

■ Parameter

format

Specification of ASCII or binary format

Value	ASCII/Binary	Initial value
ON	Binary format	*
1		
OFF	ASCII format	
0		

■ Initialization command

*RST

■ Use example

Reads the waveform data in binary format.

<Program>

BIN ON

BIN?

<Response>

ON

BRST_DETLVL

■ Function

Burst Detection Level

Sets the threshold to detect the rising or falling of the burst signal.

■ Syntax

Program Message	Query Message	Response Message
BRST_DETLVL *r*	BRST_DETLVL?	*r*

■ Parameter

r

Threshold level

Range	Resolution	Unit	Initial value
−20 to 0	1	None	0

■ Restrictions

- This command is invalid when Preamble Search and Ramp-down Detection are set to On and Off, respectively.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the threshold to −10.

<Program>

DSPL RFPWR

BRST_DETLVL −10

BRST_DETLVL?

<Response>

−10

BRST_DETOFFSET

■ Function

Burst Detection Offset

Sets the time axis offset value at the time of displaying the transient waveform of the burst signal.

■ Syntax

Program Message	Query Message	Response Message
BRST_DETOFFSET *t*	BRST_DETOFFSET?	*t*

■ Parameter

t

Offset value

Range	Resolution	Unit	Initial value
−2 to +2	0.1	None	0

■ Restrictions

- This command is invalid when Preamble Search and Ramp-down Detection are set to On and Off, respectively.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the offset value to −2.

<Program>
DSPL RFPWR
BRST_DETOFFSET −2
BRST_DETOFFSET?

<Response>
−2

BS

■ Function

Back Screen

Switches the screen from the current screen to the upper-layer screen by one rank.

■ Syntax

Program Message	Query Message	Response Message
BS	---	---

■ Use example

Moves to the upper screen.

<Program>

BS

■ Remarks

- The Setup Common Parameter is the uppermost screen.

CALSTAT

■ Function

Calibration Status

Outputs the status of level calibration and pre-selector tuning.

■ Syntax

Program Message	Query Message	Response Message
---	CALSTAT? *a*	*b,c,d,e,f,g,h,i*

■ Parameter

a

Calibration method to be read out

Value	Calibration Method
LVL	Level calibration (using calibration signal)
PSL	Pre-selector tuning
PWR	Level calibration (using power meter)

b

Status

Level Calibration (using calibration signal)	Level Calibration (using power meter) Pre-selector Tuning	Status
0	0	Calibration completed normally
–	1	RF input level limit
–	4	Receiving abnormal signal
–	7	No input signal
8	8	Calibration failed
9	9	Not calibrated

b, d, e

Calibration date

c: last two digits of year, d: month, e: day

f, g, h

Calibration time

f: hour (24-hour system), g: minute, h: second *i*

Frequency at which pre-selector is tuned

Value	Resolution	Unit
3201 to 6000	1	MHz

Frequency at which level calibration (using power meter) is performed

Value	Resolution	Unit
30 to 6000	1	MHz

■ Restrictions

- For the calibration date, calibration time, and frequency at which the pre-selector is tuned or level calibration (using power meter) is performed, "***" is read out if the calibration status is other than normal end.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Reads out the status of pre-selector tuning.

<Program>
DSPL MODANAL
CALSTAT? PSL

<Response>
0,02,09,13,22,01,52,5170

CALVAL

■ Function

Power Calibration Value
Sets the calibration value by Level Calibration (using PM).

■ Syntax

Program Message	Query Message	Response Message
CALVAL *callevel*	CALVAL?	*calmode, callevel*

■ Parameter

callevel
Calibration value

Range	Resolution	Initial value	Unit
−10.00 to 10.00	0.01	0.00	dB

calmode
Calibration mode

Value	Calibration mode	Initial value
0	Not calibrated	*
1	Internal calibration	
2	External calibration	

□ Suffix code

None: dB
DBM: dB

■ Restrictions

- This command is enabled only when Terminal is other than IQ-DC, IQ-AC, and IQ-Balance (*cf.* TERM).

■ Use example

Sets the calibration value to 5 dB.
<Program>
CALVAL 5.00
CALVAL ?

<Response>
2,5.00

CARRF

■ Function

Carrier Frequency

Outputs the carrier frequency at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CARRF?	*freq*

■ Parameter

freq

Carrier frequency

Resolution	Unit
0.1	Hz

■ Use example

Reads out the carrier frequency.

<Program>

MEAS MODANAL

CARRF?

<Response>

5170000123.4

CARRFERR

■ Function

Carrier Frequency Error

Outputs the carrier frequency error at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CARRFERR? *unit*	*freq*

■ Parameter

unit

Output unit

Value	Output Unit
None	Hz
HZ	Hz
PPM	ppm

freq

Frequency error

Resolution	Out Unit
0.1	Hz
0.001	ppm

■ Use example

Reads out the carrier frequency error.

<Program>

MEAS MODANAL

CARRFERR? HZ

<Response>

−14.5

CARRLK

■ Function

Carrier Leak

Outputs the carrier leak component (sub-carrier 0) at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CARRLK?	*leakpwr*

■ Parameter

leakpwr

Carrier Leak

Resolution	Output Unit
0.01	dB

■ Restrictions

- This command cannot be executed when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).

■ Use example

Reads out the carrier leak.

<Program>

DSPL MODANAL

SWP

CARRLK?

<Response>

−12.34

CCDFDSTRBT

■ Function

Distribution for CCDF

Outputs distribution waveform at CCDF measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CCDFDSTRBT? *a,b,c*	*d(1),b(2),...,d(b)*

■ Parameter

a

Data reading start-position

Range	Resolution	Unit	Measure Method
−50.0 to 50.0	0.1	dB	APD
0.0 to 50.0	0.1	dB	CCDF

b

Number of data reading

Range	Resolution	Measure Method
1 to 1001	1	APD
1 to 501	1	CCDF

c

Output waveform data

Value	Output waveform data
None	Outputs the measured waveform data
0	
1	Outputs the waveform data of Trace set at Save Reference Trace (*cf.* SAVETR_CCDF).
2	Outputs the waveform data of Gaussian Trace.

d(n)

Reading data

Range	Resolution
0.0001 to 1.0000	0.0001

■ Use example

Reads out 5 distribution waveforms from memory address 0.

<Program>

```
DSPL CCDF,CCDF
SWP
CCDFDSTRBT? 0,5
```

<Response>

```
0.5123,0.2432,0.1234,0.1123,0.0123
```

CCERR

■ Function

Chip Clock Error

Outputs the Chip Clock Frequency Error in Chip Clock Error measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CCERR?	*a*

■ Parameter

a

Chip Clock Frequency Error

Resolution	Range	Unit
0.1	−60.0 to +60.0	ppm

- "***" is displayed when the display range is exceeded or the measured results becomes "Signal abnormal."

■ Use example

Outputs the Chip Clock Frequency Error in Chip Clock Error measurement.

<Program>
DSPL CCERR
MEAS CCERR
CCERR?

<Response>
−10.3

CHPWR

■ Function

Adjacent Channel Power

Reads out the result of Adjacent Channel Power measurement.

This command functions the same as the ADJCH command.

■ Syntax

Program Message	Query Message	Response Message
---	CHPWR? *offset*	*level*
---	CHPWR? *offset, unit*	*level*
---	CHPWR? ALL	*low2, low1, up1, up2*
---	CHPWR? ALL, *unit*	*low2, low1, up1, up2*

■ Parameter

offset

Offset frequency

Value	Offset Frequency
LOW2	−40 MHz
LOW1	−20 MHz
UP1	20 MHz
UP2	40 MHz

unit

Unit

Value	Offset Frequency
None	Set value for unit
DB	dB
DBM	dBm
MW	mW
UW	uW
NW	nW

level

Level at the frequency specified by the offset.

Resolution	Unit
0.01	Set value for unit

low2

Level at −40 MHz

Resolution	Unit
0.01	Set value for unit

low1

Level at −20 MHz

Resolution	Unit
0.01	Set value for unit

up1

Level at 20 MHz

Resolution	Unit
0.01	Set value for unit

up2

Level at 40 MHz

Resolution	Unit
0.01	Set value for unit

■ Use example

Reads out the level at the offset frequency 20 MHz at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

SWP

CHPWR? UP1,DB

<Response>

−30.34

CNT_BCH

■ Function

Batch Measurement

Sets the measurement count (the number of measurement processes) for each measurement item at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
CNT_BCH *item, n*	CNT_BCH? *item*	*n*

■ Parameter

item

Measurement Item

mode	Measurement Item	Initial value
MOD	Modulation analysis measurement	1
PWR	RF power measurement	1
OBW	Occupied bandwidth measurement	1
ACP	Adjacent channel power measurement	1
MSK	Spectrum Mask measurement	1

n

Measurement Count

Range	Resolution	Initial value
1 to 999	1	1

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the count of the modulation analysis measurement to 10 (times) at batch measurement.

<Program>

DSPL SETTBL_BCH

CNT_BCH MOD, 10

CNT_BCH? MOD

<Response>

10

CONSTVIEW

■ Function

Constellation View

Sets the waveform display position on the constellation waveform display.

■ Syntax

Program Message	Query Message	Response Message
CONSTVIEW *mode*	CONSTVIEW?	*mode*
CONSTVIEW ONE, *number*	CONSTVIEW? ONE	*number*

■ Parameter

mode: waveform display position

Value of mode	Waveform display position	Initial value
ALL	Displays all the waveforms.	*
FIRST	Displays the first symbol only.	
LAST	Displays the analyzed last symbol only.	
PILOT	Displays the pilot signal of all the symbols.	
OUT	Displays the external sub-carrier (−26, 26) of all the symbols.	

number: sub-carrier number

Value of number	Waveform position
−26 to −1, 1 to 26	Displays Sub-carrier indicated with number.

■ Restrictions

- This setting is valid only when Trace Format is Constellation (*cf.* TRFORM).
- This setting is valid only when Marker is Normal (*cf.* MKR_MOD).
- This setting is invalid when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).
- A setup of first symbol and last symbol is invalid when Target System is HiSWANa and Data Rate is Auto.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays the constellation of sub-carrier－12.

<Program>

```
DSPL MODANAL
TRFORM CONSTEL
SWP
CONSTVIEW ONE, －12
CONSTVIEW? ONE
```

<Response>

```
－12
```

CONTS

■ Function

Continuous Measure/Sweep
Executes continuous measurement and sweeping.
Accepts a command even during a measurement.
Suspends the current measurement and starts a new measurement when a measurement execution command, such as the CONTS command, is received during a measurement.
When an operation command not related to the current measurement (for example, the INTPOL command and query message) is received during a measurement, it continues carrying out the current measurement while responding to the command.
However, when a measurement related command is received during the current measurement, it suspends the measurement and executes the operation requested by the command.

■ Syntax

Program Message	Query Message	Response Message
CONTS	---	---

■ Restrictions

- When the measurement screen is Spurious Emissions or CCDF, measurement and sweeping is not executed continuously but once (same function as the SNGLS command).

■ Use example

Continuously executes measurement and sweeping.
<Program>
CONTS

CORR

■ Function

Correction

Selects a correction data table for level correction.

■ Syntax

Program Message	Query Message	Response Message
CORR *table*	CORR?	*table*

■ Parameter

table

Correction data table

Value	Correction Data Table	Initial value
0	Does not perform data correction.	*
1	Table 1	
2	Table 2	
3	Table 3	
4	Table 4	
5	Table 5	

■ Restrictions

- The setting is not enabled when Terminal is IQ.

■ Initialization command

*RST

■ Use example

Selects Correction Data Table 3.

<Program>

CORR 3

CORR?

<Response>

3

DATRATE

■ Function

Data Rate

Sets the transmission speed of the measured signal.

■ Syntax

Program Message	Query Message	Response Message
DATRATE *rate*	DATRATE?	*rate*

■ Parameter

rate

Transmission speed

Value	Unit	Target System	Initial value
6, 9, 12, 18, 24, 36, 48, 54, AUTO	Mbps	IEEE802.11a, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	24 Mbps
6, 9, 12, 18, 27, 36, 54	Mbps	HiperLAN2	27 Mbps
6, 9, 12, 18, 27, 36, 54,AUTO	Mbps	HiSWANa	27 Mbps
1, 2, 5.5, 11, AUTO	Mbps	IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	11 Mbps

■ Restrictions

- The setting of AUTO is valid only when Measuring Object is Burst.

■ Initialization command

PRE

INI

IP

∗RST

■ Use example

Sets the transmission speed to 48 Mbps.

<Program>

TGTSY 11A

DATRATE48

DATRATE?

<Response>

48

DCOUNT_CCDF

■ Function

Measurement Data Count for CCDF

Sets the number of measured data on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
DCOUNT_CCDF *count*	DCOUNT_CCDF?	*count*

■ Parameter

count

Number of measured data

Value	Resolution	Initial value
10000 to 2000000000	1	1000000

□ Suffix code

None: 1 point

KP: K point

MP: M point

GP: G point

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the number of measured data to 10000.

<Program>

DSPL CCDF,CCDF

DCOUNT_CCDF 10KP

DCOUNT_CCDF?

<Response>

10000

DELTAMKR_CCDF

■ Function

Data marker Value for CCDF

Outputs power deviation and probability of Delta Marker on the CCDF screen.

Outputs either power deviation or probability depending on Display Data Type (*cf.* DISPTYPE_CCDF) after Delta marker is set by setting value of Reference Trace (*cf.* REFTR_CCDF).

Reference Trace	Delta Marker
Save Trace	Measure Trace-Save Trace
Gaussian Trace	Measure Trace-Gaussian Trace
Save & Gaussian	Measure Trace-Save Trace
Off	Not output

Display data Type	Output-format
Distribution	Power deviation
Probability	Probability

■ Syntax

Program Message	Query Message	Response Message
---	DELTAMKR_CCDF?	*a*

■ Parameter

a

Output data

Resolution	Unit	Output-format
0.0001	%	Probability
0.1	dB	Power deviation

■ Restrictions

- When Marker is Off or Reference Trace is Off, output is disabled (*cf.* MKR_CCDF).

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Reads out difference of power deviation.

<Program>

```
DSPL CCDF,CCDF
MKR_CCDF VERT
REFTR_CCDF SAVE
SWP
DELTAMKR_CCDF?
```

<Response>

5.12

DET_ADJ

■ Function

Detection Mode for Adjacent Channel Power
Sets the detection mode for Spectrum Analyzer at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
DET_ADJ *mode*	DET_ADJ?	*mode*

■ Parameter

mode
Detection mode

Value	Mode	Initial value
POS	Sets the detection mode to Positive Peak	*
NEG	Sets the detection mode to Negative Peak	
SMP	Sets the detection mode to Sample	
AVG	Sets the detection mode to Average	
RMS	Sets the detection mode to RMS	

■ Restrictions

- The RMS detection mode can be set only when Option 04 is installed and RBW Mode is set to Digital.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the detection mode for Spectrum Analyzer to Sample at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
DET_ADJ SMP
DET_ADJ?

<Response>
SMP

DET_OBW

■ Function

Detection Mode for Occupied Bandwidth

Sets the detection mode for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
DET_OBW *mode*	DET_OBW?	*mode*

■ Parameter

mode

Detection mode

Value	Mode	Initial value
POS	Sets the detection mode to Positive Peak	*
NEG	Sets the detection mode to Negative Peak	
SMP	Sets the detection mode to Sample	
AVG	Sets the detection mode to Average	
RMS	Sets the detection mode to RMS	

■ Restrictions

- The RMS detection mode can be set only when Option 04 is installed and RBW Mode is set to Digital.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the detection mode for Spectrum Analyzer to Sample at Occupied Bandwidth measurement.

<Program>

DSPL OBW

DET_OBW SMP

DET_OBW?

<Response>

SMP

DET_SMASK

■ Function

Detection Mode for Spectrum Mask

Sets the detection mode for Spectrum Analyzer at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
DET_SMASK *mode*	DET_SMASK?	*mode*

■ Parameter

mode

Detection mode

Value	Mode	Initial value
POS	Sets the detection mode to Positive Peak	*
NEG	Sets the detection mode to Negative Peak	
SMP	Sets the detection mode to Sample	
AVG	Sets the detection mode to Average	
RMS	Sets the detection mode to RMS	

■ Restrictions

- The RMS detection mode can be set only when Option 04 is installed and RBW Mode is set to Digital.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the detection mode for Spectrum Analyzer to Sample at Spectrum Mask measurement.

<Program>
DSPL SMASK
DET_SMASK SMP
DET_SMASK?

<Response>
SMP

DET_SPU

■ Function

Detection Mode for Spurious Emission

Sets the detection mode at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
DET_SPU *a, b*	DET_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SEARCH	At search measurement
SWEEP	At sweep measurement

b

Detection mode

Value	Mode	Initial Value
POS	Positive Peak	*
NEG	Negative Peak	
SMP	Sample	
AVG	Average	
RMS	RMS	

■ Restrictions

- Measurement is performed via detection mode with this command at Search measurement, but is performed by fixing the detection mode to Sample at spurious level measurement.
- The RMS detection mode can be set only when Option 04 is installed and RBW Mode is set to Digital.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

To set the detection mode in spot measurement to Average at spurious emission measurement.

<Program>
DET_SPU SPOT, AVG
DET_SPU? SPOT

<Response>
AVG

DFLTPAR_BCH

■ Function

Batch Measurement

For batch measurement, restores all the parameter values set in the spectrum analyzer for measuring occupied frequency bandwidth, adjacent channel leakage power and spectrum mask to their default values.

■ Syntax

Program Message	Query Message	Response Message
DFLTPAR_BCH	---	---

■ Use example

For batch measurement, restores all the parameter values set in the spectrum analyzer for measuring occupied frequency bandwidth, adjacent channel leakage power and spectrum mask to their default values.

<Program>

DSPL SETTBL_BCH

DFLTPAR_BCH

DISP_REFLVL

■ Function

Reference of waveform display for RF Power
Sets the reference for waveform display on the RF Power Measurement screen.

■ Syntax

Program Message	Query Message	Response Message
DISP_REFLVL *ref*	DISP_REFLVL?	*ref*

■ Parameter

ref: Reference

Value	Reference	Initial Value
AVE	Average: Sets the average power to 0 dB (100%).	*
MAX	Maximum: Sets the maximum power to 0 dB (100%).	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the maximum power as reference.
<Program>
DSPL RFPWR
DISP_REFLVL MAX
DISP_REFLVL?

<Response>
MAX

DISPTYPE_CCDF

■ Function

Display Data Type for CCDF

Sets the display format of grid on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
DISPTYPE_CCDF *a*	DISPTYPE_CCDF?	*a*

■ Parameter

a

Display format of grid

Value	Display format	Initial value
PROB	Displays probability of waveform for grid of vertical axis.	*
DSTRBT	Displays distribution of waveform for grid of horizontal axis.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Distribution to PROB.

<Program>

DSPL CCDF,CCDF

DISPTYPE_CCDF PROB

DISPTYPE_CCDF?

<Response>

PROB

DISPTYPE_SMASK

■ Function

Display Data Type for Spectrum Mask

Sets the method for displaying the measured results at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
DISPTYPE_SMASK *type*	DISPTYPE_SMASK?	*type*

■ Parameter

type

Measurement standard

Value	Description	Initial value
LVL	Displays the measurement level	*
MARGIN	Displays the difference between the measurement level and the template	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays MARGIN as the measured result at Spectrum Mask measurement.

<Program>

DSPL SMASK

DISPTYPE_SMASK MARGIN

DISPTYPE_SMASK?

<Response>

MARGIN

DPTS_ADJ

■ Function

Data Points: 501/1001 for Adjacent Channel Power

Sets the number of data obtained by executing the sweep of Spectrum Analyzer at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
DPTS_ADJ *p*	DPTS _ADJ?	*p*

■ Parameter

p

Number of data

Value	Number of data	Initial value
501	501 points of data	*
1001	1001 points of data	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the number of sweep data for Spectrum Analyzer to 1001 points at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

DPTS_ADJ 1001

DPTS_ADJ?

<Response>

1001

DPTS_OBW

■ Function

Data Points: 501/1001 for Occupied Bandwidth

Sets the number of data obtained by executing the sweep of Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
DPTS_OBW *p*	DPTS _OBW?	*p*

■ Parameter

p

Number of data

Value	Number of data	Initial value
501	501 points of data	*
1001	1001 points of data	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the number of sweep data for Spectrum Analyzer to 1001 points at Occupied Bandwidth measurement.

<Program>
DSPL OBW
DPTS_OBW 1001
DPTS_OBW?

<Response>
1001

DSPL

■ Function

Sets the measurement screen and measurement method, but does not start a measurement.

■ Syntax

Program Message	Query Message	Response Message
DSPL *meas,mode*	DSPL?	*meas,mode*
DSPL *meas*	DSPL?	*meas*

■ Parameter

meas: Name of the measurement screen
mode: Measurement method/template type

Value of meas	Measurement screen name	Value of mode	Measurement method/ template type	Initial value	Input terminal (->TERM)
SETCOM	Setup Common Parameter	None	---	*	RF, IQ-DC IQ-AC IQ-Balance
MODANAL	Modulation Analysis	None	---		
RFPWR	RF Power	None	---		
CCERR	Chip Clock Error	None	---		
SRERR	Symbol Rate Error	None	---		
CCDF	CCDF	CCDF	CCDF		
		APD	APD		
OBW	Occupied Bandwidth	None	---		RF
ADJ	Adjacent Channel Power	SPECT1	Spectrum (All)		
		SPECT2	Spectrum (Separate)		
PWRMTR	Power Meter	None	---		
SMASK	Spectrum Mask	SMASK	Mask		
		SET-TEMP_SMASK	Template		
SPURIOUS	Spurious	SPOT	Spot		
		SEARCH	Search		
		SWEEP	Sweep		
SETTBL_SPU	Setup Table of Spurious	SPOT	Spot		
		SWEEP	Sweep		
BATCH	Batch	None	---		RF, IQ-DC IQ-AC IQ-Balance
SETTBL_BCH	Setup Measure Table	None	---		
IQLVL	IQ Level	None	---		IQ-DC IQ-AC IQ-Balance

■ Restrictions

- Transition to the Chip Clock Error screen is enabled only when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).
- Transition to the Symbol Rate Error screen is enabled only when Target System is IEEE802.11a or IEEE802.11g (ERP-OFDM) or IEEE802.11g(DSSS-OFDM).
- Transition to the Power Meter screen is enabled only when Measuring Object is Continuous.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

[1] Moves to Modulation Analysis screen.
<Program>
DSPL MODANAL
DSPL?

<Response>
MODANAL

[2] Moves APD measurement on the CCDF screen.
<Program>
DSPL CCDF,APD
DSPL?

<Response>
CCDF,APD

ERRSC

■ Function

Error Scale for Constellation

Sets a circle that shows the error range of each symbol in the Constellation display mode at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
ERRSC *scale*	ERRSC?	*scale*

■ Parameter

scale

Error range

Value	Resolution	Initial value
5	5%	
10	10%	
20	20%	
35	35%	
OFF	Off	*

■ Restrictions

- Trace Format must be set to Constellation beforehand (*cf.* TRFORM).
- This setting can be set only when Modulation is BPSK and QPSK (*cf.* MODTYPE).
- Cannot be used when Data Rate is set to Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the error scale to 20%

<Program>
MEAS MODANAL
TRFORM CONSTEL
ERRSC 20
ERRSC?

<Response>
20

EVMSUB

■ Function

EVM vs. Sub-carrier

Reads out EVM every Sub-carrier on the Modulation Analysis.

■ Syntax

Program Message	Query Message	Response Message
---	EVMSUB? *addr,n*	*data(addr),data(addr+1),...,data(addr+n-1)*

■ Parameter

addr

Starting address to read out data

Value	Resolution
0 to 51	1

n

Number of data reading

Value	Resolution
1 to 52	1

mod

Modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation
TOTAL	All modulation

addr(addr)

Results of address addr

Value	Resolution	Output unit
0 to 32768	1	0.01%

■ Data storage method

Address	0	1	---	25	26	---	51
Sub-carrier number	−26	−25	---	−1	1	---	26

■ Restrictions

- This command cannot be executed when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).
- A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Reads out 5 pieces of EVM vs. Sub-carrier from Sub-carrier number-26.

<Program>

MEAS MODANAL

EVMSUB? 0,5

<Response>

123,234,135,257,149

EVMSYM

■ Function

EVM vs. Symbol

Reads out EVM every Symbol on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	EVMSYM? *addr,n*	*data(addr),data(addr+1),...,data(addr+n-1)*

■ Parameter

addr

Starting address to read out data

Target System	Value	Resolution
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	1 to 1367	1
HiSWANa(When Data Rate is not Auto.)	(Analysis Start) to 1367	1
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	0 to 4095	1

n

Number of data reading

Target System	Value	Resolution
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	1 to 1367	1
HiSWANa(When Data Rate is not Auto.)	(Analysis Start) to 1367	1
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1 to 4096	1

data(addr)

Results of address addr

Value	Resolution	Output unit
0 to 32768	1	0.01%

■ Data storage method

Target System	Address	0	1	2	---	1367		4095
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	Symbol number	–	1	2	---	1367		–
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	Chip Number	0	1	2	---	1367	---	4095

■ Use example

Reads out 5 pieces of EVM vs. Symbol from Symbol number 1.

<Program>

MEAS MODANAL

EVMSYM? 1,5

<Response>

123,234,135,257,149

EVM_THRES

■ Function

EVM Threshold

Sets On/Off of threshold of modulation accuracy in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
EVM_THRES on/off	EVM_THRES?	*on/off*

■ Parameter

on/off

Threshold of modulation accuracy *on/off*

Value	Threshold of modulation accuracy on/off	Initial Value
OFF	Does not set threshold of modulation accuracy.	*
ON	Sets threshold of modulation accuracy.	

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Sets in On threshold of modulation accuracy.

<Program>

TGTSY HISWAN
DATRATE AUTO
DSPL MODANAL
EVM_THRES ON
EVM_THRES?

<Response>

ON

FILTER

■ Function

Filter Type

Sets the filter to be used to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) measurement.

■ Syntax

Program Message	Query Message	Response Message
FILTER *type*	FILTER?	*type*

■ Parameter

type

Filter type

Value	Filter Type	Initial Value
OFF	Analyzes signals without using the filter processing.	*
RECT	Analyzes signals that passed through the rectangular filter.	
GAUSS	Analyzes signals that passed through the Gaussian filter.	
RRC	Analyzes signals that passed through the Root Raised Cosine filter.	

■ Restrictions

- This command is enabled when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).

■ Use example

Uses the Gaussian filter.

<Program>

TGTSY 11B

FILTER GAUSS

FILTER?

<Response>

GAUSS

FLATIN

■ Function

Spectrum Flatness

Reads out spectrum flatness of the inside sub-carrier in the Modulation Analysis screen and the Batch Measurement screen.

■ Syntax

Program Message	Query Message	Response Message
---	FLATIN?	*a,b,c,d*

■ Parameter

a

Maximum magnitude value

Resolution	Unit
0.01	dB

b

Sub-carrier number of maximum magnitude value

Resolution	Range
1	−26 to −1, 1 to 26

c

Minimum magnitude value

Resolution	Unit
0.01	dB

d

Sub-carrier number of minimum magnitude value

Resolution	Range
1	−26 to −1, 1 to 26

■ Restrictions

- This command is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) while Measuring Object is Burst, and Terminal is RF.

■ Use example

Reads out spectrum flatness of the inside sub-carrier.

<Program>

```
TGTSY 11A
MEAS MODANAL
FLATIN?
```

<Response>

12.34, −16, −1.23, −10

FLATMEAS

■ Function

Spectrum Flatness
Sets out On/Off of spectrum flatness measurement in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
FLATMEAS *a*	FLATMEAS?	*a*

■ Parameter

a
Flatness measurement

a	Flatness Measurement	Initial Value
ON	Performs Spectrum Flatness measurement.	
OFF	Does not perform Spectrum Flatness measurement.	*

■ Restrictions

- This command is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) while Measuring Object is Burst, and Terminal is RF. But it is not enabled when Data Rate is Auto (for HiSWANa).

■ Use example

Performs spectrum flatness measurement.
<Program>
TGTSY 11A
DSPL MODANAL
FLATMEAS ON
FLATMEAS?

<Response>
ON

FLATOUT

■ Function

Spectrum Flatness

Reads out spectrum flatness of the outside sub-carrier in the Modulation Analysis screen and the Batch Measurement screen.

■ Syntax

Program Message	Query Message	Response Message
---	FLATOUT?	*a,b,c,d*

■ Parameter

a

Maximum magnitude value

Resolution	Unit
0.01	dB

b

Sub-carrier number of maximum magnitude value

Resolution	Range
1	−26 to −1, 1 to 26

c

Minimum magnitude value

Resolution	Unit
0.01	dB

d

Sub-carrier number of minimum magnitude value

Resolution	Range
1	−26 to −1, 1 to 26

■ Restrictions

- This command is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) while Measuring Object is Burst, and Terminal is RF.

■ Use example

Reads out spectrum flatness of the outside sub-carrier.

<Program>

TGTSY 11A

MEAS MODANAL

FLATOUT?

<Response>

12.34, −26, −1.23, −17

FREQ

■ Function

Frequency

Sets the carrier frequency for the frequency targeted to be measured.

■ Syntax

Program Message	Query Message	Response Message
FREQ *freq*	FREQ?	*freq*

■ Parameter

freq

Carrier frequency

Range	Target System	Resolution	Initial value	Unit
100000000 to 3000000000	IEEE802.11b, IEEE802.11g	1	2412000000	Hz
100000000 to 6000000000	IEEE802.11a, HiperLAN2, HiSWANa		5170000000	

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHz, GZ: GHz

■ Restrictions

- This setting is not enabled when Terminal is not RF (*cf.* TERM).
- For the MS2681A, the setting range is from 100 MHz to 3 GHz regardless of Target System. Initial value is 2412 MHz.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the carrier frequency to 1 GHz.

<Program>

```
TERM RF
FREQ 1GHZ
FREQ?
```

<Response>

```
1000000000
```

FSPAN_OBW

■ Function

Frequency Span for Occupied Bandwidth
Reads out the sweep frequency span for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
---	FSPAN_OBW?	*freq*

■ Parameter

freq
Sweep frequency span

Resolution	Unit
100000	Hz

■ Use example

Reads out the sweep frequency span for Spectrum Analyzer at Occupied Bandwidth measurement.
<Program>
DSPL OBW
FSPAN_OBW?

<Response>
60000000

GAUSSBT

■ Function

Bandwidth-Time

Sets the BT product of the Gaussian filter to be used to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) measurement.

■ Syntax

Program Message	Query Message	Response Message
GAUSSBT *bt*	GAUSSBT?	*bt*

■ Parameter

bt

BT product

Value	Resolution	Initial Value
0.3 to 1.0	0.1	0.5

■ Restrictions

- This command is enabled only when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) and Filter Type is Gaussian Filter (*cf.* TGTSY, FILTER).

■ Use example

Sets the BT product to 0.3.

<Program>

TGTSY 11B

FILTER GAUSS

GAUSSBT 0.3

GAUSSBT?

<Response>

0.3

HSCALE_CCDF

■ Function

Horizontal Scale for CCDF

Sets the scale of horizontal axis of trace on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
HSCALE_CCDF *scale*	HSCALE_CCDF?	*scale*

■ Parameter

scale

Setting trace

Value	Maximum value on horizontal axis (Absolute value)	Initial value
2	2 dB	
5	5 dB	
10	10 dB	
20	20 dB	*
50	50 dB	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Horizontal scale to 2 dB.

<Program>

DSPL CCDF,CCDF

HSCALE_CCDF 2

HSCALE_CCDF?

<Response>

2

ICONST

■ Function

I Constellation

Reads out Constellation data of I-signal on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	ICONST? *addr,n,mod*	*data(addr),data(addr+1),...,data(addr+n-1)*
---	ICONST? EYE,*addr,n*	*data(addr),data(addr+1),...,data(addr+n-1)*

■ Parameter

addr

Starting address to read out data

Target System	Value
Other than the below	0 to 71083
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	0 to 4095

n

Number of data reading

Target System	Value
Other than the below	1 to 71084
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1 to 4096

mod

Modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation

data(addr)

Results of address addr

Value	Resolution
–32768 to 32767	1

- Sets in an integer of 0.001 unit so that an ideal signal “1” is 1000.

■ Data storage method

Target System: IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

Address	0	1	---	51	52	---	103	---	71083
Symbol number	1				2			---	1367
Sub-carrier number	−26	−25	---	26	−26	---	26	---	26

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) (Constellation data)

Address	0	1	---	4095
Chip Number	0	1	---	4095

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) (Eye Diagram data)

Address	0	1	---	40950
Chip Number	0.0	0.1	---	4095.0

■ Use example

Reads out 5 pieces of constellation data from memory address 0.

<Program>

MEAS MODANAL

ICONST? 0,5

<Response>

1234,2345,1357,2579,1496

■ Note

・Output data will have a semicolon (;) added as a separator after every 5.000th data item if more than 5,000 data items in ASCII format are read out.

For example, the following shows a response message when 10,000 data items are read out:

data1,data2,data3,…,data4999,data5000;data5001,data5002,…,data9999,data10000

Note that a semicolon (;), not a comma (,), is inserted between data5000 and data5001.

・A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

ILVL

■ Function

I Level (RMS)

Reads out the measured results of the I-signal RMS value on the IQ Level screen.

■ Syntax

Program Message	Query Message	Response Message
---	ILVL? *unit*	*rms*

■ Parameter

unit

Readout unit

Value	Readout unit
None	Current set unit (*cf.* UNIT_IQL)
MV	mV
DBMV	dBmV

rms

RMS value of I signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

■ Use example

Reads out the I Level (RMS) value.

<Program>

TERM IQAC

MEAS IQLVL

ILVL? MV

<Response>

1.42

INI

■ Function

Initialize

Initializes all the measurement control parameters to be enabled for initialization. This command functions the same as the PRE and IP commands.

■ Syntax

Program Message	Query Message	Response Message
INI	---	---

■ Use example

Initializes all the parameters to be enabled for initialization.

<Program>

INI

INTEG_ADJ

■ Function

Integral for Adjacent Channel Leakage Power
Reads out waveform integrated to the channel width on the Adjacent Channel Leakage Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	INTEG _ADJ? *a, b*	*c(a), c(a+1),....,c(a+b− 1)*

■ Parameter

a

Read Out Starting Position

Data Point	a	Resolution
1001	90 to 910	1
501	45 to 455	1

b

Read Out Count

Data Point	b	Resolution
1001	1 to 821	1
501	1 to 411	1

c(a)

a-th integrated waveform data

Resolution	Unit
1	dB

* Output in 0.01 dB units assuming 1 dB = 100

■ Restrictions

- This function is enabled only when Measure Method is set to Spectrum (All).

■ Use example

Reads out 5 integrated waveforms starting from address 100.

<Program>
DSPL ADJ,SPECT1
SWP
INTEG_ADJ? 100,5

<Response>
−6345, −6346, −6347, −5346, −5345

INTVAL_ADJ

■ Function

Refresh Interval for Adjacent Channel Power

Sets the display updating interval when Storage Mode is set to Average at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_ADJ *intval*	INTVAL_ADJ?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every one sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value by the times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

INTVAL_ADJ ONCE

INTVAL_ADJ?

<Response>

ONCE

INTVAL_CCERR

■ Function

Refresh Interval for Chip Clock Error

Sets the display updating interval when Storage Mode is set to Average in Chip Clock Error measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_CCERR *intval*	INTVAL_CCERR?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every sweep. Calculates and displays the average value among the number of measurements up to the last sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value among the number of times specified by Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval in Chip Clock Error measurement to Once.

<Program>

DSPL CCERR

STRG_CCERR AVG

INTVAL_CCERR ONCE

INTVAL_CCERR?

<Response>

ONCE

INTVAL_IQL

■ Function

Refresh Interval for IQ Level

Sets the display updating interval when Storage Mode is set to Average in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_IQL *intval*	INTVAL_IQL?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every sweep. Calculates the average value among the number of measurements up to the last sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value among the number of times specified by Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once.

<Program>

TERM IQAC

MEAS IQLVL

INTVAL_IQL ONCE

INTVAL_IQL?

<Response>

ONCE

INTVAL_MOD

■ Function

Refresh Interval for Modulation Analysis

Sets the display updating interval when Storage Mode is set to Average at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_MOD *intval*	INTVAL_MOD?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every one sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value by the times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once.

<Program>

DSPL MODANAL

STRG_MOD AVG

INTVAL_MOD ONCE

INTVAL_MOD?

<Response>

ONCE

INTVAL_OBW

■ Function

Refresh Interval for Occupied Bandwidth

Sets the display updating interval when Storage Mode is set to Average at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_OBW *intval*	INTVAL_OBW?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every one sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value by the times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once at Occupied Bandwidth measurement.

<Program>

DSPL OBW

INTVAL_OBW ONCE

INTVAL _OBW?

<Response>

ONCE

INTVAL_RFPWR

■ Function

Refresh Interval for RF Power

Sets the display updating interval when Storage Mode is set to Average at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_RFPWR *intval*	INTVAL_RFPWR?	*intval*

■ Parameter

intval

Updating interval

Value	Updating Interval	Initial Value
EVERY	Updates the display after every one sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates and displays the average value by the number of times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once.

<Program>

DSPL RFPWR

STRG_RFPWR AVG

INTVAL_RFPWR ONCE

INTVAL_RFPWR?

<Response>

ONCE

INTVAL_SRERR

■ Function

Refresh Interval for Symbol Rate Error

Sets the display updating interval when Storage Mode is set to Average in Symbol Rate Error measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_SRERR *intval*	INTVAL_SRERR?	*Intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every sweep. Calculates and displays the average value among the number of measurements up to the last sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value among the number of times specified by Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval in Symbol Rate Error measurement to Once.

<Program>

DSPL SRERR

STRG_SRERR AVG

INTVAL_SRERR ONCE

INTVAL_SRERR?

<Response>

ONCE

INTVAL_SMASK

■ Function

Refresh Interval for Spectrum Mask

Sets the display updating interval when Storage Mode is set to Average at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_SMASK *intval*	INTVAL_ SMASK?	*intval*

■ Parameter

intval

Updating interval

Value	Updating interval	Initial value
EVERY	Updates the display after every one sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after completion of averaging. Calculates the average value by the times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval to Once at Spectrum Mask measurement.

<Program>

DSPL SMASK

INTVAL_ SMASK ONCE

INTVAL _ SMASK?

<Response>

ONCE

INTVAL_SPU

■ Function

Refresh Interval for Spurious Emission

Sets the display updating interval when storage mode is set to Average at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_SPU *intval*	INTVAL_SPU?	*intval*

■ Parameter

intval

Updating Interval

Value	Updating interval	Initial value
EVERY	Updates the display after every sweep. Calculates and displays the average value by the number of measurements repeated by that sweep.	*
ONCE	Updates the display once after averaging. Calculates the average value by the times specified with Average Count.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the updating interval in Once at spurious emission measurement.

<Program>

DSPL SPURIOUS, SWEEP

INTVAL_SPU ONCE

INTVAL_SPU?

<Response>

ONCE

IP

■ Function

Preset

Initializes all the measurement control parameters to be enabled for initialization. This command functions the same as the PRE and INI commands.

■ Syntax

Program Message	Query Message	Response Message
IP	---	---

■ Use example

Initializes all the parameters to be enabled for initialization.

<Program>

IP

IPPLVL

■ Function

I Level (Peak to Peak)

Reads out the measured results of the Peak-to-Peak value for I signal in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IPPLVL? *unit*	*pp*

■ Parameter

unit

Readout unit

Value	Readout unit
None	Current set unit
MV	mV
DBMV	dBmV

pp

Peak-to-Peak value for I signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

■ Use example

Reads out the I Level (Peak to Peak) value

<Program>

TERM IQAC

MEAS IQLVL

IPPLVL? MV

<Response>

4.07

IQINZ

■ Function

IQ Impedance

Sets the input impedance of the IQ signal on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
IQINZ *r*	IQINZ?	*r*

■ Parameter

r

Impedance

Value	Impedance	Initial Value
50	50 Ω	*
1 M	1 MΩ	

■ Restrictions

- The setting can be made only when the measurement screen is Setup Common Parameter (*cf.* DSPL).
- The setting can be made only when Terminal is IQ-AC, IQ-DC, or IQ-Balance (*cf.* TERM).

■ Use example

Reads out I Level (Peak to Peak) value.

<Program>

DSPL SETCOM
TERM IQAC
IQINZ 50
IQINZ?

<Response>

50

■ Restrictions due to options and equipment

This command is enabled when option MS268*A-17 or 18 I/Q input is installed.

IQLVL

■ Function

IQ Level

Reads out the measured results of the RMS values and the peak-to-peak values for I and Q signals in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IQLVL? *unit*	*Irms,Qrms,Ipp,Qpp*

■ Parameter

unit

Readout unit

Value	Readout unit
None	Current set unit (*cf.* UNIT_IQL)
MV	mV
DBMV	dBmV

Irms

RMS value for I signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

Qrms

RMS value for Q signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

Ipp

Peak-to-Peak value for I signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

Qpp

Peak-to-Peak value for Q signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

■ Use example

Reads out the IQ Level value

<Program>

TERM IQAC

MEAS IQLVL

IQLVL? MV

<Response>

1.42,0.53,4.07,3.55

IQPHASE

■ Function

IQ Phase difference

Reads out the measured results of the phase difference between I/Q signals in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IQPHASE?	*phase*

■ Parameter

phase

Phase difference between I/Q signals

Resolution	Unit
0.01	deg

■ Use example

Reads out the phase difference between I/Q signals.

<Program>

TERM IQAC

MEAS IQLVL

IQPHASE?

<Response>

99.97

JUDGE_BCH

■ Function

Batch Measurement

Reads out pass/fail judgement results at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
---	JUDGE_BCH? *item*	*pass/fail*
---	JUDGE_BCH? *n*	*a1, a2 …, am*

■ Parameter

item

Judgement item

item	Judgement Item
MOD	Pass/fail judgement result for modulation analysis measurement
PWR	Pass/fail judgement result for RF power measurement
OBW	Pass/fail judgement result for occupied bandwidth measurement
ACP	Pass/fail judgement result for adjacent channel power measurement
MSK	Pass/fail judgement result for spectrum mask measurement
SPR1	Pass/fail judgement result for spurious emission 1 measurement
SPR2	Pass/fail judgement result for spurious emission 2 measurement
TTL	Pass/fail judgement result for all measurement items above

pass/fail

Judgement item

pass/fail	Judgement Result
1	Pass/fail judgement result is “PASS”.
0	Pass/fail judgement result is “FAIL”.
−1	Unmeasured or not to be targeted for judgement

n

Judgement item selection

Hexadecimal value converted from 8-bit binary data

a	b	c	d	e	f	g	h

1: Returns the result; 0: Does not return the result
h: Result for all measurement items
g: Result for spurious emission 2 measurement
f: Result for spurious emission 1 measurement
e: Result for spectrum mask measurement
d: Result for adjacent power channel measurement
c: Result for OBW measurement
b: Result for RF power measurement
a: Result for modulation analysis measurement

e.g. To obtain the pass/fail judgement results for modulation analysis and RF power measurements:
C0 (11000000)

a1, a2, ..., am

Judgement results

Outputs pass/fail judgement results for the selected items delimiting by a comma (,).

Ra, Rb, Rc, Rd, Re, Rf, Rg, Rh

1: Judgment result is "PASS".
0: Judgment result is "FAIL".
–1: Unmeasured or not to be targeted for judgment
h: Result for all measurement items
g: Result for spurious emission 2 measurement
f: Result for spurious emission 1 measurement
e: Result for spectrum mask measurement
d: Result for adjacent power channel measurement
c: Result for OBW measurement
b: Result for RF power measurement
a: Result for modulation analysis measurement

am	Judgement Result
1	Pass/fail judgement result is "PASS".
0	Pass/fail judgement result is "FAIL".
−1	Unmeasured or not to be targeted for judgement

e.g. The pass/fail judgement results for modulation analysis and RF power measurements:
1,0

■ Use example

Reads out the pass/fail judgement result of the modulation analysis measurement at batch measurement.

<Program>

```
DSPL BATCH
JUDGE_BCH? MOD
```

<Response>

```
1
```

JUDGUNIT_SPTBL

■ Function

Judgement for Spurious Emission

Sets whether results judgement is performed by absolute or relative value in spot measurement at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SPTBL *a*	JUDGUNIT_SPTBL? *a*	*a*

■ Parameter

a

Judgement Method

<table>
<tr><th>Value</th><th>Description</th><th>Initial Value</th></tr>
<tr><td>ABS</td><td rowspan="2">Use absolute value (dBm, xW/MHz).</td><td rowspan="2">*</td></tr>
<tr><td>ON</td></tr>
<tr><td>REL</td><td rowspan="2">Use relative value (dB).</td><td rowspan="2"></td></tr>
<tr><td>OFF</td></tr>
<tr><td>RELABS</td><td>Perform judgement at severe condition among absolute, relative value.</td><td></td></tr>
</table>

■ Restrictions

- Value is absolute if xW/MHz is set as unit.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets for judgement results by absolute value in spot measurement at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SPOT

JUDGUNIT_SPTBL ABS

JUDGUNIT_SPTBL?

<Response>

ABS

JUDGUNIT_SPU

■ Function

Judgement Unit for Spurious Emission
Sets results judgement units in spot measurement at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SPU *unit*	JUDGUNIT_SPU? *unit*	*unit*

■ Parameter

unit
Unit

Unit	Description
DB	Use dBm for absolute value judgement and dB for relative value judgement.
W_MHZ	Use xW/MHz for absolute value judgement.

■ Restrictions

- Relative value judgement is automatically switched to magnitude judgement if xW/MHz is set.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets xW/MHz as a results judgement unit in spot measurement at spurious emission measurement.
<Program>
DSPL SETTBL_SPU,SPOT
JUDGUNIT_SPU W_MHZ
JUDGUNIT_SPU?

<Response>
W_MHZ

JUDGUNIT_SWTBL

■ Function

Judgement Unit for Spurious Emission

Sets whether to use absolute value or relative value for pass/fail judgement in Search/Sweep measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SWTBL *a*	JUDGUNIT_SWTBL?	*a*

■ Parameter

a

ABS/REL

a	Description	Initial Value
ABS ON	Use absolute value (dBm, xW/MHz, xW).	*
REL OFF	Use relative value (dB).	
RELABS	Perform judgement under whichever condition is more severe: absolute value or relative value.	

■ Restrictions

- Relative value judgement is disabled if xW/MHz or xW is set.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Performs judgement using absolute value.

<Program>
DSPL SETTBL_SPU,SWEEP
JUDGUNIT_SWTBL ABS
JUDGUNIT_SWTBL?

<Response>
ABS

JUDGUNIT_SWU

■ Function

Judgement Unit for Spurious Emission
Sets pass/fail judgement units in Search/Sweep measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SWU *a*	JUDGUNIT_SWU?	*a*

■ Parameter

a
Unit

Unit	Description
DB	Use dBm for absolute value judgement and dB for relative value judgement.
W_MHZ	Use xW/MHz for absolute value judgement.
W	Use xW for absolute value judgement.

■ Restrictions

- Relative value judgement is disabled if xW/MHz or xW is set.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets xW/MHz as the judgement unit.
<Program>
DSPL SETTBL_SPU,SWEEP
JUDGUNIT_SWU W_MHZ
JUDGUNIT_SWU?

<Response>
W_MHZ

LMTACP_BCH

■ Function

Batch Measurement

Sets the judgement value for adjacent channel power at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTACP_BCH *b, c, a*	LMTACP_BCH? *b, c*	*a*
LMTACP_BCH *b, c, NULL*	LMTACP_BCH? *b, c*	*NULL*

■ Parameter

b

Offset Frequency Type

b	Offset Frequency Type
20M	20 MHz offset adjacent channel power
40M	40 MHz offset adjacent channel power

c

Item Type

c	Type
VAL	Threshold value
UNT	Unit

NULL cannot be specified when c is set to UNT.

a

Adjacent Channel Power Range

Unit	Range	Resolution
mW	0.001 to 999.999	0.001
dB	−99.99 to 0.00	0.01
dBm	−99.99 to 40.00	0.01

Initial Value for Adjacent Channel Power

b	Unit	Initial Value
20M	mW	0.500
	dB	−25.00
	dBm	NULL
40M	mW	0.016
	dB	−40.00
	dBm	NULL

Unit for Adjacent Channel Power

a	Unit	Initial Value
DB	dB	*
DBM	dBm	
MW	mW	

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the system is IEEE802.11a, HiperLAN2 or HiSWANa.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for 20 MHz offset of adjacent channel power to −50 dBm at batch measurement.

<Program>

```
DSPL SETTBL_BCH
LMTACP_BCH 20M, UNT, DBM
LMTACP_BCH 20M, VAL, −50
LMTACP_BCH? 20M, VAL
```

<Response>

```
−50.00
```

LMTEVM_BCH

■ Function

Batch Measurement

Sets the judgement value for EVM at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTEVM_BCH *b, a*	LMTEVM_BCH? *b*	*a*
LMTEVM_BCH *b, NULL*	LMTEVM_BCH? *b*	*NULL*

■ Parameter

b

Item

b	Item
RMS	rms value
PEK	peal value
UNT	Unit of rms value

NULL cannot be specified when b is set to UNT.

a

Judgement Value for rms Value

Unit	Range	Resolution	Initial value	
			IEEE802.11b	Other than IEEE802.11b
%	0.30 to 99.99	0.01	NULL	15.00
dB	−50.00 to 0.00	0.01	---	–16.00

Judgement Value for peak Value

Range	Resolution	Unit	Initial value	
			IEEE802.11b	Other than IEEE802.11b
0.30 to 99.99	0.01	%	35.00	NULL

Unit of rms Value

a	Unit	Initial value
DB	dB	*
PER	%	

NULL indicates “not to be targeted for judgement” irrespective of whether b is RMS, PEK or UNT.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for EVM to 20% (rms) at batch measurement.

<Program>

```
DSPL SETTBL_BCH
LMTEVT_BCH UNT, PER
LMTEVT_BCH RMS, 20
LMTEVT_BCH? RMS
```

<Response>

20

LMTFLT_BCH

■ Function

Batch Measurement

Sets the judgement value for flatness at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTFLT_BCH *b, a*	LMTFLT_BCH? *b*	*a*
LMTFLT_BCH *b, NULL*	LMTFLT_BCH? *b*	*NULL*

■ Parameter

b

Item

b	Item
INLOW	Lower limit value for inside
INUP	Upper limit value for inside
OUTLOW	Lower limit value for outside
OUTUP	Upper limit value for outside

a

Judgement Value for Flatness

b	Range	Unit	Resolution	Initial value
INLOW	−20.00 to inside upper limit value	dB	0.01	−2.00
INUP	Inside lower limit value to +20.00	dB	0.01	+2.00
OUTLOW	−20.00 to outside upper limit value	dB	0.01	−4.00
OUTUP	outside lower limit value to +20.00	dB	0.01	+2.00

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the system is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM), the signal status is Burst and input is RF.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the judgement value for inside lower limit of flatness to −0.5 dB at batch measurement.

<Program>

```
DSPL SETTBL_BCH
LMTFLT_BCH INLOW, −0.5
LMTFLT_BCH? INLOW
```

<Response>

−0.5

LMTFRERR_BCH

■ Function

Batch Measurement
Sets the judgement value for frequency errors at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTFRERR_BCH *b, a*	LMTFRERR_BCH? *b*	*a*
LMTFRERR_BCH *b, NULL*	LMTFRERR_BCH? *b*	*NULL*

■ Parameter

b
Item

b	Item
ERR	Frequency error
UNT	Unit

NULL cannot be specified when b is set to UNT.

a
Judgement Value for Frequency Error (when b is ERR)

Unit	Range	Resolution	Initial value
Hz	0.0 to 200000.0	0.1	120000.0
ppm	0.000 to 99.999	0.001	20.000

Unit (when b is UNT)

a	Unit	Initial value
PPM	ppm	*
HZ	Hz	

NULL indicates “not to be targeted for judgement” irrespective of whether b is ERR or UNT.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for frequency errors to 10 kHz at batch measurement.

<Program>

```
DSPL SETTBL_BCH
LMTFRERR_BCH UNT, HZ
LMTFRERR_BCH ERR, 10000
LMTFRERR_BCH? ERR
```

<Response>

```
10000.0
```

LMTLEAK_BCH

■ Function

Batch Measurement
Sets the judgement value for carrier leak at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTLEAK_BCH *a*	LMTLEAK_BCH?	*a*
LMTLEAK_BCH *NULL*	LMTLEAK_BCH?	*NULL*

■ Parameter

a
Judgement Value for Carrier Leak

Range	Resolution	Unit	Initial Value
−50.00 to 50.00	0.01	dB	−15.00

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the system is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for carrier leak to 40 dB at batch measurement.
<Program>
DSPL SETTBL_BCH
LMTLEAK_BCH 40
LMTLEAK_BCH?

<Response>
40

LMTMGERR_BCH

■ Function

Batch Measurement

Sets the judgement value for magnitude errors at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTMGERR_BCH *a*	LMTMGERR_BCH?	*a*
LMTMGERR_BCH *NULL*	LMTMGERR_BCH?	*NULL*

■ Parameter

a

Judgement Value for Magnitude Error

Range	Unit	Resolution	Initial Value
0.01 to 99.99	%	0.01	NULL

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid when the system is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for magnitude errors to 10% at batch measurement.

<Program>
DSPL SETTBL_BCH
LMTMGERR_BCH 10
LMTMGERR_BCH?

<Response>
10

LMTOBW_BCH

■ Function

Batch Measurement
Sets the judgement value for occupied bandwidth at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTOBW_BCH *b, a*	LMTOBW_BCH? *b*	*a*
LMTOBW_BCH *b, NULL*	LMTOBW_BCH? *b*	*NULL*

■ Parameter

a
Judgement Value for Occupied Bandwidth

b	Range	Resolution	Unit
99	0.00 to 40.00	0.01	MHz
90	0.00 to 40.00	0.01	MHz

b
Item

b	Item
99	99% bandwidth
90	90% bandwidth (spreading bandwidth)

Initial Value for Occupied Bandwidth

<table>
<tr><th>b</th><th>System</th><th>Measurement Standard</th><th>Initial Value</th></tr>
<tr><td rowspan="3">99</td><td>IEEE802.11b,
IEEE802.11g (ERP-DSSS/CCK)</td><td>---</td><td>26.00</td></tr>
<tr><td rowspan="2">Other than the above</td><td>TELEC standard (Indoor)</td><td>18.00</td></tr>
<tr><td>TELEC standard (Outdoor)</td><td>19.70</td></tr>
<tr><td>90</td><td>IEEE802.11b,
IEEE802.11g (ERP-DSSS/CCK)</td><td>---</td><td>0.50</td></tr>
</table>

NULL indicates “not to be targeted for judgement”.

■ Restrictions

• Setting *b* to 90 is possible when the system is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the judgement value for occupied bandwidth (99% bandwidth) to 17.5 MHz at batch measurement.

<Program>

DSPL SETTBL_BCH

LMTOBW_BCH 99, 17.5

LMTOBW_BCH? 99

<Response>

17.5

LMTOFPWR_BCH

■ Function

Batch Measurement

Sets the judgement value for Carrier Off Power at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTOFPWR_BCH *b, a*	LMTOFPWR_BCH? *b*	*a*
LMTOFPWR_BCH *b, NULL*	LMTOFPWR_BCH? *b*	*NULL*

■ Parameter

a

Judgement Value for Carrier Off Power

Unit	Range	Resolution	Initial value
dBm	−99.99 to 40.00	0.01	NULL
mW	0.001 to 999.999	0.001	NULL

b

Item

b	Item
PWR	Carrier Off Power
UNT	Unit

NULL cannot be specified when be is set to UNT.

Unit of Carrier Off Power

a	Unit	Initial value
MW	mW	*
DBM	dBm	

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the signal status is Burst.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the judgement value for Carrier Off Power to −40 dBm at batch measurement.

<Program>

```
DSPL SETTBL_BCH
LMTOFPWR_BCH UNT, DBM
LMTOFPWR_BCH PWR, −40
LMTOFPWR_BCH? PWR
```

<Response>

```
−40.00
```

LMTORG_BCH

■ Function

Batch Measurement
Sets the judgement value for origin offset at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTORG_BCH *a*	LMTORG_BCH?	*a*
LMTORG_BCH *NULL*	LMTORG_BCH?	*NULL*

■ Parameter

a

Judgement Value for Origin Offset

Range	Unit	Resolution	Initial Value
−99.99 to 0.00	dB	0.01	NULL

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid when the system is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for origin offset to −40 dB at batch measurement.
<Program>
DSPL SETTBL_BCH
LMTORG_BCH −40
LMTORG_BCH?

<Response>
−40

LMTPHERR_BCH

■ Function

Batch Measurement

Sets the judgement value for phase errors at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTPHERR_BCH *a*	LMTPHERR_BCH?	*a*
LMTPHERR_BCH *NULL*	LMTPHERR_BCH?	*NULL*

■ Parameter

a

Judgement Value for Phase Error

Range	Unit	Resolution	Initial Value
0.01 to 180.00	deg	0.01	NULL

NULL indicates "not to be targeted for judgement".

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for phase errors to 20 deg at batch measurement.

<Program>
DSPL SETTBL_BCH
LMTPHERR_BCH 20
LMTPHERR_BCH?

<Response>
20

LMTPWR_BCH

■ Function

Batch Measurement
Sets the judgement value for TX Power at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTPWR_BCH *b, a*	LMTPWR_BCH? *b*	*a*
LMTPWR_BCH *b, NULL*	LMTPWR_BCH? *b*	*NULL*

■ Parameter

a
Judgement Value for TX Power

Unit	b	Range	Resolution	Initial value
MW	UP	Lower limit value to 999.999	0.001	300.000
	LOW	0.001 to upper limit value	0.001	50.000
DBm	UP	Lower limit value to 40.00	0.01	24.77
	LOW	−60.00 to upper limit value	0.01	17.00

b
Item

b	Item
UP	Upper limit value
LOW	Lower limit value
UNT	Unit

NULL cannot be specified when b is set to UNT.

Unit

a	Unit	Initial value
MW	mW	*
DBM	dBm	

NULL indicates “not to be targeted for judgement” irrespective of whether b is UP, LOW or UNT.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for upper limit of TX Power to 20 mW at batch measurement.

<Program>

DSPL SETTBL_BCH
LMTPWR_BCH UP, 20
LMTPWR_BCH? UP

<Response>

20.000

LMTRAMP_BCH

■ Function

Batch Measurement
Sets the judgement value for ramp time at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTRAMP_BCH *a*	LMTRAMP_BCH?	*a*
LMTRAMP_BCH *NULL*	LMTRAMP_BCH?	*NULL*

■ Parameter

a
Judgement Value for Ramp Time

Range	Unit	Resolution	Initial Value
0.00 to 20.00	us	0.01	2.00

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the system is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) and the signal status is Burst.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for ramp time to 2 us at batch measurement.
<Program>
DSPL SETTBL_BCH
LMTRAMP_BCH 2
LMTRAMP_BCH?

<Response>
2.00

LMTRATIO_BCH

■ Function

Batch Measurement
Sets the judgement value for On/Off ratio at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
LMTRATIO_BCH *a*	LMTRATIO_BCH?	*a*
LMTRATIO_BCH *NULL*	LMTRATIO_BCH?	*NULL*

■ Parameter

a
Judgement Value for On/Off Ratio

Range	Unit	Resolution	Initial Value
0.00 to 99.99	dB	0.01	NULL

NULL indicates “not to be targeted for judgement”.

■ Restrictions

- This command is valid only when the signal status is Burst.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the judgement value for On/Off ratio to 50 dB at batch measurement.
<Program>
DSPL SETTBL_BCH
LMTRATIO_BCH 50
LMTRATIO_BCH?

<Response>
50.00

LVLCAL

■ Function

Level Calibration

Performs level calibration using the built-in calibration signal of the measuring instrument as the absolute-value reference.

■ Syntax

Program Message	Query Message	Response Message
LVLCAL	---	---

■ Restrictions

- This command cannot be executed when the measurement screen is Setup Common Parameter (*cf.* DSPL).
- This command is enabled only when Terminal is RF (*cf.* TERM).

■ Use example

Executes level calibration.

<Program>

DSPL RFPWR

LVLCAL

■ Note

- The instrument will be in a non-calibrated status if the power is turned on or initialization process is performed.

MAGTDERR

■ Function

Magnitude Error

Outputs a Magnitude Error at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MAGTDERR?	*err*

■ Parameter

err

Magnitude Error

Resolution	Unit
0.01	%

■ Restrictions

- This command is enabled when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).

■ Use example

Reads out Magnitude Error.

<Program>

TGTSY 11B

MEAS MODANAL

MAGTDERR?

<Response>

12.34

MAXPWR

■ Function

Maximum Power

Outputs the ratio between the maximum momentary and reference of power in one slot at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MAXPWR? *unit*	*maxpwr*

■ Parameter

unit

Output unit

Value	Output Unit	Output Description
DBM	dBm	Maximum power
WATT	W	Maximum power
DB	dB	Ratio to reference
PC	%	Ratio to reference

maxpwr

Maximum power

Output Unit	Resolution
dBm	0.01
W	Four significant digits
dB	0.01
%	0.01

■ Use example

Reads out the Maximum Power dBm value of.

<Program>

MEAS RFPWR

MAXPWR? DBM

<Response>

23.45

MEAS

■ Function

Sets the measurement screen and measurement method, and starts measurement.
When the previous measurement is not a continuous measurement, a Single measurement is executed. On the other hand, when the previous measurement is a continuous one, a continuous measurement is executed.

■ Syntax

Program Message	Query Message	Response Message
MEAS *meas, mode*	MEAS?	*meas, mode*
MEAS *meas*	MEAS?	*meas*

■ Parameter

meas: measurement screen name; *mode:* measurement method/template type

Value of meas	Measurement screen name	Value of mode	Measurement method/ template type	Initial value	Input terminal (->TERM)
SETCOM	Setup Common Parameter	None	---	*	RF, IQ-DC IQ-AC IQ-Balance
MODANAL	Modulation Analysis	None	---		
RFPWR	RF Power	None	---		
CCERR	Chip Clock Error	None	---		
SRERR	Symbol Rate Error	None	---		
CCDF	CCDF	CCDF	CCDF		
		APD	APD		
OBW	Occupied Bandwidth	None	---		RF
ADJ	Adjacent Channel Power	SPECT1	Spectrum (All)		
		SPECT2	Spectrum (Separate)		
PWRMTR	Power Meter	None	---		
SMASK	Spectrum Mask	SMASK	Mask		
		SET-TEMP_SMASK	Template		
SPURIOUS	Spurious	SPOT	Spot		
		SEARCH	Search		
		SWEEP	Sweep		
SETTBL_SPU	Setup Table of Spurious	SPOT	Spot		
		SWEEP	Sweep		
BATCH	Batch	None	---		RF, IQ-DC IQ-AC IQ-Balance
SETTBL_BCH	Setup Measure Table	None	---		
IQLVL	IQ Level	None	---		IQ-DC IQ-AC IQ-Balance

■ Restrictions

- Transition to the Chip Clock Error screen and measurement on the Chip Clock Error screen are enabled only when Target System is IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK).
- Transition to the Symbol Rate Error screen and measurement on the Symbol Rate Error screen are enabled only when Target System is IEEE802.11a, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

[1] Moves the screen to the Modulation Analysis screen to perform a measurement.
<Program>
MEAS MODANAL
MEAS?

<Response>
MODANAL

[2] Moves the screen to APD measurement on the CCDF screen.
<Program>
MEAS CCDF,APD
MEAS?

<Response>
CCDF,APD

MEAS_BCH

■ Function

Batch Measurement

Switches On/Off of each measurement item for batch measurement.

■ Syntax

Program Message	Query Message	Response Message
MEAS_BCH *item, on/off*	MEAS_BCH? *item*	*on/off*

■ Parameter

item

Measurement Item

mode	Measurement Item	Initial value
MOD	Modulation analysis measurement	1
PWR	RF power measurement	0
OBW	OBW measurement	0
ACP	Adjacent channel power measurement	0
MSK	Spectrum mask measurement	0
SPR	Spurious emission measurement	0
FLT	Flatness measurement	0

on/off

Measurement Execution

on/off	Measurement Execution
1	Executes measurement
0	Does not execute measurement

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Executes occupied frequency bandwidth measurement at batch measurement.

<Program>
DSPL BATCH
MEAS_BCH OBW, 1
MEAS_BCH? OBW

<Response>
1

MEASOBJ

■ Function

Measuring Object

Sets the type of signal for the measurement target (Measuring Object) on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
MEASOBJ *object*	MEASOBJ?	*object*

■ Parameter

object

Measuring Object

Value	Measuring Object	Initial value (Except HiSWANa)	Initial value (HiSWANa)
BURST	Burst signal	*	
BC_BURST	Broadcast Burst signal		
DL_BURST	Downlink Burst signal		
UL_BURST	Uplink Burst signal		
ALL_BURST	Burst signal(for HiSWANa)		*
CONT	Continuous signal		

■ Restrictions

- The measurement screen displayed must be set to the Setup Common Parameter screen (*cf.* DSPL).
- Broadcast Burst signal and Downlink Burst signal and Uplink Burst signal and Burst signal(for HiSWANa) are enabled only when Target System is HiSWANa.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Measuring Object to Burst signal.

<Program>

MEASOBJ BURST
MEASOBJ?

<Response>

BURST

MKL_ADJ

■ Function

Marker Level for Adjacent Channel Power
Reads out the level at the marker position during Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_ ADJ? *unit*	*level*

■ Parameter

unit
Unit

Value	Offset Frequency
None	Set value for unit
DB	dB
DBM	dBm
WATT	W

level
Level

Resolution	Unit
0.01	dB
0.01	dBm
Four significant digits	W

■ Restrictions

- "***" is displayed when Marker is not displayed.

■ Use example

Reads out the level at the marker position during Adjacent Channel Power measurement.
<Program>
DSPL ADJ
MKR_ADJ NRM
SWP
MKL_ADJ?

<Response>
−45.18

MKL_CCDF

■ Function

Marker Value for CCDF

Outputs power deviation and probability in the marker position on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_CCDF? *wave,mode*	*result*

■ Parameter

wave

Output waveform

Value	Output waveform
0	Outputs the value of measurement waveform
1	Outputs the value of the saved waveform. Outputs 0 when the waveform is not saved.
All	Outputs the measurement waveform and the saved waveform in order.

mode

Output format

Value	Output Format
PROB	Outputs the value of probability (X-coordinate).
DSTRBT	Outputs the value of power deviation (Y-coordinate).

result

Output format

Resolution	Unit	Output format
0.1	dB	Power deviation
0.0001	%	Probability

■ Use example

Reads out the measurement results of probability in the marker position of the measurement waveform.

<Program>

DSPL CCDF,CCDF

SWP

MKL_CCDF? 0,DSTRBT

<Response>

0.5012

MKL_MOD

■ Function

Marker Level for Modulation Analysis

Outputs the measured results at marker position when Trance Format is set to Constellation, Eye Diagram, EVM vs. Symbol, Phase Error vs. Symbol, EVM vs. Sub-carrier, Spectrum Flatness at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_MOD? *phase*	*result*

■ Parameter

phase

Signal type

Value	Signal Type	Trace Format (*cf.* TRFORM)
None	None	EVM vs. Symbol, Phase Error vs. Symbol, EVM vs. Sub-carrier, Spectrum Flatness
I	I signal	Constellation, Eye Diagram
Q	Q signal	Constellation, Eye Diagram

level

Marker Level

Resolution	Unit	Trace Format (*cf.* TRFORM)
0.001	None	Constellation, Eye Diagram
0.01	%	EVM vs. Symbol, EVM vs. Sub-carrier
0.01	deg	Phase Error vs. Symbol
0.01	dB	Spectrum Flatness

■ Restrictions

- "***" is read out when Trace Format is set to No Trace (*cf.* TRFORM).
- "***" is read out when Marker is set to Off (*cf.* MKR_MOD).

■ Use example

Reads out the value at Symbol point 768 on I signal in the Constellation mode.

<Program>

DSPL MODANAL

TRFORM CONSTEL

MKR_MOD NRM

SWP

MKP_MOD SYM,768

MKL_MOD? I

<Response>

−0.289

MKL_RFPWR

■ Function

Marker Level for RF Power

Outputs the measured results at RF Power measurement marker position.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_RFPWR?	*result*

■ Parameter

result

Marker Level

Resolution	Unit
0.01	Unit selected in Unit (*cf.* UNIT_RFPWR)

■ Use example

Reads out dBm value of Power at 2.0 µsec.

<Program>

DSPL RFPWR

UNIT_RFPWR DBM

SWP

MKR_RFPWR NRM

MKP_RFPWR 2.0

MKL_RFPWR?

<Response>

1.23

MKL_SMASK

■ Function

Marker Level for Spectrum Mask

Reads the marker value at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_SMASK? *unit*	*level*

■ Parameter

unit

Unit

Value	Unit
None	Setting for Unit
DB	dB
DBM	dBm
W	W

level

Marker value

Unit	Resolution
dBm	0.01
dB	0.01
W	4 significant digits

■ Use example

Reads out the marker value in dBm unit at Spectrum Mask measurement.

<Program>

DSPL ADJ

MKL_SMASK? DBM

<Response>

−45.23

MKL_SPU

■ Function

Marker Level for Spurious Emission

Reads out the marker position level when waveform display turns On for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_SPU? *a, u*	*l*

■ Parameter

a

Frequency Table

Value	Unit
F1 to F15	None

u

Unit

c	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

l

Marker Level

<table>
<tr><th>Output unit</th><th>Resolution</th></tr>
<tr><td>dBm</td><td>0.01</td></tr>
<tr><td>dB</td><td>0.01</td></tr>
<tr><td>W</td><td rowspan="2">4 significant digits</td></tr>
<tr><td>W/MHz</td></tr>
</table>

■ Use example

Reads out marker level of frequency table F1 at sweep measurement.

<Program>

```
DSPL SPURIOUS, SWEEP
WAVEFORM_SPU ON
SWP
MKL_SPU? F1,DBM
```

<Response>

−60.54

MKN_ADJ

■ Function

Marker Position for Adjacent Channel Power in Frequency
Specifies the marker position by frequency at Adjacent Channel Power measurement.
This command functions the same as the MKRS_ADJ command.

■ Syntax

Program Message	Query Message	Response Message
MKN_ADJ *freq*	MKN_ADJ?	*freq*

■ Parameter

freq
Frequency

Data points	Range	Resolution	Unit	Initial value
1001	−41000000 to 41000000	10000	Hz	0
501	−41000000 to 41000000	20000	Hz	0

□ Suffix code

None: Hz
HZ: Hz
KHZ: kHz
MHZ: MHz
GHZ: GHz

■ Restrictions

- This setting is not possible when Marker is not displayed.
- Valid for Spectrum (All) measurement.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to 10 MHz at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
MKN_ADJ 10MHZ
MKN_ADJ?

<Response>
10000000

MKN_SMASK

■ Function

Marker Position for Spectrum Mask in Frequency
Specifies the marker position by frequency at Spectrum Mask measurement.
This command functions the same as the MKRS_SMASK command.

■ Syntax

Program Message	Query Message	Response Message
MKN_SMASK *freq*	MKRS MKN_SMASK?	*freq*

■ Parameter

freq
Frequency

System	Range	Resolution	Unit	Initial value
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	–30000000 to 30000000	10000	Hz	0
Other than the above	–40000000 to 40000000	10000	Hz	0

□ Suffix code

None: Hz
HZ: Hz
KHZ: kHz
MHZ: MHz
GHZ: GHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to 10 MHz at Spectrum Mask measurement
<Program>
DSPL SMASK
MKN_SMASK 10MHZ
MKN_SMASK?

<Response>
10000000

MKP_ADJ

■ Function

Marker Position for Adjacent Channel Power in position
Specifies the marker position by the number of points at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
MKP_ADJ *point*	MKP_ADJ?	*point*

■ Parameter

point
Marker position

Number of Measurement Points	Range	Resolution	Initial value
501	45 to 455	1	250
1001	90 to 910	1	500

■ Restrictions

- This setting is not possible when Marker is not displayed.
- Valid for Spectrum (All) measurement.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to 300 points at the Spectrum (All) measurement in Adjacent Channel Power measurement.
<Program>
DSPL ADJ
MKP_ADJ 300
MKP_ADJ?

<Response>
300

MKP_CCDF

■ Function

Marker Position for CCDF

Specifies the marker position on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
MKP_CCDF *a*	MKP_CCDF?	*a*

■ Parameter

a

Sets either power deviation or probability by the setting value of Display Data Type (*cf.* DIPTYPE_CCDF).

Display Data Type	Range	Resolution	Unit
Probability	0.0001 to 100.0000	0.0001	Probability (%)
Distribution	0.0 to 50.0	0.1	Power deviation (dB)

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the Marker to 10.0 dB.

<Program>

DSPL CCDF,CCDF

MKR_CCDF NRM

MKP_CCDF 10.0

MKP_CCDF?

<Response>

10.0

MKP_MOD

■ Function

Marker Position for Modulation Analysis

(Constellation, Eye Diagram, EVM vs. Symbol, Phase Error vs. Symbol, EVM vs. Sub-carrier, Spectrum Flatness)

Specifies the marker position when Trance Format is set to Constellation, Eye Diagram, EVM vs. Symbol, Phase Error vs. Symbol, EVM vs. Sub-carrier, Spectrum Flatness at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
MKP_MOD *a,b*	MKP_MOD? *a*	*b*
	MKP_MOD?	*a,b*
MKP_MOD *a*	MKP_MOD?	*a*

■ Parameter

a,b

Marker position

Target System: IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g(ERP-OFDM), IEEE802.11g (DSSS-OFDM)

When Data Rate is Auto (for HiSWANa)

a	B	Resolution	Marker Position
SYM	1 to 1367	1	Specifies Symbol mark. Sub-carrier number is located at present Marker position.
SUB	−26 to −1, 1 to 26	1	Specifies Sub-carrier number. Symbol number is located at present Marker position.
1 to 1367	−26 to −1, 1 to 26	1	Specifies Symbol and Sub-carrier numbers simultaneously.

Target System: HiSWANa

When Data Rate is except Auto

a	B	Resolution	Marker Position
SYM	1 to 1367	1	Specifies Symbol mark. Sub-carrier number is located at present Marker position.
SUB	−26 to −1, 1 to 26	1	Specifies Sub-carrier number. Symbol number is located at present Marker position.
1 to 1367	−26 to −1, 1 to 26	1	Specifies Symbol and Sub-carrier numbers simultaneously.

Initial value: Symbol number: 1

Sub-carrier number: −26

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

Trace Format	a	Resolution	Initial Value
Constellation, EVM vs. Symbol, Phase Error vs. Symbol	0 to 4095	1	0
Eye Diagram	0.0 to 4095.0	0.1	0.0

■ Restrictions

- This setting is not possible when Trace Format is No trace (*cf.* TRFORM).
- This setting is not possible when Marker Mode is Off (*cf.* MKR_MOD).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to Symbol 10, Sub-carrier −7 on the Constellation screen.

<Program>

```
TGTSY 11A
DSPL MODANAL
TRFORM CONSTEL
SWP
MKR_MOD NRM
MKP_MOD 10, −7
MKP_MOD?
```

<Response>

```
10, −7
```

MKP_RFPWR

■ Function

Marker Position for RF Power

Specifies the marker position at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
MKP_RFPWR *a*	MKP_RFPWR?	*a*

■ Parameter

a

Marker position

Trace Format	a	Initial Value	Resolution	Unit
Slot	−20 to (Signal length + 20)	Center of display	0.1	µsec
Transient	−4 to 4, (Signal length − 4) to (Signal length + 4)	4.0	0.1	µsec

* A signal length refers to the sum of the analysis length, preamble, and signal information section (such as signal field).

■ Restrictions

- Setting is disabled when Marker Mode is Off (*cf.* MKR_RFPWR).

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the marker position to 0.0 µsec on the Transient screen.

<Program>

DSPL RFPWR

TRFORM_RFPWR TRNSNT

SWP

MKR_RFPWR NRM

MKP_RFPWR 0.0

MKP_RFPWR?

<Response>

0.0

MKP_SMASK

■ Function

Marker Position for Spectrum Mask in position
Specifies the marker position by the number of points at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
MKP_SMASK *point*	MKP_SMASK?	*point*

■ Parameter

point
Marker position

Range	Resolution	Initial value
0 to 1000	1	500

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to 1000 points at Spectrum Mask measurement.
<Program>
DSPL SMASK
MKP_SMASK 1000
MKP_SMASK?

<Response>
1000

MKP_SPU

■ Function

Set Marker Position on Waveform Display for Spurious Emission

Sets marker position when waveform display turns On for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
MKP_SPU *a*	MKP_SPU?	*a*

■ Parameter

a

Marker Position

Value	Data Point	Initial Value	Resolution	Unit
0 to 1000	1001	Point where marker level is greatest	1	None
0 to 500	501	Point where marker level is greatest	1	None

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets marker position to 100 points at sweep measurement.

<Program>

DSPL SPURIOUS, SWEEP

WAVEFORM_SPU ON

SWP

MKP_SPU 100

MKP_SPU?

<Response>

100

MKR_ADJ

■ Function

Marker Mode for Adjacent Channel Power
Sets whether to display the marker at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
MKR_ADJ *a*	MKR_ADJ?	*a*

■ Parameter

a
Marker display

Value	Description	Initial value
NRM	Displays the marker	
OFF	Deletes the marker	*

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the marker value at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
MKR_ADJ NRM
MKR_ADJ?

<Response>
NRM

MKR_CCDF

■ Function

Marker Mode for CCDF

Sets Marker to On or Off on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
MKR_CCDF *mode*	MKR_CCDF?	*mode*

■ Parameter

mode

Marker setting

Value	Marker setting	Initial value
NRM	Normal: Displays the marker, and changes the marker position into entry status.	
OFF	Off: Erases the marker display, and cancels the entry status for the marker position.	*

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Changes the marker mode into entry status.

<Program>
DSPL CCDF,CCDF
SWP
MKR_CCDF NRM
MKP_CCDF?

<Response>
NRM

MKR_MOD

■ Function

Marker Mode for Modulation Analysis

Sets Marker to On or Off for each trace at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
MKR_MOD *mode*	MKR_MOD?	*mode*

■ Parameter

mode

Marker setting

Value	Marker setting	Initial value
NRM	Normal: Displays the marker, and changes the marker position into entry status.	
OFF	Off: Erases the marker display, and cancels the entry status for the marker position.	*

■ Restrictions

- This setting is not possible when Trace Format is set to No Trace (*cf.* TRFORM).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays a marker in the Constellation display on the Modulation Analysis screen.

<Program>

DSPL MODANAL

TRFORM CONSTEL

SWP

MKR_MOD NRM

MKR_MOD?

<Response>

NRM

MKR_RFPWR

■ Function

Marker Mode for RF Power

Sets the marker to On or Off for each trace at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
MKR_RFPWR *mode*	MKR_RFPWR?	*mode*

■ Parameter

mode

Marker setting

Value	Marker setting	Initial Value
NRM	Normal: Displays the marker and changes the marker position to entry status.	
OFF	Off: Erases the marker display and cancels the entry status for the marker position.	*

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays marker on the RF Power screen.

<Program>

DSPL RFPWR

SWP

MKR_RFPWR NRM

MKR_RFPWR?

<Response>

NRM

MKR_SMASK

■ Function

Marker Mode for Spectrum Mask
Sets whether to display the marker at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
MKR_SMASK *a*	MKR_SMASK?	*a*

■ Parameter

a
Marker display

Value	Description	Initial value
NRM	Displays the marker	
OFF	Deletes the marker	*

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the marker value at Spectrum Mask measurement.
<Program>
DSPL SMASK
MKR_SMASK NRM
MKR_SMASK?

<Response>
NRM

MKRS_ADJ

■ Function

Marker Position for Adjacent Channel Power in Frequency

Specifies the marker position by frequency at Adjacent Channel Power measurement.

This command functions the same as the MKN_ADJ command.

■ Syntax

Program Message	Query Message	Response Message
MKRS_ ADJ *freq*	MKRS_ADJ?	*freq*

■ Parameter

freq

Frequency

Data points	Range	Resolution	Unit	Initial value
1001	–41000000 to 41000000	10000	Hz	0
501	–41000000 to 41000000	20000	Hz	0

☐ Suffix code

None: Hz

HZ: Hz

KHZ: kHz

MHZ: MHz

GHZ: GHz

■ Restrictions

- This setting is not possible when Marker is not displayed.
- Valid for Spectrum (All) measurement.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the marker position to 10 MHz at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

MKRS_ADJ 10MHZ

MKRS_ADJ?

<Response>

10000000

MKRS_SMASK

■ Function

Marker Position for Spectrum Mask in Frequency
Specifies the marker position by frequency at Spectrum Mask measurement.
This command functions the same as the MKN_SMASK command.

■ Syntax

Program Message	Query Message	Response Message
MKRS_SMASK *freq*	MKRS _SMASK?	*freq*

■ Parameter

freq

Frequency

System	Range	Resolution	Unit	Initial value
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	−30000000 to 30000000	10000	Hz	0
Other than the above	−40000000 to 40000000	10000	Hz	0

□ Suffix code

None: Hz
HZ: Hz
KHZ: kHz
MHZ: MHz
GHZ: GHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the marker position to 10 MHz at Spectrum Mask measurement.

<Program>
DSPL SMASK
MKRS_SMASK 10MHZ
MKRS_SMASK?

<Response>
10000000

MKSSYM

■ Function

Marker Number for Modulation Analysis

Outputs Symbol number of Marker or Sub-carrier number at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MKSSYM? *mode*	*number*

■ Parameter

mode

Type of reading number

Target System (*cf.* TGTSY)	Trace Format (*cf.* TRFORM)	Value	Type
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	Constellation	None	Symbol number
		SYM	Symbol number
		SUB	Sub-carrier number
	EVM vs. Symbol, Phase Error vs. Symbol	None	Symbol number
		SYM	Symbol number
	EVM vs. Sub-carrier, Spectrum Flatness	None	Sub-carrier number
		SUB	Sub-carrier number
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	All waveform formats	---	Chip Number

number

Reading number

Type of reading number	Range	Resolution
Symbol number	1 to 1367	1
Sub-carrier number	−26 to −1, 1 to 26	1
Chip Number	0 to 4095	1*

*: Resolution is 0.1 at Eye Diagram Trace Format.

■ Restrictions

- "***" is read out when Trace Format is No Trace (*cf.* TRFORM).
- "***" is read out when Marker is Off (*cf.* MKR_MOD).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Reads out Symbol number of Marker in Constellation display.

<Program>

```
TGTSY 11A
DSPL MODANAL
TRFORM CONSTEL
MKR_MOD NRM
SWP
MKSSYM? SYM
```

<Response>

1234

MOD_SYM

■ Function

Modulation for every symbol

Reads out modulation for every symbol at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
	MOD_SYM? *symbol*	*mod*

■ Parameter

symbol

Symbol number

Value	Resolution	Unit
1 to 1367	1	Symbol

mod

Modulation

Value	Modulation
OFDM_BPSK	BPSK modulation
OFDM_QPSK	QPSK modulation
OFDM_16QAM	16QAM modulation
OFDM_64QAM	64QAM modulation

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Reads out modulation for 5 symbol at Modulation Analysis measurement.

<Program>

TGTSY HISWAN

DATRATE AUTO

DSPL MODANAL

MOD_SYM? 5

<Response>

OFDM-BPSK

MODE_BCH

■ Function

Batch Measurement

Sets countermeasures in case an error occurs during batch measurement.

■ Syntax

Program Message	Query Message	Response Message
MODE_BCH *mode*	MODE_BCH?	*mode*

■ Parameter

mode

Countermeasures

mode	Description	Initial value
NRM	Continues batch measurement until completed, irrespective of whether an error occurs during measurement.	*
FAIL	Stops batch measurement if a parameter is judged as “FAIL” by the individual pass/fail judgement during measurement.	
ABN	Stops batch measurement if a status error occurs during measurement.	
ABRT	Stops batch measurement if a status error occurs or a parameter is judged as “FAIL” by the individual pass/fail measurement.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Stops batch measurement if a status error occurs during measurement.

<Program>
DSPL BATCH
MODE_BCH ABN
MODE_BCH?

<Response>
ABN

MODTYPE

■ Function

Modulation Type

Sets the modulation type of the measured signal.

■ Syntax

Program Message	Query Message	Response Message
MODTYPE *mod*	MODTYPE?	*mod*

■ Parameter

mod

Modulation type

Target System: IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

Value	Modulation type	Initial value
OFBPSK	OFDM-BPSK	
OFQPSK	OFDM-QPSK	
OF16QAM	OFDM-16QAM	*
OF64QAM	OFDM-64QAM	

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

Value	Modulation type	Initial value
DBPSK	DBPSK	
DQPSK	DQPSK	
CCK5_5M	CCK-5.5 Mbps	
CCK11M	CCK-11 Mbps	*

■ Use example

Sets the modulation type to OFDM-64QAM.

<Program>

TGTSY 11A

DSPL SETCOM

MODTYPE OF64QAM

MODTYPE?

<Response>

OF64QAM

MRGN_SPU

■ Function

Margin for Spurious Emission

Sets all Limit values for pass/fail judgement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
MRGN_SPU *a,b,c*	MRGN_SPU? *a,b*	*c*

■ Parameter

a

Setup Table

a	Setup Table
SPOT	Setup Spot Table
SWEEP	Setup Search/Sweep Table

b

Judgement method

b
ABS_W
ABS_DBM
REL

c

Setting range

	c	Resolution	Initial Value	Unit
ABS_W	0.00 to 10.00	0.01	0.00	dB
ABS_DBM	0.00 to 10.00	0.01	0.00	dB
REL	0.00 to 10.00	0.01	0.00	dB

■ Use example

Adds 1 dB (absolute value) to the Limit value in the frequency table for Spot measurement.

<Program>

DSPL SETTBL_SPU,SPOT

MRGN_SPU, SPOT ABS_DBM 1.00

MRGM_SPU? SPOT,ABS_DBM

<Response>

1.00

MSTAT

■ Function

Returns the current measurement status.

■ Syntax

Program Message	Query Message	Response Message
---	MSTAT?	*status*

■ Parameter

status

Measurement state

Value	Measurement State
0	Normal termination
1	RF-signal level limit
2	Level over
3	Level under
4	Receiving signal abnormal
5	Synchronization failure
6	Trigger time out
9	Not measured
10	Preamble not detected

- "Level limit" represents the signal that has gone beyond the RF level limit that can be input to the measuring instrument.
- "Level over" represents the signal that can be measured by adjusting the Reference level.

■ Use example

Reads out the measurement status after modulation analysis.

<Program>

DSPL MODANAL

SWP

MSTAT?

<Response>

0

MSTAT_BCH

■ Function

Measurement Status for Batch Measurement
Returns the measurement status on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	MSTAT_BCH? *item*	*a*

■ Parameter

item
Measurement Item

mode	Measurement Item
MOD	Modulation Analysis measurement
PWR	RF Power measurement
OBW	Occupied BandWidth measurement
ACP	Adjacent Channel Power measurement
MSK	Spectrum Mask measurement
SPR1	Spurious Emission1 measurement
SPR2	Spurious Emission2 measurement

a
Measurement state

a	Measurement State
0	Normal termination
1	RF input level limit
2	Level Over
3	Level Under
4	Receiving signal abnormal
5	Synchronization failure
6	Trigger timeout
9	Not measured
10	Preamble signal not detected

■ Use example

Reads out the Modulation Analysis measurement state on the Batch screen.
<Program>
DSPL BATCH
MSTAT_BCH? MOD

<Response>
0

NUMBST

■ Function

Number of Burst

Reads out the number of bursts for every modulation at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	NUMBST? *mod*	*symbol*

■ Parameter

mod

modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation

symbol

number of symbols

Resolution	Unit
1	Symbol

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.
- This command is enabled only when Storage Mode is Average.

■ Use example

Reads out the number of bursts by which 16QAM modulated at Modulation Analysis measurement.

<Program>

TGTSY HISWAN

DATRATE AUTO

MEAS MODANAL

STRG_MOD AVG

NUMBST? 16QAM

<Response>

3

NUMSYM_BST

■ Function

Number of Symbol for Burst
Reads out the number of symbols for every modulation at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	NUMSYM_BST? *mod*	*symbol*

■ Parameter

mod
modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation

symbol
number of symbols

Resolution	Unit
1	Symbol

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Reads out the number of symbols by which BPSK modulated at Modulation Analysis measurement.
<Program>
TGTSY HISWAN
DATRATE AUTO
MEAS MODANAL
NUMSYM_BST? BPSK

<Response>
5

NUMSYM_TOTAL

■ Function

Number of Total Symbol

Reads out all the numbers of symbols for every modulation at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	NUMSYM_TOTAL? *mod*	*symbol*

■ Parameter

mod

modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation

symbol

number of symbols

Resolution	Unit
1	Symbol

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.
- This command is enabled only when Storage Mode is Average.

■ Use example

Reads out all the numbers of symbols by which BPSK modulated at Modulation Analysis measurement.

<Program>

TGTSY HISWAN

DATRATE AUTO

MEAS MODANAL

STRG_MOD AVG

NUMSYM_TOTAL? BPSK

<Response>

15

OBW

■ Function

Occupied Bandwidth
Reads out the occupied frequency bandwidth at Occupied Bandwidth measurement.
This command functions the same as the OCCBW command.

■ Syntax

Program Message	Query Message	Response Message
---	OBW? *pc*	*bw*

■ Parameter

pc
Percentage of power

Value	Measurement Details
99	Reads out the occupied frequency bandwidth containing 99% of the total power
90	Reads out the occupied frequency bandwidth containing 90% of the total power
---	Reads out the occupied frequency bandwidth containing 99% of the total power

bw
Occupied frequency bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out the occupied frequency bandwidth (99%) at Occupied Bandwidth measurement.
<Program>
DSPL OBW
OBW?

<Response>
18000000

OBWFREQ

■ Function

Occupied Bandwidth Limit and Center

Reads out the center, upper or lower frequency of the waveform at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
---	OBWFREQ? *area*	*freq*

■ Parameter

area

Percentage of power

<table>
<tr><th>Value</th><th>Measurement Details</th></tr>
<tr><td>UPPER</td><td rowspan="2">Reads out the upper limit of the occupied frequency bandwidth (99%)</td></tr>
<tr><td>+</td></tr>
<tr><td>LOWER</td><td rowspan="2">Reads out the lower limit of the occupied frequency bandwidth (99%)</td></tr>
<tr><td>−</td></tr>
<tr><td>CENTER</td><td>Reads out the center frequency of the occupied frequency bandwidth</td></tr>
</table>

freq

Occupied frequency bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out the center frequency of the occupied frequency bandwidth at Occupied Bandwidth measurement.

<Program>
DSPL OBW
OBWFREQ? CENTER

<Response>
2412000000

OCCBW

■ Function

Occupied Bandwidth

Reads out the occupied frequency bandwidth at Occupied Bandwidth measurement.

This command functions the same as the OBW command.

■ Syntax

Program Message	Query Message	Response Message
---	OCCBW? *pc*	*bw*

■ Parameter

pc

Percentage of power

Value	Measurement Details
99	Reads out the occupied frequency bandwidth containing 99% of the total power
90	Reads out the occupied frequency bandwidth containing 90% of the total power
---	Reads out the occupied frequency bandwidth containing 99% of the total power

bw

Occupied frequency bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out the occupied frequency bandwidth (99%) at Occupied Bandwidth measurement.

<Program>

DSPL OBW

OCCBW?

<Response>

18000000

OFFPWR

■ Function

Carrier Off Power

Outputs average power when transmission is Off at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	OFFPWR?	*offpwr1,offpwr2*

■ Parameter

offpwr1/offpwr2

Average power when transmission is Off

Power	Resolution	Unit
offpwr1	0.01	dBm
offpwr2	Four significant digits	W

■ Use example

Reads out the measured results for Carrier Off Power.

<Program>

MEAS RFPWR

OFFPWR?

<Response>

−12.34,0.00005834

ORGOFS

■ Function

Origin Offset

Outputs the Origin Offset in Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	ORGOFS?	*offset*

■ Parameter

offset

Origin offset

Resolution	Unit
0.01	dB

■ Restrictions

- This command is enabled when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).

■ Use example

Reads out Origin Offset.

<Program>

TGTSY 11B

MEAS MODANAL

ORGOFS?

<Response>

−12.34

PEAK_SMASK

■ Function

Peak Data for Spectrum Mask

Reads out peak value of measured value and pass/fail judgement results for spectrum mask measurement.

■ Syntax

Program Message	Query Message	Response Message
---	PEAK_SMASK? *type, unit*	*freq, lvl, judge*

■ Parameter

type

Readout data type

Range	Readout Data
ALL	Displays result at a measurement point with the minimum margin to standard line within all frequency bands of standard line
PEAK	Displays result at a measurement point with the minimum margin to standard line
L4, L3, L2, L1, U1, U2, U3, U4	Displays result at a measurement point with the minimum margin to standard line at the specified frequency bands of standard line L4, L3, U3 and U4 are invalid for IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK)

unit

Unit

Value	Unit
None	Set value for unit
DB	dB
DBM	dBm
W	W
MW	mW
UW	uW
NW	nW

freq

Frequency

Resolution	Unit
1	Hz

level

Level

Unit	Resolution
dBm	0.01
dB	0.01
W	4 significant digits
mW	4 significant digits
uW	4 significant digits
nW	4 significant digits

judge

Judgement result

Value	Judgement Results
PASS	Passed
FAIL	Failed

■ Restrictions

- The value for unit is set to DB when Display Type is set to Margin.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Reads out measured value at a point with the minimum margin at spectrum mask measurement.

<Program>

DSPL SMASK
DISPTYPE_SMASK LVL
SWP
PEAK_SMASK? PEAK, DB

<Response>

100023, −10.45, PASS

PHASEERR

■ Function

RMS Phase Error

Outputs the measured results for the RMS value of Phase Error at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	PHASEERR? *mod*	*phase*

■ Parameter

mod

Modulation

Resolution	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation
TOTAL	Every modulation

phase

RMS value of Phase Error

Resolution	Unit
0.01	deg

■ Restrictions

• A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Reads out the measured results of phase error.

<Program>

DSPL MODANAL

SWP

PHASEERR?

<Response>

11.58

PHSYM

■ Function

Phase Error vs. Symbol

Outputs the measured results every Symbol of Phase Error vs. Symbol at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	PHSYM? *sym,n*	*phase(sym),phase(sym+1),…,phase (sym+n-1)*

■ Parameter

sym

Starting address to read out data (Symbol number)

Target System	Value	Resolution
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	1 to 1367	1
HiSWANa(When Data Rate is not Auto.)	(Analysis Start) to 1367	1
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	0 to 4095	1

n

Number of data reading

Target System	Value	Resolution
IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)	1 to 1367	1
HiSWANa(When Data Rate is not Auto.)	(Analysis Start) to 1367	1
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1 to 4096	1

phase(sym)

Results of Symbol sym

Value	Resolution	Output unit
−32768 to 32767	1	0.01 deg

■ Data storage method

Target System: IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

Address	1	2	---	1366	1367
Symbol number	1	2	---	1366	1367

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)

Address	1	2	---	4095	4096
Chip Number	0	1	---	4094	4095

■ Use example

Reads out 5 pieces of Phase Error vs. symbol from Symbol number 1.

<Program>

MEAS MODANAL

PHSYM? 1,5

<Response>

123, −234,135, −257,149

PHY_BURST

■ Function

PHY Burst for HiSWANa

Reads out Judgement result for PHY Burst at Modulation Analysis measurement and RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
	PHY_BURST? a	*phy*

■ Parameter

a

Measurement screen

Value	Measurement screen
MODANAL	Modulation Analysis
RFPWR	RF Power

phy

PHY Burst

Value	PHY Burst
BC_BURST	Broadcast Burst
DL_BURST	Downlink Burst
UL_BURST	Uplink Burst

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Measuring Object is Burst(All).

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Reads out Judgement result for PHY Burst at Modulation Analysis measurement.

<Program>

TGTSY HISWAN
MEASOBJ ALL_BURST
DSPL MODANAL
PHY_BURST? MODANAL

<Response>

BC_BURST

PLVL_SMASK

■ Function

Peak Level-Spectrum Mask

Reads out the peak value within the signal band on the Spectrum Mask screen.

■ Syntax

Program Message	Query Message	Response Message
---	PLVL_SMASK?	*a*

■ Parameter

a

Peak level

Resolution	Output unit
0.01	dBm

■ Use example

Reads out the peak value within the signal band.

<Program>

DSPL SMASK

SWP

PLVL_SMASK?

<Response>

－34.56

PNLMD

■ Function

Panel Mode

Switches the measurement mode for the Spectrum Analyzer.

■ Syntax

Program Message	Query Message	Response Message
PNLMD *mode*	PNLMD?	*mode*

■ Parameter

mode

Measurement mode

Value	Measurement Mode
SPECT	Spectrum Analyzer mode
SYSTEM	Signal Analysis mode
CONFIG	Config mode

■ Use example

Switches to the Signal Analysis mode.

<Program>

PNLMD SYSTEM

PNLMD?

<Response>

SYSTEM

POWER

■ Function

Power

Outputs the absolute or relative value of the average RF power measured by the power meter.

■ Syntax

Program Message	Query Message	Response Message
---	POWER? *unit*	*pwr*

■ Parameter

unit

Readout unit

Value	Readout unit
DBM	dBm
WATT	W
DB	dB

pwr

Absolute or relative value of average RF power

Resolution	Unit (Depends on the value specified by *unit*.)
0.01	dBm, dB
0.001	W

■ Use example

Reads out the average RF power in dBm units.

<Program>

DSPL PWRMTR

POWER? DBM

<Response>

−1.43

POWER_CCDF

■ Function

Power for CCDF

Outputs Power at CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
---	POWER_CCDF?	*a,b,c,d,e*

■ Parameter

a,b,c,d,e

The list below shows each value of a,b,c,d,e and resolution.

Value	Measured result	Resolution	Unit
a	Average Power	0.01	dBm
b	Maximum Power (Absolute value)	0.01	dBm
c	Maximum Power (Relative value against average power)	0.01	dB
d	Minimum Power (Absolute value)	0.01	dBm
e	Minimum Power (Relative value against average power)	0.01	dB

■ Use example

Reads out the measured results of average Power.

<Program>

DSPL CCDF,CCDF

SWP

POWER_CCDF?

<Response>

10.53,20.53,10.00,0.53,–10.00

PRE

■ Function

Preset

Initializes all the measurement control parameters to be initialized.

This command functions the same as the INI and IP commands.

■ Syntax

Program Message	Query Message	Response Message
PRE	---	---

■ Parameter

Initializes parameters to be initialized.

<Program>

PRE

PREAMP

■ Function

Pre Ampl

Sets Pre Ampl to On or Off.

■ Syntax

Program Message	Query Message	Response Message
PERAMP *on_off*	PREAMP?	*on_off*

■ Parameter

on_off

On or Off setting of Pre Ampl

Value	Pre Ampl	Initial Value
ON	Sets Pre Ampl to On.	
OFF	Sets Pre Ampl to Off.	*

■ Restrictions

- When Spurious Emission measurement starts while the pre-amplifier is On, the pre-amplifier is forcibly set to Off.
- This setting is possible only when Carrier Frequency is 3 GHz or higher.
- This setting is not enabled when Terminal is IQ.

■ Initialization command

*RST

■ Use example

Sets Pre Ampl to On.

<Program>

PREAMP ON

PREAMP?

<Response>

ON

■ Restrictions according to model type and options

If option MS268*A-08/MS860*A-08 is not installed, this command is invalid.

PRMBL_SRCH

■ Function

Preamble Search

Detects burst rising by the preamble information.

■ Syntax

Program Message	Query Message	Response Message
PRMBL_SRCH *a*	PRMBL_SRCH?	*a*

■ Parameter

a

On/Off

Value	Description	Initial value
OFF	Detects burst rising by the level change.	*
ON	Detects burst rising by the preamble information.	

■ Restrictions

- This command is invalid when Measuring Object is set to Continuous.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Preamble Search to On.

<Program>

MEASOBJ BURST

DSPL RFPWR

PRMBL_SRCH ON

PRMBL_SRCH?

<Response>

ON

PROBPWR_CCDF

■ Function

Power at Specified Probability for CCDF

Outputs Power deviation for the specified probability on CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
---	PROBPWR_CCDF?	*a1,a2,a3,a4,a5,a6*

■ Parameter

a

Value of a

Resolution	Unit
0.1	dB

Outputs results in order of 10, 1, 0.1, 0.01, 0.001, and 0.0001%.

Outputs "***" when the corresponding Power is absent.

■ Use example

Outputs the measured results of Power deviation.

<Program>

DSPL CCDF,CCDF

SWP

PROBPWR_CCDF?

<Response>

2.3,4.5,5.6,6.8,***,***

PSLTUNE

■ Function

Pre-selector Tuning

Tunes pre-selector.

■ Syntax

Program Message	Query Message	Response Message
PSLTUNE	---	---

■ Restrictions

- This command cannot be executed when the measurement screen is Setup Common Parameter (*cf.* DSPL).
- This command is enabled when Terminal is RF and frequency is 3.201 GHz or higher (*cf.* TERM, FREQ).

■ Use example

Tunes pre-selector.

<Program>

```
FREQ 5250000000
DSPL RFPWR
PSLTUNE
```

■ Note

- The instrument will be in a non-calibrated status if the power is turned on or initialization process is performed.

PVECTERR

■ Function

Peak EVM

Outputs the measured result for the EVM maximum instantaneous value at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	PVECTERR? *mod*	*pevm*

■ Parameter

mod

Modulation

Resolution	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation
TOTAL	Every modulation

pevm

Peak EVM

Resolution	Unit
0.01	%

■ Restrictions

- A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Reads out the peak EVM value.

<Program>

DSPL MODANAL

SWP

PVECTERR?

<Response>

45.23

PWRCAL

■ Function

Power Calibration

"PWRCAL" performs calibration in power measurement, and "PWRCAL?" reads out the calibration value. "CALVAL" enables setting of the calibration value just using external control.

■ Syntax

Program Message	Query Message	Response Message
PWRCAL	PWRCAL?	*cal*

■ Parameter

cal

Calibration value

Range	Resolution	Initial value	Unit
−10.00 to 10.00	0.01	0.00	dBm

■ Restrictions

- This function cannot be executed when the displayed measurement screen is the Setup Common Parameter, Power Meter or IQ Level screen. (*cf.* DSPL)
- The setting is not enabled when Measuring Object is Burst.
- The setting is not enabled when Input Terminal is IQ-DC, IQ-AC or IQ-Balance.

■ Use example

Performs calibration in power measurement.

<Program>

CALVAL 2.33

PWRCAL?

PWRCAL

<Response>

2.33

PWRPROB_CCDF

■ Function

Probability at Specified Power for CCDF

Outputs probability for grid on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
---	PWRPROB_CCDF?	*a1,a2,a3,a4,a5*

■ Parameter

a

Probability in setting power

Resolution	Unit
0.0001	%

Outputs the results in ascending order of grid value.

Outputs "***" when the corresponding Power is absent.

Horizontal Scale (*cf.* HSCALE_CCDF)	Grid value to be read				
2 dB	0.4 dB	0.8 dB	1.2 dB	1.6 dB	2 dB
5 dB	1 dB	2 dB	3 dB	4 dB	5 dB
10 dB	2 dB	4 dB	6 dB	8 dB	10 dB
20 dB	4 dB	8 dB	12 dB	16 dB	20 dB
50 dB	10 dB	20 dB	30 dB	40 dB	50 dB

Read out grid data on the minus side only when Trace Format is Negative.

■ Use example

Reads out the measured results of probability for grid.

<Program>

DSPL CCDF,CCDF

SWP

PWRPROB_CCDF?

<Response>

50.1234,12.2345,7.1234,3.2345,***

PWRTIME

■ Function

Power vs. Time

Outputs the measured results of Power for each time period at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	PWRTIME? *addr,n*	*pwr(addr),pwr(addr+1),…,pwr(addr+n-1)*

■ Parameter

addr

Data read start address

Value	Resolution
0 to 55279	1

n

Data read count

Value	Resolution
1 to 55280	1

pwr(addr)

Result at address addr

Value	Resolution	Output Unit
−32678 to 32767	1	Unit selected in Unit (*cf.* UNIT_RFPWR)

■ Data storage method

Address	0	1	---	55278	55279
Time (μsec)	−20.0	−19.9	---	5507.8	5507.9

■ Use example

Reads five Power waveforms from memory address 100.

<Program>

DSPL RFPWR

UNIT_RFPWR DBM

SWP

PWRTIME? 100,5

<Response>

−12.23,−12.34,−10.24,−9.78,−11.56

■ Note

Output data have a semicolon (;) added as a separator after every 5.000th data item if more than 5,000 data items in ASCII format are read out.

For example, the following shows a response message when 10,000 data items are read out:

data1,data2,data3,…,data4999,data5000;data5001,data5002,…,data9999,data10000

Note that a semicolon (;), not a comma (,), is inserted between data5000 and data5001.

QCONST

■ Function

Q Constellation

Reads out the constellation data of Q signal on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	QCONST? *addr,n,mod*	*data(addr),data(addr+1),...,data(addr+n-1)*
---	QCONST? EYE,*addr,n*	*data(addr),data(addr+1),...,data(addr+n-1)*

■ Parameter

addr

Starting address to read out data

Target System	Value
Other than the below	0 to 71083
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	0 to 4095

n

Number of data reading

Target System	Value
Other than the below	1 to 71084
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1 to 4096

mod

Modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation

data(addr)

Starting address to read out data

Value	Resolution
−32768 to 32767	1

- Sets in an integer of 0.001 unit so that an ideal signal “1” is 1000.

■ Data storage method

Target System:IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM), IEEE802.11g (DSSS-OFDM)

Address	**0**	**1**	**---**	**51**	**52**	**---**	**103**	**---**	**71083**
Symbol number	1				2			---	1367
Sub-carrier number	−26	−25	---	26	−26	---	26	---	26

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) (Constellation data)

Address	**0**	**1**	**---**	**4095**
Chip Number	0	1	---	4095

Target System: IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) (Eye Diagram data)

Address	**0**	**1**	**---**	**40950**
Chip Number	0.0	0.1	---	4095.0

■ Use example

Reads out 5 constellation data of Q signal from memory address 0.

<Program>

MEAS MODANAL

QCONST? 0,5

<Response>

1234,2345,1357,2579,1496

■ Note

•Output data have a semicolon (;) added as a separator after every 5.000th data item if more than 5,000 data items in ASCII format are read out.

For example, the following shows a response message when 10,000 data items are read out:

data1,data2,data3,…,data4999,data5000;data5001,data5002,…,data9999,data10000

Note that a semicolon (;), not a comma (,), is inserted between data5000 and data5001.

•A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

QLVL

■ Function

Q Level (RMS)

Reads out the measured results of the RMS value for the Q signal on the IQ Level screen.

■ Syntax

Program Message	Query Message	Response Message
---	QLVL? *unit*	*rms*

■ Parameter

unit

Readout unit

Value	Readout unit
None	Current set unit
MV	mV
DBMV	dBmV

rms

RMS value for Q signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

■ Use example

Reads out the Q Level (RMS) value

<Program>

TERM IQAC

MEAS IQLVL

QLVL? MV

<Response>

0.53

QPPLVL

■ Function

Q Level (Peak to Peak)

Reads out the measured results of the peak-to-peak value for the Q signal on the IQ Level screen.

■ Syntax

Program Message	Query Message	Response Message
---	QPPLVL? *unit*	*pp*

■ Parameter

unit

Readout unit

Value	Readout unit
None	Current set unit
MV	mV
DBMV	dBmV

pp

Peak-to-Peak value for Q signal

Resolution	Unit
0.01	Depends on the value specified by *unit*.

■ Use example

Reads out the Q Level (peak to peak) value

<Program>

TERM IQAC

MEAS IQLVL

QPPLVL? MV

<Response>

3.55

RATIO

■ Function

On/Off ratio

Outputs ratio between transmit power and the average power when transmission is OFF at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	RATIO?	*ratio*

■ Parameter

ratio

On/Off ratio

Resolution	Unit
0.01	dB

■ Use example

Reads measured result of On/Off ratio.

<Program>

MEAS RFPWR

RATIO?

<Response>

12.34

RBD_ADJ

■ Function

RBW Mode: Normal/Digital for Adjacent Channel Power

Sets the RBW Type setting for Spectrum Analyzer to analog (Normal) or digital (Digital) at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
RBD_ADJ *type*	RBD_ADJ?	*type*

■ Parameter

type

Filter selection

Value	Filter Selection	Initial value
NRM	Performs the measurement with the analog RBW filter	*
DGTL	Performs the measurement with the digital RBW filter	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RBW Type to Digital at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

RBD_ADJ DGTL

RBD_ADJ?

<Response>

DGTL

■ Note

This function is an option. RBW Type is set to Normal when the option is not mounted.

RBD_OBW

■ Function

RBW Mode: Normal/Digital for Occupied Bandwidth

Sets the RBW Type setting for Spectrum Analyzer to analog (Normal) or digital (Digital) at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
RBD_OBW *type*	RBD_OBW?	*type*

■ Parameter

type

Filter selection

Value	Filter Selection	Initial value
NRM	Performs the measurement with the analog RBW filter	*
DGTL	Performs the measurement with the digital RBW filter	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RBW Type to Digital at Occupied Bandwidth measurement.

<Program>

DSPL OBW

RBD_OBW DGTL

RBD_OBW?

<Response>

DGTL

■ Note

This function is an option. RBW Type is set to Normal when the option is not mounted.

RBD_SMASK

■ Function

RBW Mode: Normal/Digital for Spectrum Mask

Sets the RBW Type setting for Spectrum Analyzer to analog (Normal) or digital (Digital) at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
RBD_SMASK *type*	RBD_SMASK?	*type*

■ Parameter

type

Filter selection

Value	Filter Selection	Initial value
NRM	Performs the measurement with the analog RBW filter	*
DGTL	Performs the measurement with the digital RBW filter	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets RBW Type to Digital at Spectrum Mask measurement.

<Program>
DSPL SMASK
RBD_SMASK DGTL
RBD_SMASK?

<Response>
DGTL

■ Note

This function is an option. RBW Type is set to Normal when the option is not mounted.

RBW_ADJ

■ Function

Select Resolution Bandwidth for Adjacent Channel Power
Sets RBW for Spectrum Analyzer at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
RBW_ADJ *f*	RBW_ADJ?	*f*

■ Parameter

f
RBW

RBW Type	Range	Resolution	Unit	Initial value
Normal	300 to 20000000	1	Hz	30000
Digital	10 to 1000000	1	Hz	30000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

RBW Type	Setting value
Normal	300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz, 10 MHz, 20 MHz
Digital	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets RBW to 30 kHz at Adjacent Channel Power measurement.

<Program>

```
DSPL ADJ
RBW_ADJ 30KHZ
RBW_ADJ?
```

<Response>

```
30000
```

RBW_CCDF

■ Function

Select Resolution Bandwidth for CCDF
Selects the digital filter for filtering on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
RBW_CCDF *type*	RBW_CCDF?	*type*

■ Parameter

type
Filter selection

Value	Filter Selection	Initial Value
3 MHz, 5 MHz,10 MHz, 20 MHz, 22 MHz	Uses RBW of type value	5 MHz
RRC	Uses RRC filter (α = 0.22) of 3.84 MHz	
RC	Uses RC filter (α = 0.22) of 3.84 MHz	

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets RBW to 20 MHz.
<Program>
DSPL CCDF,CCDF
RBW_CCDF? 20MHZ
RBW_CCDF?

<Response>
20MHZ

RBW_OBW

■ Function

Select Resolution Bandwidth for Occupied Bandwidth
Sets RBW for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
RBW_OBW *f*	RBW_OBW?	*f*

■ Parameter

f

RBW

RBW Type	Range	Resolution	Unit	Initial value
Normal	300 to 20000000	1	Hz	30000
Digital	10 to 1000000	1	Hz	30000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

RBW Type	Setting value
Normal	300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz, 10 MHz, 20 MHz
Digital	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets RBW to 30 kHz at Occupied Bandwidth measurement.

<Program>

```
DSPL OBW
RBW_OBW 30KHZ
RBW_OBW?
```

<Response>

```
30000
```

RBW_SMASK

■ Function

Select Resolution Bandwidth for Spectrum Mask

Sets RBW for Spectrum Analyzer at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
RBW_SMASK *f*	RBW_SMASK?	*f*

■ Parameter

f

RBW

RBW Type	Range	Resolution	Unit	Initial value
Normal	300 to 20000000	1	Hz	30000
Digital	10 to 1000000	1	Hz	30000

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

RBW Type	Setting value
Normal	300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz, 10 MHz, 20 MHz
Digital	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RBW to 30 kHz at Spectrum Mask measurement.

<Program>

```
DSPL SMASK
RBW_SMASK 30KHZ
RBW_SMASK?
```

<Response>

```
30000
```

REFTR_CCDF

■ Function

Select Reference Trace for CCDF

Selects the waveform additionally displayed on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
REFTR_CCDF *ref*	REFTR_CCDF?	*ref*

■ Parameter

ref

Selection for waveform

Value	Selection for waveform	Initial value
OFF	Sets only the measured waveform	*
SAVE	Displays Trace set in Save Reference Trace (*cf.* SAVETR_CCDF)	
GAUSS	Displays Gaussian Trace	
SAVEGAUSS	Displays Save Trace and Gaussian Trace.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays Save Trace.

<Program>

DSPL CCDF,CCDF

REFTR_CCDF? SAVE

REFTR_CCDF?

<Response>

SAVE

RFINPUT

■ Function

RF Input

Sets the RF signal input connector.

■ Syntax

Program Message	Query Message	Response Message
RFINPUT *a*	RFINPUT?	*a*

■ Parameter

a

RF connector

a	RF connector	Initial value
HIGH	High Power input	*
LOW	Low Power input	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RF connector to High Power input.

<Program>

RFINPUT HIGH

RFINPUT?

<Response>

HIGH

RFLVL

■ Function

Reference Level

Sets the Reference Level.

■ Syntax

Program Message	Query Message	Response Message
RFLVL *rflevel*	RFLVL?	*rflevel*

■ Parameter

rflevel

Reference Level

Model		PREAMP	Range	Initial value	Resolution	Unit
MS2681A		On	(−46.00+offset) to (26.00+offset)	10	0.01	dBm
		Off	(−26.00+offset) to (26.00+offset)			
MS2683A		On	(−46.00+offset) to (26.00+offset)	10	0.01	dBm
		Off	(−26.00+offset) to (26.00+offset)			
MS2687A/MS2687B		Off	(−26.00+offset) to (24.00+offset)	6	0.01	dBm
MS8608A	High input	On	(−26.00+offset) to (38.00+offset)	10	0.01	dBm
		Off	(−6.00+offset) to (38.00+offset)			
	Low input	On	(−46.00+offset) to (18.00+offset)			
		Off	(−26.00+offset) to (18.00+offset)			
MS8609A		On	(−46.00+offset) to (18.00+offset)	10	0.01	dBm
		Off	(−26.00+offset) to (18.00+offset)			

- *offset* represents the value set for the reference level offset (*cf.* RFVLOFS).

□ Suffix code

None: dBm

DBM: dBm

■ Initial command

- This setting is not possible when Terminal is other than RF (*cf.* TERM).

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the Reference Level to −10 dBm.

<Program>

```
TERM RF
RFLVLOFS 0
RFLVL−10
RFLVL?
```

<Response>

```
−10.00
```

RFLVLOFS

■ Function

Reference Level Offset
Sets the Reference Level Offset.

■ Syntax

Program Message	Query Message	Response Message
RFLVLOFS *offset*	RFLVLOFS?	*offset*

■ Parameter

offset
Reference Level Offset

Range	Resolution	Initial value	Unit
−99.99 to 99.99	0.01	0.00	dB

□ Suffix code

None: dB
DB: dB

■ Restrictions

- This setting is not possible when Terminal is other than RF (*cf.* TERM).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Reference Level Offset to 0 dB.
<Program>
TERM RF
RFLVLOFS 0.00
RFLVLOFS?

<Response>
0.00

RL_ADJ

■ Function

Reference Level for Adjacent Channel Power
Sets Reference Level at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
RL_ADJ *rflevel*	RL_ADJ?	*rflevel*

■ Parameter

rflevel
Reference Level

Model name	Pre ampl	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	---	−120.00 to 40.00	20.00	0.01	dBm
Other than the above	None	−120.00 to 40.00	20.00	0.01	dBm
	Provided	−140.00 to 20.00	20.00	0.01	dBm

□ Suffix code

None: dBm
DBM: dBm

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Reference Level to −10 dBm at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
RL_ADJ −10
RL_ADJ?

<Response>
−10.00

RL_OBW

■ Function

Reference Level for Occupied Bandwidth

Sets Reference Level at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
RL_OBW *rflevel*	RL_OBW?	*rflevel*

■ Parameter

rflevel

Reference Level

Model name	Pre ampl	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	---	−120.00 to 40.00	20.00	0.01	dBm
Other than the above	None	−120.00 to 40.00	20.00	0.01	dBm
	Provided	−140.00 to 20.00	20.00	0.01	dBm

□ Suffix code

None: dBm

DBM: dBm

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets Reference Level to −10 dBm at Occupied Bandwidth measurement.

<Program>

DSPL OBW

RL_OBW−10

RL_OBW?

<Response>

−10.00

RL_SMASK

■ Function

Reference Level for Spectrum Mask
Sets Reference Level at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
RL_SMASK *rflevel*	RL_SMASK?	*rflevel*

■ Parameter

rflevel

Reference Level

Model name	Pre ampl	Range	Initial value	Resolution	Unit
MS2687A/MS2687B	---	−120.00 to 40.00	20.00	0.01	dBm
Other than the above	None	−120.00 to 40.00	20.00	0.01	dBm
	Provided	−140.00 to 20.00	20.00	0.01	dBm

□ Suffix code

None: dBm
DBM: dBm

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Reference Level to −10 dBm at Spectrum Mask measurement.
<Program>
DSPL SMASK
RL_SMASK −10
RL_SMASK?

<Response>
−10.00

RMPDET

■ Function

Ramp Down Detection
Detects burst falling automatically.

■ Syntax

Program Message	Query Message	Response Message
RMPDET *a*	RMPDET?	*a*

■ Parameter

a
On/Off

Value	State	Initial value
OFF	Sets the burst length and performs the measurement at RF Power measurement.	*
ON	Detects burst falling automatically and performs the measurement while recognizing the burst length at RF Power measurement.	

■ Restrictions

- This command is invalid when Measuring Object is set to Continuous.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Ramp Down Detection to On.
<Program>
MEASOBJ BURST
DSPL RFPWR
RMPDET ON
RMPDET?

<Response>
ON

RNG

■ Function

Increases or decreases the measurement range for the power meter.

■ Syntax

Program Message	Query Message	Response Message
RNG *up_down*	---	---

■ Parameter

up_down

Operation of power meter range

Value	Operation of Power Meter Range
UP	Increases the measurement range by one step.
DN	Decreases the measurement range by one step.

- Transmitting the RNG UP command does not change the range when the range is set to maximum.
- Transmitting the RNG DN command does not change the range when the range is set to minimum.

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Increases the range by one step.

<Program>

RNG UP

RNG1

■ Function

Sets the measurement range for the power meter to the minimum level. The range value is set to 0 dBm or −20 dBm when the Input RF level is set to MS8608A High power or MS8608A Low power/MS8609A, respectively.

■ Syntax

Program Message	Query Message	Response Message
RNG1	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the measurement range for the power meter to the minimum level.

<Program>

RNG1

RNG2

■ Function

Sets the measurement range for the power meter to the second lowest level. The range value is set to +10 dBm or −10 dBm when the Input RF level is set to MS8608A High power or MS8608A Low power/MS8609A, respectively.

■ Syntax

Program Message	Query Message	Response Message
RNG2	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the measurement range for the power meter to the second lowest level.
<Program>
RNG2

RNG3

■ Function

Sets the measurement range for the power meter to the intermediate level. The range value is set to +20 dBm or 0 dBm when the Input RF level is set to MS8608A High power or MS8608A Low power/MS8609A, respectively.

■ Syntax

Program Message	Query Message	Response Message
RNG3	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the measurement range of the power meter to the intermediate level.

<Program>

RNG3

RNG4

■ Function

Sets the measurement range for the power meter to the fourth lowest level. The range value is set to +30 dBm or +10 dBm when the Input RF level is set to MS8608A High Power or MS8608A Low power/MS8609A, respectively.

■ Syntax

Program Message	Query Message	Response Message
RNG4	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the measurement range for the power meter to the fourth lowest level.

<Program>

RNG4

RNG5

■ Function

Sets the measurement range for the power meter to the maximum level. The range value is set to +40 dBm or +20 dBm when the Input RF level is set to MS8608A High power or MS8608A Low power/MS8609A, respectively.

■ Syntax

Program Message	Query Message	Response Message
RNG5	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the measurement range for the power meter to the maximum level.
<Program>
RNG5

ROLLOFF

■ Function

Roll Off Factor

Sets the roll off factor of the root raised cosine filter to be used for IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) measurement.

■ Syntax

Program Message	Query Message	Response Message
ROLLOFF α	ROLLOFF?	α

■ Parameter

α

Roll off factor

Value	State	Initial value
0.30 to 1.00	0.01	0.50

■ Restrictions

- This command is enabled only when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) and Filter Type is Root Raised Cosine filter (*cf.* TGTSY, FILTER).

■ Use example

Sets the roll off factor to 0.70.

<Program>

TGTSY 11B

FILTER RRC

ROLLOFF 0.70

ROLLOFF?

<Response>

0.70

RSLTANALYLEN

■ Function

Analysis Length for Modulation Analysis

Outputs the length of the analyzed signals in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	RSLTANALYLEN?	*a*

■ Parameter

a

Signal length

Target System	Resolution	Unit
Other than IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK)	1	OFDM symbol
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1	chip

■ Restrictions

- When the data rate is set to other than Auto, a value set in Analysis Length is returned.

■ Use example

Reads out the signal length.

<Program>

TGTSY11A

DATRATE AUTO

MEAS MODANAL

RSLTANALYLEN?

<Response>

10

RSLTMODTYPE

■ Function

Modulation Type for Modulation Analysis

Reads out the modulation type of the analyzed signals in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	RSLTMODTYPE?	*a*

■ Parameter

a

Modulation type

	IEEE802.11a	HiperLAN2	HiSWANa	IEEE802.11b	IEEE802.11g (ERP-DSSS/ CCK)	IEEE802.11g (ERP-OFDM)	IEEE802.11g (DSSS-OFDM)
a	OFBPSK	OFBPSK	OFBPSK	DBPSK	DBPSK	OFBPSK	OFBPSK
	OFQPSK	OFQPSK	OFQPSK	DQPSK	DQPSK	OFQPSK	OFQPSK
	OF16QAM	OF16QAM	OF16QAM	CCK5_5M	CCK5_5M	OF16QAM	OF16QAM
	OF64QAM	OF64QAM	OF64QAM	CCK11M	CCK11M	OF64QAM	OF64QAM

■ Restrictions

- When the data rate is set to other than Auto, a modulation type set in Modulation is returned.
- When the modulation type is set to HiSWANa and the data rate is set to Auto, this message is invalid.

■ Use example

Reads out the modulation type.

<Program>

TGTSY11A

DATRATE AUTO

MEAS MODANAL

RSLTMODTYPE?

<Response>

OF64QAM

S1

■ Function

Continuous Measure/Sweep

Executes a measurement or sweeping continuously.

Accepts a command even during measurement. This command functions the same as the CONTS command.

Stops the current measurement and starts with a new measurement when a measurement execution command, such as CONTS command, is received during measurement.

When an operation command not related to the measurement, for example, the INTPOL command or query message, is received during measurement; the current measurement is continued while responding to the received command.

However, when a measurement-related command is received during measurement, the current measurement is stopped and the command is executed.

■ Syntax

Program Message	Query Message	Response Message
S1	---	---

■ Use example

Continuously executes a measurement or sweeping.

<Program>

S1

S2

■ Function

Single Measure/Sweep

Executes a measurement or sweeping once.

Accepts a command even during measurement.

This command functions the same as the SNGLS command.

Stops the current measurement and starts with a new measurement when a measurement execution command, such as SNGLS command, is received for the second time during measurement.

When an operation command not related to the measurement, for example, the INTPOL command or query message, is received during measurement; the current measurement is continued while responding to the command.

However, when a measurement-related command is received during measurement, the current measurement is stopped and the command is executed.

■ Syntax

Program Message	Query Message	Response Message
S2	---	---

■ Use example

Executes a measurement or sweeping once.

<Program>

S2

SAVE2MCARD

■ Function

Save to Memory Card for Batch Measurement

Saves the measured results to a memory card on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
SAVE2MCARD	---	---

■ Use example

Saves the measured results.

<Program>

DSPL BATCH

START_BCH

SAVE2MCARD

SAVETR_CCDF

■ Function

Save Reference Trace for CCDF

Saves Reference Trace on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
SAVETR_CCDF	SAVETR_CCDF?	*a*

■ Parameter

a

Value of a

Value	State
OFF	Waveform is not saved.
ON	Waveform is saved.

■ Use example

Saves Reference Trace.

<Program>

DSPL CCDF,CCDF

SAVETR_CCDF

SAVETR_CCDF?

<Response>

ON

SRERR

■ Function

Symbol Rate Error

Outputs the Symbol Rate Frequency Error in Symbol Rate Error measurement.

■ Syntax

Program Message	Query Message	Response Message
---	SRERR?	*a*

■ Parameter

a

Symbol Rate Frequency Error

Resolution	Range	Unit
0.1	−60.0 to +60.0	ppm

- "***" is displayed when the display range is exceeded or the measured results becomes "Signal abnormal."

■ Use example

Outputs the Symbol Rate Frequency Error in Symbol Rate Error measurement.

<Program>

DSPL SRERR

MEAS SRERR

SRERR?

<Response>

−10.3

SETREL

■ Function

Set Relative level

Sets the power value (displayed on the Power Meter screen) to the reference value for relative value display.

■ Syntax

Program Message	Query Message	Response Message
SETREL	---	---

■ Restrictions

- This function can be executed only when the displayed measurement screen is the Power Meter screen. (*cf.* DSPL)

■ Use example

Sets the power value (being displayed) to the reference value for relative value display.

<Program>

SETREL

SETTBL_BCH

■ Function

Batch Measurement

Switches the judgement value setting screen and the measurement parameters setting screen (Setup Measure Table) for batch measurement.

■ Syntax

Program Message	Query Message	Response Message
SETTBL_BCH *mode*	SETTBL_BCH?	*mode*

■ Parameter

mode

Target screen

mode	Screen	Initial value
PAR	Measurement parameters setting screen	*
LMT	Judgement value setting screen	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Switches the Setup Measure Table screen to the judgement setting screen for batch measurement.

<Program>

DSPL SETTBL_BCH

SETTBL_BCH LMT

SETTBL_BCH?

<Response>

LMT

SLCTTEMP_SMASK

■ Function

Select Template for Spectrum Mask
Selects the measurement standard at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
SLCTTEMP_SMASK *std*	SLCTTEMP_SMASK?	*std*

■ Parameter

std
Measurement standard

Value	Description	Initial value
STD	Selects the system standard template	*
USER	Selects the user set template	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Selects USER as the measurement standard at Spectrum Mask measurement.
<Program>
DSPL SMASK
SLCTTEMP_SMASK USER
SLCTTEMP_SMASK?

<Response>
USER

SLCTTEMP_SMASK_BCH

■ Function

Batch Measurement

Selects the standard line of the spectrum mask to be used for judgement on the Setup Measure Table (Batch screen).

■ Syntax

Program Message	Query Message	Response Message
SLCTTEMP_SMASK_BCH *a*	SLCTTEMP_SMASK_BCH?	*a*

■ Parameter

a

Standard Line of Spectrum Mask

a	Settings for Spectrum Analyzer	Initial Value
STD	Judged using the standard line stipulated in the standard selected by the target system.	*
USER	Judged using the user-defined standard line.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Selects the user-defined standard line of the spectrum mask.

<Program>
DSPL SETTBL_BCH
SLCTEMP_SMASK_BCH USER
SLCTEMP_SMASK_BCH?

<Response>
USER

SMOFLT

■ Function

Smoothing Filter

Selects whether to smooth waveform at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
SMOFLT *flt*	SMOFLT?	*flt*

■ Parameter

flt: On/Off of waveform smoothing

Value	On/Off of Waveform Smoothing	Initial Value
OFF	Does not smooth a waveform.	*
ON	Smoothes a waveform.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Smoothes a waveform.

<Program>
DSPL RFPWR
SMOFLT ON
SMOFLT?

<Response>
ON

SNGLS

■ Function

Single Measure/Sweep

Executes a measurement or sweeping once.

Accepts a command even during measurement.

This command functions the same as the S2 command.

Stops the current measurement and starts with a new measurement when a measurement execution command, such as SNGLS command, is received for the second time during measurement.

When an operation command not related to the measurement, for example, the INTPOL command or query message, is received during measurement; the current measurement is continued while responding to the command.

However, when a measurement-related command is received during measurement, the current measurement is stopped and the received command is executed.

■ Syntax

Program Message	Query Message	Response Message
SNGLS	---	---

■ Restrictions

- This command is disabled when using Batch Measurement.

■ Use example

Executes a measurement or sweeping once.

<Program>

SNGLS

SPAN_OBW

■ Function

Frequency Span for Occupied Bandwidth
Sets the sweep frequency span for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
SPAN_OBW	SPAN_OBW?	*freq*

■ Parameter

freq
Sweep frequency span

System	Range	Resolution	Unit	Initial value
IEEE802.11b, IEEE802.11g	20000000 to 200000000	1	Hz	60000000
Other than the above	20000000 to 200000000	1	Hz	40000000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Use example

Sets the sweep frequency span for Spectrum Analyzer to 60 MHz at Occupied Bandwidth measurement.
<Program>
DSPL OBW
SPAN_OBW 60MHZ
SPAN_OBW?

<Response>
60000000

SPECT_ADJALL

■ Function

Spectrum (All) for Adjacent Channel Leakage Power

Reads out the frequency axis sweep waveform when Measure Method is Spectrum (All) on the Adjacent Channel Leakage Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_ADJALL? *a, b*	*c(a), c(a+1),....,c(a+b–1)*

■ Parameter

a

Read Out Starting Position

Data Point	a	Resolution
1001	0 to 1000	1
501	0 to 500	1

b

Read Out Count

Data Point	b	Resolution
1001	1 to 1001	1
501	1 to 501	1

c(a)

a-th frequency axis sweep waveform data

Resolution	Unit
1	dB

* Output in 0.01 dB units assuming 1 dB = 100

■ Use example

Reads out 5 sweep waveforms starting from address 0 when Measure Method is Spectrum (All).

<Program>

DSPL ADJ,SPECT1

SWP

SPECT_ADJALL? 0,5

<Response>

−6345,−6346,−6347,−5346,−5345

SPECT_ADJSEP

■ Function

Spectrum (Separate) for Adjacent Channel Leakage Power

Reads out the frequency axis sweep waveform when Measure Method is Spectrum (Separate) on the Adjacent Channel Leakage Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_ADJSEP? *a, b*	*c(a), c(a+1),....,c(a+b–1)*

■ Parameter

a

Read Out Starting Position

Data Point	a	Resolution
1001	0 to 5004	1
501	0 to 2504	1

b

Read Out Count

Data Point	b	Resolution
1001	1 to 5005	1
501	1 to 2505	1

c(a)

a-th frequency axis sweep waveform data

Resolution	Unit
1	dB

* Output in 0.01 dB units assuming 1 dB = 100

■ Use example

Reads out 5 sweep waveforms starting from address 0 when Measure Method is Spectrum (Separate).

<Program>

DSPL ADJ,SPECT2

SWP

SPECT_ADJSEP? 0,5

<Response>

−3345,−3346,−3347,−4346,−4345

SPECT_OBW

■ Function

Spectrum-Occupied Band Width

Reads out the frequency axis sweep waveform on the Occupied Bandwidth screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_OBW? *a,b*	*c(a),c(a+1),....,c(a+b–1)*

■ Parameter

a

Read Out Starting Position

Data Point	a	Resolution
1001	0 to 1000	1
501	0 to 500	1

b

Read Out Count

Data Point	b	Resolution
1001	1 to 1001	1
501	1 to 501	1

c(a)

a-th frequency axis sweep waveform data

Resolution	Unit
1	dB

* Output in 0.01 dB units assuming 1 dB = 100

■ Use example

Reads out 5 sweep waveforms starting from address 0.

<Program>

DSPL OBW

SWP

SPECT_OBW? 0,5

<Response>

−2345,−2346,−2347,−2346,−2345

SPECT_SMASK

■ Function

Data for Spectrum Mask

Reads out waveform data for spectrum mask measurement.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_SMASK? *a, b*	*c(a), c(a+1),....,C(a+b–1)*

■ Parameter

a

Read Out Starting Position

Range	Resolution
0 to 1000	1

b

Read Out Count

Range	Resolution
1 to 1001	1

c(n)

Waveform Data

Resolution	Unit
1	dB

Output assuming 1 dB = 100

■ Use example

Reads out 5 waveform data starting from 0 at spectrum mask measurement.

<Program>

DSPL SMASK

SWP

SPECT_SMASK? 0,5

<Response>

−5128,−5237,−5083,−5283,−4992

SPECT_SPUF

■ Function

Spectrum Data for Spurious Emission

Reads out sweep waveform of frequency base for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_SPUF? *tbl, a, n*	*d(a), d(a+1),...,d(a+n–1)*

■ Parameter

tbl

Frequency Table

Value	Unit
F1 to F15	None

a

Read Out Starting Position

Value	Data Point	Resolution
0 to 500	501	1
0 to 1000	1001	1

n

Read out count

Value	Data Point	Resolution
1 to 501	501	1
1 to 1001	1001	1

d(m)

Waveform Data of m Joint

Resolution	Unit
1	dBm

Unit is 0.01 dBm (1 dBm = 100)

■ Restrictions

- Effective in sweep or search measurement.

■ Use example

Reads out five data from 0 of sweep waveform in frequency table F2 at sweep measurement.

<Program>

```
DSPL SPURIOUS, SWEEP
SWP
SPECT_SPUF? F2,0,5
```

<Response>

−5423,−5832,−5693,−5934,−4924

SPECT_SPUT

■ Function

Spectrum Data for Spurious Emission

Reads out sweep waveform of time base for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPECT_SPUT? *tbl, a, n*	*d(a), d(a+1),...,d(a+n–1)*

■ Parameter

tbl

Frequency Table

Value	Unit
F1 to F15	None

a

Read Out Starting Position

Value	Data Point	Resolution
0 to 500	501	1
0 to 1000	1001	1

n

Read Out Count

Value	Data Point	Resolution
1 to 501	501	1
1 to 1001	1001	1

d(m)

Waveform Data of m Joint

Resolution	Unit
1	dBm

Unit is 0.01 dBm (1 dBm = 100)

■ Restrictions

- Effective only in spot measurement.

■ Use example

Reads out five data from 0 of sweep waveform in frequency table F2 at spot measurement.

<Program>

DSPL SPURIOUS, SPOT
SWP
SPECT_SPUT? F2,0,5

<Response>

−5423,−5832,−5693,−5934,−4924

SPFLAT

■ Function

Spectrum Flatness

Reads out spectrum flatness of each sub-carrier in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPFLAT? *addr,n*	*data(addr),data(addr+1),...,data(addr+n-1)*

■ Parameter

addr

Starting address to read out data

Value	Resolution
0 to 51	1

n

Number of data reading

Value	Resolution
1 to 52	1

data(addr)

Results of address addr

Value	Resolution	Output unit
−32768 to 32767	1	0.01 dB

■ Data storage method

Address	0	1	---	25	26	---	51
Sub-carrier Number	−26	−25	---	−1	1	---	26

■ Restrictions

- This command is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) while Measuring Object is Burst, and Terminal is RF.

■ Use example

Reads out spectrum flatness of five sub-carriers starting from sub-carrier number −26.

<Program>

MEAS MODANAL

SPFLAT? 0,5

<Response>

123,234,135,257,149

SPRTBL_BCH

■ Function

Batch Measurement

Selects standards for spurious measurement at batch measurement.

■ Syntax

Program Message	Query Message	Response Message
SPRTBL_BCH *tbl, n*	SPRTBL_BCH? *tbl*	*N*

■ Parameter

tbl

Spurious Table

tbl	Table
1	Spurious 1
2	Spurious 2

n

Spurious Standards

n	Standards
0	TELEC 2.4G Data Communication System Spurious
1	TELEC 2.4G Data Communication System Secondary Emission
2	TELEC 5G Wireless Access 5.03 GHz Band Spurious & Out-Band Leakage
3	TELEC 5G Wireless Access 4.9 GHz Band Spurious & Out-Band Leakage
4	TELEC 5G Wireless Access Secondary Emission
5	TELEC 5G Data Communication System Spurious
6	TELEC 5G Data Communication System Out-Band Leakage
7	TELEC 5G Data Communication System Secondary Emission
8	ETSI TS101 475 (HiperLAN2) Signal ON
9	ETSI TS101 475 (HiperLAN2) Signal OFF
10	FCC 15.407 5.15-5.25 Band
11	FCC 15.407 5.25-5.35 Band
12	FCC 15.407 5.725-5.825 Band
13	FCC 15.247 2.4 GHz Band
14	TELEC 2.4G Data Communication System (14CH) Spurious
98	Spot Table
99	Does not execute measurement

Initial Value

Spurious Table	Initial Value	
	IEEE802.11b, IEEE802.11g	Other than IEEE802.11b or IEEE802.11g
Spurious 1	0	5
Spurious 2	99	99

■ Restrictions

- Select different standards for Spurious 1 and Spurious 2 tables.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Spot Table to Spurious 2 for batch measurement.

<Program>
DSPL SETTBL_BCH
SPRTBL_BCH 2, 98
SPRTBL_BCH? 2

<Response>
98

SPUALL

■ Function

Spurious Frequency, Level and Judgement for Spurious Emission
Reads out measured spurious frequency, level, and setting value for spurious emission in same time.

■ Syntax

Program Message	Query Message	Response Message
---	SPUALL? *a, n, u*	*f(a), l(a), r(a), v(a), t(a), rl(a), at(a), f(a+1), l(a+1), r(a+1), v(a+1), t(a+1), rl(a+1), at(a+1), …,f(a+n–1), l(a+n–1), r(a+n–1), v(a+n–1), t(a+n–1), rl(a+n–1), at(a+n–1)*

■ Parameter

a

Frequency Table

Value	Unit
F1 to F15	None

n

Read Out Count

Value	Resolution	Unit
1 to 15	1	None

u

Unit

c	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

f(m)

Spurious Frequency of Frequency Table m

Resolution	Unit
1	Hz

l(m)

Spurious Level of Frequency Table m

Output unit	Resolution
dBm	0.01
dB	0.01
W	4 significant digits
W/MHz	

r(m)

RBW of Frequency Table m

RBW	Value
Normal	300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz, 10 MHz, 20 MHz
Digital	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz

v(m)

VBW of Frequency Table m

Value
0 Hz (OFF), 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz

t(m)

Sweep Time of Frequency Table m

Resolution	Unit
1	us

rl(m)

Reference Level of Frequency Table m

Resolution	Unit
0.01	dBm

at(m)

Attenuator of Frequency Table m

Main frame	Resolution	Unit
MS2687A/MS2687B	10	dB
Other than the Above	2	dB

■ Use example

Reads out spurious frequency, level and setting value of frequency table F2 at spot measurement.

<Program>

DSPL SPURIOUS, SPOT
SWP
SPUALL? F2,1,DBM

<Response>

12340000,−12.34, 1000000, 1000000, 10000,−10.00, 30

SPUFREQ

■ Function

Spurious Frequency for Spurious Emission

Reads out measured spurious frequency for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQ? *a, n*	*c(a),c(a+1),...,c(a+n–1)*

■ Parameter

a

Frequency Table

Value	Unit
F1 to F15	None

n

Read out count

Value	Resolution	Unit
1 to 15	1	None

c(a)

Spurious Frequency

Resolution	Unit
1	Hz

■ Use example

Reads out spurious frequency of F1 to F4 at spot measurement.

<Program>

DSPL SPURIOUS, SPOT

SWP

SPUFREQ? F1, 4

<Response>

1102000000, 4176200000, 6722620000, 7716100000

SPUFREQ_BCH

■ Function

Spurious Frequency for Batch
Reads out measured spurious frequency on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQ_BCH? *a,b,n*	*c(b),c(b+1),...,c(b+n–1)*

■ Parameter

a
Spurious Table Selection

a	Result
SPR1	Result of Spurious Emission1
SPR2	Result of Spurious Emission2

b
Frequency Table

Value	Unit
F1 to F15	None

n
Read out count

Value	Resolution	Unit
1 to 15	1	None

c(a)
Spurious Frequency

Resolution	Unit
1	Hz

■ Use example

Reads out frequencies of F1 to F4 of Spurious Emission1 at Batch measurement.
<Program>
DSPL BATCH
SPUFREQ_BCH? SPR1,F1, 4

<Response>
1102000000, 4176200000, 6722620000, 7716100000

SPUFREQLVL

■ Function

Spurious Frequency and Spurious Level for Spurious Emission

Reads out the measured results for spurious frequency and level on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQLVL? *a,b,c*	*d(a),e(a),d(a+1),e(a+1),…,d(a+b-1),e(a+b-1)*

■ Parameter

a

Frequency Table

a	Unit
F1 to F15	None

b

Read out count

b	Resolution
1 to 15	1

c

Output unit

c	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

d(a)

Spurious frequency in frequency table a

Resolution	Unit
1	Hz

e(a)

Spurious level in frequency table a

Output unit	Resolution
dBm	0.01
dB	0.01
W	4 significant digits
W/MHz	

■ Restrictions

- "***" is displayed as the result for a frequency table that is not measured.

■ Use example

Reads out a spurious frequency of F2 to F4 and the spurious level in Spot measurement in dBm units.

<Program>

DSPL SPURIOUS,SPOT

SWP

SPUFREQLVL? F2,3,DBM

<Response>

12340000,−12.34, 234500000,−23.45, 3456000000,−34.56

SPUFREQLVL_BCH

■ Function

Spurious Frequency and Spurious Level for Batch

Reads out the measured results for spurious frequency and level on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQLVL_BCH? *a,b,n,u*	*c(b),d(b),c(b+1),d(b+1),...,c(b+n-1),d(b+n-1)*

■ Parameter

a

Spurious Table Selection

a	Result
SPR1	Result of Spurious Emission1
SPR2	Result of Spurious Emission2

b

Frequency Table

Value	Unit
F1 to F15	None

n

Read out count

Value	Resolution	Unit
1 to 15	1	None

u

Unit

Value	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

c(n)

Spurious frequency

Resolution	Unit
1	Hz

d(n)

Spurious level

<table>
<tr><th>Output unit</th><th>Resolution</th></tr>
<tr><td>dBm</td><td>0.01</td></tr>
<tr><td>dB</td><td>0.01</td></tr>
<tr><td>W</td><td rowspan="2">4 significant digits</td></tr>
<tr><td>W/MHz</td></tr>
</table>

■ Use example

Reads out a spurious frequency of F2 to F4 of Spurious Emission1 and the spurious level at Batch measurement in dBm units.

<Program>

DSPL BATCH

SPUFREQLVL_BCH? SPR1,F2,3,DBM

<Response>

12340000,−12.34, 234500000,−23.45, 3456000000,−34.56

SPUJDG

■ Function

Spurious Total Judgement for Spurious Emission

Reads out measured general spurious judgement for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPUJDG?	*a*

■ Parameter

a

Spurious Judgement Result

a	Result
PASS	Pass
FAIL	Fail
OFF	Not judged

■ Use example

Reads out general judgement result at spot measurement.

<Program>

DSPL SPURIOUS, SPOT

SWP

SPUJDG?

<Response>

PASS

SPUJDG_BCH

■ Function

Spurious Total Judgement for Batch

Reads out measured general spurious judgement on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUJDG_BCH? a	*b*

■ Parameter

a

Spurious Table Selection

a	Result
SPR1	Result of Spurious Emission1
SPR2	Result of Spurious Emission2

b

Spurious Judgement Result

b	Result
PASS	Pass
FAIL	Fail
OFF	Not judged

■ Use example

Reads out general judgement result of Spurious Emission1 at Batch measurement.

<Program>

DSPL BATCH

SPUJDG_BCH?

<Response>

PASS

SPULMT

■ Function

Limit for Spurious Emission

Sets reference value to do results judgement at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
SPULMT *a, Ftable_no, lmt, b, unit*	SPULMT? *a, Ftable_no, b, unit*	*lmt*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

lmt

Reference Value

Range	Resolution	Unit
−100.00 to 100.00	0.01	dBm
0.001 to 999.999	0.001	xW/MHz

b

Judgement Method

b	Description
ABS	Judges results with spurious absolute level
REL	Judges results with carrier & spurious levels

unit

Unit

b	e	Description
ABS	DBM	Sets Absolute Limit value in a dBm unit.
	MW	Sets Absolute Limit value in mW/MHZ unit.
	UW	Sets Absolute Limit value in uW/MHZ unit.
	NW	Sets Absolute Limit value in nW/MHZ unit.
REL	DB	Sets Relative Limit value in a dB unit.

■ Initial value

Initial value of each parameter is as follows. "---" means no value is set.

Spurious Mode: Spot Target Sysytem:IEEE802.11a, HiperLAN2, HiSWANa

Table Number	Reference Value	Unit
F1	0.001	uW/MHz
F2	0.001	uW/MHz
F3	0.001	uW/MHz
F4 to F15	---	---

Spurious Mode: Spot Target Sysytem:IEEE802.11b, IEEE802.11g

Table Number	Reference Value	Unit
F1	0.001	uW/MHz
F2	0.001	uW/MHz
F3	0.001	uW/MHz
F4 to F15	---	---

Spurious Mode: Search, Sweep

Table Number	Frequency
F1 to F15	---

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets reference level of the fourth table for spot measurement to −13 dBm at spurious emission measurement.

<Program>
DSPL SPURIOUS, SPOT
SPULMT SPOT, F4, −13, DBM

<Response>
−13.00

SPULVL

■ Function

Spurious Level for Spurious Emission

Reads out measured spurious level for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPULVL? *a, n, u*	*c(a),c(a+1),...,c(a+n–1)*

■ Parameter

a

Frequency Table

Value	Unit
F1 to F15	None

n

Read out count

Value	Resolution	Unit
1 to 15	1	None

u

Unit

c	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

c(n)

Spurious level

Output unit	Resolution
dBm	0.01
dB	0.01
W	4 significant digits
W/MHz	

■ Use example

Reads out spurious level of F1 to F4 at spot measurement.

<Program>

```
DSPL SPURIOUS, SPOT
SWP
SPURLVL? F1, 4
```

<Response>

```
−60.54,−45.83,−53.32,−56.29
```

SPULVL_BCH

■ Function

Spurious Level for Batch

Reads out measured spurious level on the Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPULVL_BCH? *a,b,n,u*	*c(b),c(b+1),...,c(b+n–1)*

■ Parameter

a

Spurious Table Selection

a	Result
SPR1	Result of Spurious Emission1
SPR2	Result of Spurious Emission2

b

Frequency Table

Value	Unit
F1 to F15	None

n

Read out count

Value	Resolution	Unit
1 to 15	1	None

u

Unit

Value	Unit
None	dBm
DBM	dBm
DB	dB
W	W
W_MHZ	W/MHz

c(n)

Spurious level

<table>
<tr><th>Output unit</th><th>Resolution</th></tr>
<tr><td>dBm</td><td>0.01</td></tr>
<tr><td>dB</td><td>0.01</td></tr>
<tr><td>W</td><td rowspan="2">4 significant digits</td></tr>
<tr><td>W/MHz</td></tr>
</table>

■ Use example

Reads out spurious level of F1 to F4 of Spurious Emission1 at Batch measurement.

<Program>

DSPL BATCH

SPURLVL_BCH? SPR1,F1, 4

<Response>

−60.54,−45.83,−53.32,−56.29

SPUPASS

■ Function

Spurious Judgement for Spurious Emission

Reads out measured spurious judgement for spurious emission.

■ Syntax

Program Message	Query Message	Response Message
---	SPUPASS? *a*	*b*
	SPUPASS? ALL	*b(1),b(2),...,b(15)*

■ Parameter

a

Frequency Table

Value	Description
F1 to F15	Reads out judgement result of specified frequency table
ALL	Reads out judgement result of all frequency tables

b(n)

Spurious Judgement Result

b	Result
PASS	Pass
FAIL	Fail
OFF	Not judged

■ Use example

Reads out judgement result of frequency table F2 at spot measurement.

<Program>

DSPL SPURIOUS, SPOT

SWP

SPUPASS? F2

<Response>

PASS

SPUPASS_BCH

■ Function

Spurious Judgement for Batch
Reads out measured spurious judgement on Batch screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUPASS_BCH? *a,n*	*b*
	SPUPASS_BCH? ALL	*b(1),b(2),...,b(15)*

■ Parameter

a
Spurious Table Selection

a	Result
SPR1	Result of Spurious Emission1
SPR2	Result of Spurious Emission2

n
Frequency Table

Value	Description
F1 to F15	Reads out judgement result of specified frequency table
ALL	Reads out judgement result of all frequency tables

b(n)
Spurious Judgement Result

b	Result
PASS	Pass
FAIL	Fail
OFF	Not judged

■ Use example

Reads out judgement result of frequency table F2 of Spurious Emission1 at Batch measurement.
<Program>
DSPL BATCH
SPUPASS_BCH? SPR1,F2

<Response>
PASS

START_BCH

■ Function

Batch Measurement

Starts batch measurement.

■ Syntax

Program Message	Query Message	Response Message
START_BCH	START_BCH?	*n*

■ Parameter

n

Measurement state

n	Measurement State
1	Under measurement
0	Measurement stopped

■ Restrictions

- This command is valid in the Batch Measure screen only.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Starts batch measurement.

<Program>

DSPL BATCH

START_BCH

START_BCH?

<Response>

1

STM_ADJ

■ Function

Sweep Time: Auto/Manual for Adjacent Channel Power
Sets whether Sweep Time for Spectrum Analyzer is set automatically or manually at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
STM_ADJ *mode*	STM_ADJ?	*mode*

■ Parameter

mode
Sweep Time setting mode

Value	Mode	Initial value
AUTO	Sets the Sweep Time setting mode to automatic mode	*
MAN	Sets the Sweep Time setting mode to manual mode	

■ Restrictions

- If Sweep Time is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Sweep Time is automatically set by the values of RBW and VBW when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Sweep Time setting mode to automatic mode at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
STM_ADJ AUTO
STM_ADJ?

<Response>
AUTO

STM_OBW

■ Function

Sweep Time: Auto/Manual for Occupied Bandwidth

Sets whether Sweep Time for Spectrum Analyzer is set automatically or manually at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
STM_OBW *mode*	STM_OBW?	*mode*

■ Parameter

mode

Sweep Time setting mode

Value	Mode	Initial value
AUTO	Sets the Sweep Time setting mode to automatic mode	*
MAN	Sets the Sweep Time setting mode to manual mode	

■ Restrictions

- If Sweep Time is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Sweep Time is automatically set by the values of RBW and VBW when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Sweep Time setting mode to automatic mode at Occupied Bandwidth measurement.

<Program>
DSPL OBW
STM_OBW AUTO
STM_OBW?

<Response>
AUTO

STM_SMASK

■ Function

Sweep Time: Auto/Manual for Spectrum Mask
Sets whether Sweep Time for Spectrum Analyzer is set automatically or manually at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
STM_SMASK *mode*	STM_SMASK?	*mode*

■ Parameter

mode
Sweep Time setting mode

Value	Mode	Initial value
AUTO	Sets the Sweep Time setting mode to automatic mode	*
MAN	Sets the Sweep Time setting mode to manual mode	

■ Restrictions

- If Sweep Time is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of Sweep Time is automatically set by the values of RBW and VBW when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the Sweep Time setting mode to automatic mode at Spectrum Mask measurement.
<Program>
DSPL SMASK
STM_SMASK AUTO
STM_SMASK?

<Response>
AUTO

STOP_BCH

■ Function

Batch Measurement

Stops batch measurement.

■ Syntax

Program Message	Query Message	Response Message
STOP_BCH	STOP_BCH?	*n*

■ Parameter

n

Measurement state

n	Measurement State
1	Measurement stopped
0	Under measurement

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Stops batch measurement.

<Program>

DSPL BATCH

STOP_BCH

STOP_BCH?

<Response>

1

STRG_ADJ

■ Function

Storage Mode for Adjacent Channel Power
Sets the method for displaying the measured results at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_ADJ *mode*	STRG_ADJ?	*mode*

■ Parameter

mode
Display method

Value	Description	Initial Value
NRM	Normal: Gives a ordinary display (single measurement).	*
AVG	Average: Repeats a measurement by the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the average value at Adjacent Channel Power measurement.
<Program>
DSPL ADJ
STRG_ADJ AVG
STRG_ADJ?

<Response>
AVG

STRG_CCERR

■ Function

Storage Mode for Chip Clock Error

Sets the method for displaying the measured results in Chip Clock Error measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_CCERR *mode*	STRG_CCERR?	*mode*

■ Parameter

mode

Display method

Value	Display Method	Initial Value
NRM	Normal: Ordinary display (single measurement).	*
AVG	Average: Repeats measurement for the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the average value in Chip Clock Error measurement.

<Program>
DSPL CCERR
STRG_CCERR AVG
STRG_CCERR?

<Response>
AVG

STRG_IQL

■ Function

Storage Mode for IQ Level

Sets the method for displaying the measured results in IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_IQL *mode*	STRG_IQL?	*mode*

■ Parameter

mode

Display method

Value	Display Method		Initial Value
NRM	Normal:	Ordinary display (single measurement).	*
AVG	Average:	Repeats measurement for the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays the average value in IQ Level measurement.

<Program>

DSPL IQLVL

STRG_IQL AVG

STRG_IQL?

<Response>

AVG

STRG_MOD

■ Function

Storage Mode for Modulation Analysis

Sets the method for displaying the measured results at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_MOD *mode*	STRG_MOD?	*mode*

■ Parameter

mode

Display method

Value	Display Method		Initial Value
NRM	Normal:	Gives a ordinary display (single measurement).	*
AVG	Average:	Repeats a measurement by the number of times specified by Average Count, and displays the average value as the result.	
OVER	Overwrite:	Overwrites the plotting of measured results in order, and displays the overwritten results at Continuous measurement.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the average value at Modulation Analysis measurement.

<Program>
DSPL MODANAL
STRG_MOD AVG
STRG_MOD?

<Response>
AVG

STRG_OBW

■ Function

Storage Mode for Occupied Bandwidth

Sets the method for displaying the measured results at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_OBW *mode*	STRG_OBW?	*mode*

■ Parameter

mode

Display method

Value	Description	Initial value
NRM	Normal: Gives a ordinary display (single measurement).	*
AVG	Average: Repeats a measurement by the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays the average value at Occupied Bandwidth measurement.

<Program>

DSPL OBW

STRG_OBW AVG

STRG _OBW?

<Response>

AVG

STRG_RFPWR

■ Function

Storage Mode for RF Power
Sets the method for displaying the measured results at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_RFPWR *mode*	STRG_RFPWR?	*mode*

■ Parameter

mode
Display method

Value	Display Method	Initial Value
NRM	Normal: Ordinary display (single measurement).	*
AVG	Average: Repeats measurement by number of times specified by Average Count and displays the average value as the result.	
OVER	Overwrite: Overwrites measured results plotting in order and displays the overwritten results at Continuous measurement.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the average value at RF Power measurement.
<Program>
DSPL RFPWR
STRG_RFPWR AVG
STRG_RFPWR?

<Response>
AVG

STRG_SRERR

■ Function

Storage Mode for Symbol Rate Error

Sets the method for displaying the measured results in Symbol Rate Error measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_SRERR *mode*	STRG_SRERR?	*mode*

■ Parameter

mode

Display method

Value	Display Method		Initial Value
NRM	Normal:	Ordinary display (single measurement).	*
AVG	Average:	Repeats measurement for the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays the average value in Symbol Rate Error measurement.

<Program>

DSPL SRERR

STRG_SRERR AVG

STRG_SRERR?

<Response>

AVG

STRG_SMASK

■ Function

Storage Mode for Spectrum Mask
Sets the method for displaying the measured results at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_SMASK *mode*	STRG_SMASK?	*mode*

■ Parameter

mode
Display method

Value	Description	Initial value
NRM	Normal: Gives a ordinary display (single measurement).	*
AVG	Average: Repeats a measurement by the number of times specified by Average Count, and displays the average value as the result.	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays the average value at Spectrum Mask measurement.
<Program>
DSPL SMASK
STRG_SMASK AVG
STRG _SMASK?

<Response>
AVG

STRG_SPU

■ Function

Storage Mode for Spurious Emission

Sets the method for displaying the measured results at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_SPU *mode*	STRG_SPU?	*mode*

■ Parameter

mode

Display Method

Value	Description	Initial value
NRM	Normal: Normal display (single measurement).	*
AVG	Average: Repeats measurement the number of times specified by average count, and displays the average value as the result.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays the average value at spurious emission measurement.

<Program>

DSPL SPURIOUS, SWEEP

STRG_SPU AVG

STRG _SPU?

<Response>

AVG

SWP

■ Function

Single Measure/Sweep

Executes a measurement or sweeping once.

Unlike the SNGLS command, when the measuring instrument accepts a command during measurement, the command is not processed immediately but is queued until measurement is completed.

Since the command following this SWP command is processed after the current measurement completion, this means that the synchronization between the measuring instrument operation and the program (which sends the command) is ensured.

■ Syntax

Program Message	Query Message	Response Message
SWP	SWP?	*a*

■ Parameter

a

Measurement/sweep state

Value	Measurement/sweep state
1	Sweeping
0	Sweep stopped

■ Restrictions

- This command is disabled when using Batch Measurement.

■ Use example

Executes a measurement or sweeping once.

<Program>

SWP

SWT_ADJ

■ Function

Sweep Time for Adjacent Channel Power

Sets Sweep Time for Spectrum Analyzer at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
SWT_ADJ *t*	SWT_ADJ?	*t*

■ Parameter

t

Sweep Time at setting parameter

Range	Resolution	Unit	Initial value
10 to 1000000	1	ms	10

Sweep Time at reading value

Range	Resolution	Unit
10000 to 1000000000	1	μs

□ Suffix code

None: ms

S: s

MS: ms

US: us

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets sweep time to 100 ms at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

SWT_ADJ 100MS

SWT_ADJ?

<Response>

100000

SWT_OBW

■ Function

Sweep Time for Occupied Bandwidth

Sets Sweep Time for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
SWT_OBW *t*	SWT_OBW?	*t*

■ Parameter

t

Sweep Time at setting parameter

Range	Resolution	Unit	Initial value
10 to 1000000	1	ms	10

Sweep Time at reading value

Range	Resolution	Unit
10000 to 1000000000	1	μs

□ Suffix code

None: ms

S: s

MS: ms

US: us

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets sweep time to 100 ms at Occupied Bandwidth measurement.

<Program>

DSPL OBW

SWT_OBW 100MS

SWT_OBW?

<Response>

100000

SWT_SMASK

■ Function

Sweep Time for Spectrum Mask

Sets Sweep Time for Spectrum Analyzer at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
SWT_SMASK *t*	SWT_SMASK?	*t*

■ Parameter

t

Sweep Time at setting parameter

Range	Resolution	Unit	Initial value
10 to 1000000	1	ms	80

Sweep Time at reading value

Range	Resolution	Unit
10000 to 1000000000	1	μs

□ Suffix code

None: ms

S: s

MS: ms

US: us

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets sweep time to 100 ms at Spectrum Mask measurement.

<Program>

DSPL SMASK

SWT_SMASK 100MS

SWT_SMASK?

<Response>

100000

SYS

■ Function

System Change

Switches the measurement software in the Signal Analysis mode.

■ Syntax

Program Message	Query Message	Response Message
SYS *area*	SYS?	*area*

■ Parameter

area

Storage area for measurement software

Value	Storage Area for Measurement Software
1	Area 1 (F1 key)
2	Area 2 (F2 key)
3	Area 3 (F3 key)

■ Use example

Switches to the software stored in Area 1.

<Program>

SYS 1

SYS?

<Response>

1

TBLATTMD_SPU

■ Function

Attenuator Mode: Manual/Auto for Spurious Emission
Sets whether attenuator is set automatically or manually at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLATTMD_SPU *a, b*	TBLATTMD_SPU? *a*	*b*

■ Parameter

a
Measure Method

	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

b
Setting Method

Value	Setting Method	Initial Value
MAN	Sets attenuator setting mode to manual mode	
AUTO	Sets attenuator setting mode to automatic mode	*

■ Initialization command

PRE
INI
IP
*RST

■ Restrictions

- Setting is forcibly switched to Manual if attenuator is changed when setting mode is set to Auto.

■ Use example

Sets attenuator in Spot measurement into automatic setting at spurious emission measurement.
<Program>
TBLATTMD_SPU SPOT, AUTO
TBLATTMD_SPU? SPOT

<Response>
AUTO

TBLATTRLMD_SPU

■ Function

Attenuator Reference Level Mode: Manual/Auto for Spurious Emission

Sets whether attenuator and reference level for spectrum analyzer are automatically or manually set at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLATTRLMD_SPU *a, b*	TBLATTRLMD_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

b

Setting Method

Value	Setting Method	Initial Value
MAN	Sets attenuator and reference level setting modes to manual mode	
AUTO	Sets attenuator and reference level setting modes to automatic mode	*

■ Restrictions

- Setting is forcibly switched to Manual if attenuator or reference level is changed when the setting mode is set to Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets attenuator and reference level in Spot measurement into automatic setting at spurious emission measurement.

<Program>
TBLATTRLMD_SPU SPOT, AUTO
TBLATTRLMD_SPU? SPOT

<Response>
AUTO

TBLATT_SPU

■ Function

Attenuator for Spurious Emission

Sets attenuator at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLATT_SPU *table, Ftable_no, att*	TBLRL_SPU? *table, Ftable_no*	*att*

■ Parameter

table

Frequency Table

Value	Frequency Table
SPOT	Spot Table
SWEEP	Sweep/Search Table

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

att

Attenuator

Main frame	Range	Resolution	Unit
MS2681A, MS2683A, MS8608A, MS8609A	0 to 62	2	dB
MS2687A, MS2687B	0 to 70	10	dB

□ Suffix code

None: dB

DB: dB

■ Restrictions

- Setting ranges of attenuator vary according to reference level.

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets attenuator of fourth table for Sweep measurement to 20 dB at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SWEEP
TBLATT_SPU SWEEP, F4, 20DB
TBLATT_SPU? SWEEP, F4

<Response>

20

TBLFREQ_SPU

■ Function

Sets the frequency of each frequency table for Setup Spot Table or Setup Search/Sweep Table.

■ Syntax

Program Message	Query Message	Response Message
TBLFREQ_SPU *mode, Ftable_no, freq*	TBLFREQ_SPU? *mode, Ftable_no*	*freq*
TBLFREQ_SPU *mode, HRM*	TBLFREQ_SPU? *mode, Ftable_no*	*freq*

Sets n times of carrier frequency in F1 to F15 when second argument is HRM.

■ Parameter

mode

Frequency Type

Value	Frequency
SPOT	Measurement frequency of Spot Mode
START	Sweep starting frequency of Sweep/Search Mode
STOP	Sweep closing frequency of Sweep/Search Mode

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

freq

Frequency

Mode	Range	Resolution	Unit
SPOT	100 to upper limited frequency of main frame	1	Hz
START	1000 to (upper limited frequency of main frame –1000)	1	Hz
STOP	2000 to upper limited frequency of main frame	1	Hz
SPOT, START, STOP	0	---	---

- Frequency table is deleted when zero is set.

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Initial value

Initial value of each parameter is as follows. “---” means no value is set.

Spurious Mode: Spot Target Sysytem:IEEE802.11a, HiperLAN2, HiSWANa

Table Number	Frequency
F1	10,340 MHz
F2	15,510 MHz
F3	20,680 MHz
F4 to F15	---

Spurious Mode: Spot Target Sysytem:IEEE802.11b, IEEE802.11g

Table Number	Frequency
F1	4,824 MHz
F2	7,236 MHz
F3	9,648 MHz
F4 to F15	---

Spurious Mode: Search, Sweep

Table Number	Frequency
F1 to F15	---

■ Initialization command

∗RST

■ Use example

Sets frequency of fourth table for Spot Table to 1850 MHz at spurious emission measurement.

<Program>
DSPL SETTBL_SPU, SPOT
TBLFREQ_SPU SPOT, F4, 1850MHZ
TBLFREQ_SPU?

<Response>
1850000000

TBLRBWMD_SPU

■ Function

RBW Manual/Auto for Spurious Emission
Sets whether RBW is set automatically or manually at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLRBWMD_SPU *a, b*	TBLRBWMD_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep or search measurement

b

RBW Setting Method

Value	Description	Initial Value
MAN	Sets RBW setting mode to manual mode	
AUTO	Sets RBW setting mode to automatic mode	*

■ Restrictions

- Setting is forcibly switched to Manual if RBW is changed when setting mode is set to Auto.
- The value of RBW is automatically set when the Auto setting mode is as follows.

Frequency	RBW
9 kHz ≤ freq < 150 kHz	1 kHz
150 kHz ≤ freq < 30 MHz	10 kHz
30 MHz ≤ freq < 1 GHz	100 kHz
1 GHz ≤ freq	1 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets RBW setting mode to automatic mode when the spot is measured at spurious emission measurement.

<Program>

```
TBLRBWMD_SPU SPOT, AUTO
TBLRBWMD_SPU? SPOT
```

<Response>

```
AUTO
```

TBLRBW_SPU

■ Function

RBW for Spurious Emission
Sets RBW of each frequency table for Setup Spot Table or Setup Search/Sweep Table.

■ Syntax

Program Message	Query Message	Response Message
TBLRBW_SPU *table, Ftable_no, rbw*	TBLRBW_SPU? *table, Ftable_no*	*rbw*

■ Parameter

table
Frequency Table

Value	Frequency Table
SPOT	Spot Table
SWEEP	Sweep/Search Table

Ftable_no
Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

rbw
Frequency

RBW	Value	Unit
Normal	300, 1 k, 3 k, 10 k, 30 k, 100 k, 300 k, 1 M, 3 M, 5 M, 10 M, 20 M	Hz
Digital	10, 30, 100, 300, 1 k, 3 k, 10 k, 30 k, 100 k, 300 k, 1 M	

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets frequency of fourth table for Spot Table to 30 kHz at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SPOT
TBLRBW_SPU SPOT, F4, 30KHZ
TBLRBW_SPU? F4

<Response>

30000

TBLRBWLM_SPU

■ Function

RBW for Spurious Emission

Sets RBW of spurious emission measurement for frequency tables in Search measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLRBWLM_SPU *a,b,c*	TBLRBWLM_SPU? *a,b*	*c*

■ Parameter

a

Spurious Mode

a	Spurious Mode
SWEEP	RBW at Search measurement

b

Frequency Table

b	Unit
F1 to F15	None

c

RBW

RBW	c	Unit
Normal	300, 1000, 3000, 10000, 30000, 100000, 300000, 1000000, 3000000, 5000000, 10000000, 20000000	Hz
Digital	10, 30, 100, 300, 1000, 3000, 10000, 30000, 100000, 300000, 1000000	

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RBW of spurious emission measurement for Frequency Table 4 in Search measurement to 30 kHz.

<Program>

DSPL SETTBL_SPU,SWEEP

TBLRBWLM_SPU SWEEP,F4,30KHZ

TBLRBWLM_SPU? SWEEP,F4

<Response>

30000

TBLRBWTP_SPU

■ Function

RBW Mode Normal/Digital for Spurious Emission

Sets RBW mode to normal or digital at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLRBWTP_SPU *a, b*	TBLRBWTP_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

b

RBW mode

Value	Setting Method	Initial Value
NRM	Implement RBW with analog hardware	*
DGTL	Implement RBW with digital filter	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets RBW in spot measurement into digital setting at spurious emission measurement.

<Program>

TBLRBWTP_SPU SPOT, DGTL

TBLRBWTP_SPU? SPOT

<Response>

DGTL

■ Note

This function is optional.

TBLRL_SPU

■ Function

Reference Level for Spurious Emission

Sets the reference level at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLRL_SPU *table, Ftable_no, rl*	TBLRL_SPU? *table, Ftable_no*	*rl*

■ Parameter

table

Frequency Table

Value	Frequency Table
SPOT	Spot Table
SWEEP	Sweep/Search Table

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

rl

Reference Level

Preamplifier	Range	Resolution	Unit
Off	−120 to 40	0.01	dBm
On	−140 to 20	0.01	dBm

□ Suffix code

None: dBm

DBM: dBm

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets reference level of fourth table for Sweep measurement to 10 dBm at spurious emission measurement.

<Program>
DSPL SETTBL_SPU, SWEEP
TBLRL_SPU SWEEP, F4, 10DBM
TBLRL_SPU? SWEEP, F4

<Response>
10.00

TBLSTD_ADJ

■ Function

Table Standard for Adjacent Channel Power

Performs settings conforming to the measurement method stipulated in the TELEC standards on the Adjacent Channel Leakage Power screen.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_ADJ *a*	---	---

■ Parameter

a

Settings for Spectrum Analyzer

a	Settings for Spectrum Analyzer
STD	Settings conforming to the measurement method stipulated in the TELEC standards

■ Use example

Performs setting conforming to the measurement method stipulated in TELEC standards.

<Program>

DSPL ADJ,SPECT1

TBLSTD_ADJ STD

TBLSTD_ADJ_BCH

■ Function

Batch Measurement

Sets the adjacent channel leakage power measurement parameters on the Setup Measure Table (Batch screen) to values conforming to the TELEC Standard or to the user-defined settings.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_ADJ_BCH *a*	TBLSTD_ADJ_BCH?	*a*

■ Parameter

a

Standard

Target System	a	Standard	Initial Value
Other than IEEE802.11b or IEEE802.11g	STDIN	TELEC Standard (indoor)	*
	STDOUT	TELEC Standard (outdoor)	
	NOT	User-defined settings	

■ Restrictions

- This command is valid only when the system is IEEE802.11a, HiperLAN2 or HiSWANa.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the adjacent channel leakage power measurement parameters to the values conforming to the TELEC Standard (outdoor).

<Program>
DSPL BATCH
TBLSTD_ADJ_BCH STDOUT
TBLSTD_ADJ_BCH?

<Response>
STDOUT

TBLSTD_OBW

■ Function

TELEC Standard for Occupied Bandwidth

Selects the measurement standard for the occupied frequency bandwidth at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_OBW *std*	---	---

■ Parameter

std

Measurement standard

Value	Description	Initial value
STDIN	5 GHz band low power data communication system	*
STDOUT	5 GHz band radio access system	
STD	2.4 GHz band wide band low power data communication system	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Selects STD (2.4 GHz band wide band low power data communication system) as the measurement standard at Occupied Bandwidth measurement.

<Program>

DSPL OBW
TBLSTD_OBW STD

TBLSTD_OBW_BCH

■ Function

Batch Measurement

Sets the OBW measurement parameters on the Setup Measure Table (Batch screen) to values conforming to the TELEC Standard or to the user-defined settings.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_OBW_BCH *a*	TBLSTD_OBW_BCH?	*a*

■ Parameter

a

Standard

Target System	a	Standard	Initial Value
IEEE802.11b, IEEE802.11g	STD	TELEC Standard	*
	NOT	User-defined settings	
Other than the above	STDIN	TELEC Standard (indoor)	*
	STDOUT	TELEC Standard (outdoor)	
	NOT	User-defined settings	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the OBW measurement parameters to the values conforming to the TELEC Standard (outdoor).

<Program>
DSPL SETTBL_BCH
TBLSTD_OBW_BCH STDOUT
TBLSTD_OBW_BCH?

<Response>
STDOUT

TBLSTD_SMASK

■ Function

Table Standard-Spectrum Mask

Performs settings conforming to the measurement method stipulated in the standards selected by the Target System on the Spectrum Mask screen.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_SMASK *a*	---	---

■ Parameter

a

Settings for Spectrum Analyzer

a	Settings for Spectrum Analyzer
STD	Settings conforming to the measurement method stipulated in the standards selected by the Target System

■ Use example

Performs settings conforming to the measurement method stipulated in IEEE802.11b.

<Program>

TGTSY 11B

DSPL SMASK

TBLSTD_SMASK STD

TBLSTD_SMASK_BCH

■ Function

Batch Measurement
Sets the spectrum mask measurement parameters on the Setup Measure Table (Batch screen) to values conforming to the measurement method stipulated in the standard selected by the target system or to the user-defined settings.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_SMASK_BCH *a*	TBLSTD_SMASK_BCH?	*a*

■ Parameter

a
Settings for Spectrum Analyzer

a	Settings for Spectrum Analyzer	Initial Value
STD	Settings conforming to the measurement method stipulated in the standard selected by the target system	*
NOT	User-defined settings	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the spectrum mask measurement parameters to the values conforming to the measurement method stipulated in IEEE802.11b.
<Program>
TGTSY 11B
DSPL SETTBL_BCH
TBLSTD_SMASK_BCH STD
TBLSTD_SMASK_BCH?

<Response>
STD

TBLSTD_SPU

■ Function

Table Standard Spurious

Sets the frequency table values according to the standards on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLSTD_SPU *a*	---	---

■ Parameter

a

Standards

a	Standards
0	TELEC 2.4G Data Communication System Spurious
1	TELEC 2.4G Data Communication System Secondary Emission
2	TELEC 5G Wireless Access 5.03 GHz Band Spurious & Out-Band Leakage
3	TELEC 5G Wireless Access 4.9 GHz Band Spurious & Out-Band Leakage
4	TELEC 5G Wireless Access Secondary Emission
5	TELEC 5G Data Communication System Spurious
6	TELEC 5G Data Communication System Out-Band Leakage
7	TELEC 5G Data Communication System Secondary Emission
8	ETSI TS101 475 (HiperLAN2) Signal ON
9	ETSI TS101 475 (HiperLAN2) Signal OFF
10	FCC 15.407 5.15-5.25 Band
11	FCC 15.407 5.25-5.35 Band
12	FCC 15.407 5.725-5.825 Band
13	FCC 15.247 2.4 GHz Band
14	TELEC 2.4G Data Communication System (14CH) Spurious

Initial Value

	Initial Value	
	IEEE802.11b, IEEE802.11g	Other than IEEE802.11b or IEEE802.11g
Spurious Table	0	5

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the frequency table standards to FCC 15.247 2.4 GHz Band.

<Program>

```
DSPL SPURIOUS,SPOT
TBLSTD_SPU 13
```

TBLSWTLM_SPU

■ Function

Sweep Time for Spurious Emission

Sets Sweep Time for spurious emission measurement in Search measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLSWTLM_SPU *a,b,c*	TBLSWTLM_SPU? *a,b*	*c*

■ Parameter

a

Spurious Mode

a	Frequency Table
SWEEP	Sweep Time in Search measurement

b

Frequency Table

b	Unit
F1 to F15	None

vbw

Sweep Time

Setting

Resolution	Unit
1	msec

Response

Resolution	Unit
1	usec

□ Suffix code

None: msec

S: sec

MS: msec

US: usec

■ Restrictions

Input values are rounded as shown below.

Input Value	Setting Value
10 msec to 1 sec	Rounded to 5-msec resolution value (fractions are rounded up)
1 to 1000 sec	Rounded to 3-digit valid number (4th digit from top is rounded up)

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Sweep Time of fourth Frequency Table in spurious emission measurement to 100 msec.

<Program>
DSPL SETTBL_SPU,SWEEP
TBLSWTLM_SPU SWEEP,F4,100MS
TBLSWTLM_SPU? SWEEP,F4

<Response>
100000

TBLSWTMD_SPU

■ Function

Sweep Time Manual/Auto for Spurious Emission

Sets whether sweep time is automatically or manually set at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLSWTMD_SPU *a*, *b*	TBLSWTMD_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

b

Setting Method of Sweep Time

Value	Description	Initial Value
MAN	Sets sweep time setting mode to manual mode	
AUTO	Sets sweep time setting mode to automatic mode	*

■ Restrictions

- Setting is forcibly switched to Manual if sweep time is changed when the setting mode is set to Auto.
- Minimum value “a” shown below is added when RBW mode is digital.

RBW	Data Point is 501		Data Point is 1001	
	Minimum Value “a” (ms)	Resolution (ms)	Minimum Value “a” (ms)	Resolution (ms)
10Hz	50	50	100	100
30Hz	50	50	100	100
100Hz	50	50	100	100
300Hz	10	10	20	20
1 kHz	10	10	20	20
3 kHz	10	5	10	10
10 kHz	10	5	10	5
30 kHz	10	5	10	5
100 kHz	10	5	10	5
300 kHz	10	5	10	5
1 MHz	10	5	10	5

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets sweep time in spot measurement into automatic setting at spurious emission measurement.

<Program>
TBLSWTMD_SPU SPOT, AUTO
TBLSWTMD_SPU? SPOT

<Response>
AUTO

TBLSWT_SPU

■ Function

Sweep Time for Spurious Emission

Sets sweep time at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLSWT_SPU *table, Ftable_no, swt*	TBLSWT_SPU? *table, Ftable_no*	*swt*

■ Parameter

table

Frequency Table

Value	Frequency Table
SPOT	Spot Table
SWEEP	Sweep/Search Table

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

swt

Sweep time

Value	Resolution	Unit
10 ms to 1 s	5 ms	us
1 to 1000 s	Three columns of significant digits	us

□ Suffix code

None: ms

US: us (microsecond)

MS: ms

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets sweep time of the fourth table for sweep measurement to 100ms at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SWEEP
TBLSWT_SPU SWEEP, F3, 100MS
TBLSWT_SPU? F3

<Response>

100000

TBLVBWLM_SPU

■ Function

VBW for Spurious Emission

Sets VBW of spurious emission measurement in Search measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLVBWLM_SPU *a,b,c*	TBLVBWLM_SPU? *a,b*	*c*

■ Parameter

a

Spurious Mode

a	Spurious Mode
SWEEP	VBW in Search measurement

b

Frequency Table

b	Unit
F1 to F15	None

c

VBW

c	Unit
0, 1, 3, 10, 30, 100, 300, 1000, 3000, 10000, 30000, 100000, 300000, 1000000, 3000000	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets VBW of spurious emission measurement for Frequency Table 4 in Search measurement to 30 kHz.

<Program>

```
DSPL SETTBL_SPU,SWEEP
TBLVBWLM_SPU SWEEP,F4,30KHZ
TBLVBWLM_SPU? SWEEP,F4
```

<Response>

```
30000
```

TBLVBWMD_SPU

■ Function

VBW Manual/Auto for Spurious Emission
Sets whether VBW is automatically or manually set at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLVBWMD_SPU *a, b*	TBLVBWMD_SPU? *a*	*b*

■ Parameter

a
Measure Method

Value	Measure Method
SPOT	At Spot measurement
SWEEP	At Sweep measurement or Search measurement

b
VBW Setting Method

Value	Description	Initial Value
MAN	Sets VBW setting mode to manual mode	
AUTO	Sets VBW setting mode to automatic mode	*

■ Restrictions

- Setting is forcibly switched to Manual if VBW is changed when the setting mode is set to Auto.
- The value of VBW is automatically set by RBW and VBW/RBW Ratio values when setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the VBW setting mode to automatic mode when the spot is measured at spurious emission measurement.
<Program>
TBLVBWMD_SPU SPOT, AUTO
TBLVBWMD_SPU? SPOT

<Response>
AUTO

TBLVBWRT_SPU

■ Function

VBW/RBW Ratio for Spurious Emission

Sets ratio of VBW and RBW when VBW is set automatically at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLVBWRT_SPU *a, b*	TBLVBWRT_SPU? *a*	*b*

■ Parameter

a

Measure Method

Value	Measure Method
SPOT	At spot measurement
SWEEP	At sweep measurement or search measurement

b

Ratio

Range	Resolution	Initial Value
0.0001 to 100	0.0001	1

■ Restrictions

- Real set value is rounded off to values in the list shown below.

Setting Value
0.0001, 0.0003, 0.001, 0.003, 0.01, 0.03, 0.1, 0.3, 1, 3, 10, 30, 100

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets VBW/RBW ratio in spot measurement to 3 at spurious emission measurement.

<Program>

TBLVBWRT_SPU SPOT, 3

TBLVBWRT_SPU? SPOT

<Response>

3

TBLVBW_SPU

■ Function

VBW for Spurious Emission

Sets VBW for each frequency table of Setup Spot Table screen or Setup Search/Sweep Table.

■ Syntax

Program Message	Query Message	Response Message
TBLVBW_SPU *table, Ftable_no, rbw*	TBLVBW_SPU? *table, Ftable_no*	*vbw*

■ Parameter

table

Frequency Table

Value	Frequency Table
SPOT	Spot table
SWEEP	Sweep/Search table

Ftable_no

Frequency Table Number

Range	Resolution	Unit
F1 to F15	1	None

vbw

Frequency

Value	Unit
0, 1, 3, 10, 100, 300, 1 k, 3 k, 10 k, 30 k, 100 k, 300 k, 1 M, 3 M	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets frequency of fourth table for Spot Table to 30 kHz at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SPOT

TBLVBW_SPU SPOT, F4, 30KHZ

TBLVBW_SPU? F4

<Response>

30000

TBLVIEW_SPU

■ Function

View Items for Spurious Emission

Selects view items displayed on right pane of the Setup Spot Table screen or Set Search/Sweep Table.

■ Syntax

Program Message	Query Message	Response Message
TBLVIEW_SPU *a*	TBLVIEW_SPU? *a*	*a*

■ Parameter

a

View items

a	Description	Initial Value
BWSWT	Displays RBW, VBW, or SWT at sweep measurement or at spurious frequency measurement of search measurement	*
REFATT	Displays reference level and attenuator	
LMTDB	Displays Limit (dB)	
LMTW	Displays Limit (xW)	
BWSWTLM	Displays RBW, VBW, or Sweep Time for spurious level measurement. * Only for Setup Search/Sweep Table	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays reference level for Setup Spot Table screen at spurious emission measurement.

<Program>

DSPL SETTBL_SPU, SPOT

TBLVIEW_SPU REFATT

TBLVIEW_SPU?

<Response>

REFATT

TEMPLVL_SMASK

■ Function

User Template Level for Spectrum Mask

Sets level value of user template for spectrum mask measurement.

■ Syntax

Program Message	Query Message	Response Message
TEMPLVL_SMASK *ofs, lvl*	TEMPLVL_SMASK? *ofs*	*lvl*

■ Parameter

ofs

Offset Point

System	Value	Definition
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1	Level when offset frequency is −22 MHz and lower, or 22 MHz and higher (Line1)
	2	Level when offset frequency is −11 to −22 MHz or 11 to 22 MHz (Line2)
Other than the above	1	Level when offset frequency is −30 MHz or 30 MHz
	2	Level when offset frequency is −20 MHz or 20 MHz
	3	Level when offset frequency is −11 MHz or 11 MHz

lvl

Level

System	a	b	Initial Value	Resolution	Unit
IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)	1	−70.0 to 0.0	−50.0	0.1	dB
	2	−70.0 to 0.0	−30.0	0.1	dB
Other than the above	1	−70.0 to 0.0	−40.0	0.1	dB
	2	−70.0 to 0.0	−28.0	0.1	dB
	3	−70.0 to 0.0	−20.0	0.1	dB

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets 11 to 22 MHz line level for IEEE802.11b template at spectrum mask measurement.

<Program>

DSPL SMASK

TEMPLVL_SMASK 2, 30

TEMPLVL_SMASK? 2

<Response>

30

TEMPPASS_SMASK

■ Function

Template Pass/Fail Judgement for Spectrum Mask

Reads out the pass/fail judgement result for the waveform measured by template at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
---	TEMPPASS_SMASK?	*judge*

■ Parameter

judge

Judgement result

Value	Judgement Result
PASS	Passed
FAIL	Failed

■ Restrictions

- When no measurement is performed, OFF is returned as Response Message.

■ Use example

Reads out the judgement result at Spectrum Mask measurement.

<Program>

MEAS SMASK

TEMPPASS_SMASK?

<Response>

PASS

TERM

■ Function

Sets the connector for the input signal to be measured.

■ Syntax

Program Message	Query Message	Response Message
TERM *terminal*	TERM?	*terminal*

■ Parameter

terminal

Connector for the input signal to be measured

Value	Display Method	Initial Value
RF	Sets the input signal connector to RF.	*
IQDC	Sets the input signal connector to IQ-DC.	
IQAC	Sets the input signal connector to IQ-AC.	
IQBAL	Sets the input signal connector to IQ-Balance.	

■ Restrictions

- Only the Setup Common Parameter can set these (*cf.* DSPL).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the input signal connector to IQ-DC.
<Program>
DSPL SETCOM
TERM IQDC
TERM?

<Response>
IQDC

■ Restrictions due to options and equipment

Terminal = “IQDC”, “IQAC”, and “IQBAL” are enabled when option MS268*A-17 or 18 I/Q input is installed.

TGTSY

■ Function

Target System
Selects the measurement target system on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
TGTSY *sys*	TGTSY?	*sys*

■ Parameter

sys
Measurement object system

Value	Measurement Object System
11A	IEEE802.11a
HLAN2	HiperLAN2
HISWAN	HiSWANa
11B	IEEE802.11b
11G_CCK	IEEE802.11g (ERP-DSSS/CCK)
11G_EOFDM	IEEE802.11g (ERP-OFDM)
11G_DOFDM	IEEE802.11g (DSSS-OFDM)

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the measurement object system to HiSWANa.
<Program>
DSPL SETCOM
TGTSY HISWAN
TGTSY?

<Response>
HISWAN

THREHOLD

■ Function

Threshold

Sets threshold of modulation accuracy in the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
THREHOLD n	THREHOLD?	*n*

■ Parameter

n

Threshold of modulation accuracy

Value	Initial Value	Resolution	Unit
5 to 20	20	1	%

■ Restrictions

- This command is enabled only when Target System is HiSWANa and Data Rate is Auto.
- This command is enabled only when EVM Threshold is On.

■ Use example

Sets threshold of modulation accuracy in 10.

<Program>

TGTSY HISWAN
DATRATE AUTO
DSPL MODANAL
EVM_THRES ON
THREHOLD 10
THREHOLD?

<Response>

10

TLCSTD_ADJ

■ Function

Select Template for Adjacent Channel Power

Selects TELEC measurement standard at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
TLCSTD_ADJ *std*	TLCSTD_ADJ?	*std*

■ Parameter

std

Measurement standard

Value	Description	Initial value
IN	5 GHz band low power data communication system	*
OUT	5 GHz band radio access system	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Selects 5 GHz band radio access system as TELEC measurement standard at Adjacent Channel Power measurement.

<Program>
TGTSY 11A
DSPL ADJ
TLCSTD_ADJ OUT
TLCSTD_ADJ?

<Response>
OUT

TRANSREFPWR

■ Function

Transient Reference Power for RF Power
In case of Ramp-on/Ramp-down of Burst is displayed Tx Power Reference Value is set in IEEE802.11b,IEEE802.11g(ERP-DSSS/CCK).

■ Syntax

Program Message	Query Message	Response Message
TRANSREFPWR a	TRANSREFPWR?	*a*

■ Parameter

a

Tx Power Reference Value

A	Initial value
TOTAL	*
RAMP	

■ Restrictions

- Target System can be used at IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK).
- It is effective only when Measuring Object is Burst.
- It is invalid at the time of Trace Format is Slot or Measuring Object is Continuous.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Tx Power reference value of Ramp-on/Ramp-down is set up on the basis of the average power of wave-form display within the limits of Ramp-on and Ramp-down of Burst.

<Program>
DSPL RFPWR
TRANSSCALE 10.0
TRANSREFPWR RAMP
TRANSREFPWR?

<Response>
RAMP

TRANSSCALE

■ Function

Transient Scale for RF Power

Sets the display range of burst rising/falling waveform on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
TRANSSCALE *a*	TRANSSCALE?	*a*

■ Parameter

a

Waveform display range

a	Initial value	Resolution	Unit
8.0 to 40.0	8.0	0.2	usec

■ Restrictions

- This command is disabled when Trace Format is Slot or when Measuring Object is Continuous.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the display range of the rising/falling waveform to 10 usec.

<Program>
DSPL RFPWR
TRANSSCALE 10.0
TRANSSCALE?

<Response>
10.0

TRANSTIME

■ Function

Transient-Time

Outputs the burst transient time of IEEE802.11b and IEEE802.11g (ERP-DSSS/CCK) on the RF Power and Batch screens.

■ Syntax

Program Message	Query Message	Response Message
---	TRANSTIME?	*a,b*

■ Parameter

a,b

Transient time

	Resolution	Unit	Remarks
a	0.1	usec	Ramp-on
b	0.1	usec	Ramp-down

■ Restrictions

- This function is disabled when Target System is not set to IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK), or when Measuring Object is Continuous.

■ Use example

Reads out the burst transient time.

<Program>

TGTSY 11B

MEASOBJ BURST

MEAS RFPWR

TRANSTIME?

<Response>

0.12,2.34

TRFORM

■ Function

Trace Format for Modulation Analysis

Sets the format of waveform display at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
TRFORM *form*	TRFORM?	*form*

■ Parameter

form

Waveform format

Value	Waveform format		Initial value
NON	No Trace:	Displays the numeric results only. Does not display a waveform.	*
CONSTEL	Constellation:	Displays IQ diagram.	
CONSTEL_BPSK	Constellation:	Displays IQ diagram(BPSK).	
CONSTEL_QPSK	Constellation:	Displays IQ diagram(QPSK).	
CONSTEL_16QAM	Constellation:	Displays IQ diagram(16QAM).	
CONSTEL_64QAM	Constellation:	Displays IQ diagram(64QAM).	
EYE	Eye Diagram:	Displays difference from IQ signal time.	
EVMSYM	EVM vs. Symbol:	Displays EVM in Chip units.	
PHASE	Phase Error vs. Symbol:	Displays the phase error in Chip units.	
EVMSUB	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units.	
EVMSUB_BPSK	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units(BPSK).	
EVMSUB_QPSK	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units(QPSK).	
EVMSUB_16QAM	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units(16QAM).	
EVMSUB_64QAM	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units(64QAM).	
EVMSUB_TOTAL	EVM vs. Sub-carrier:	Displays EVM in Sub-carrier units(TOTAL).	
SPFLAT	Spectrum Flatness:	Displays spectrum flatness in Sub-carrier units.	

■ Restrictions

- The Eye Diagram display is enabled when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).
- The EVM vs. Sub-carrier display is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) (*cf.* TGTSY).
- The Spectrum Flatness display is enabled only when Target System is IEEE802.11a, HiperLAN2, HiSWANa, IEEE802.11g (ERP-OFDM) or IEEE802.11g (DSSS-OFDM) while Measuring Object is Burst and Terminal is RF. However When Target System is HiSWANa and Data Rate is Auto is not enabled.

- The display for each modulation in Constellation and EVM vs. Sub-carrier is enable when Target System is HiSWANa and Data Rate is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the waveform display format to Phase Error vs. Symbol.

<Program>
MEAS MODANAL
TRFORM PHASE
TRFORM?

<Response>
PHASE

TRFORM_CCDF

■ Function

Trace Format for CCDF

Sets the waveform display format on the CCDF screen.

■ Syntax

Program Message	Query Message	Response Message
TRFORM_CCDF *form*	TRFORM_CCDF?	*form*

■ Parameter

form

Wave format

Value	Wave format	Initial value
POS	Displays Power distribution more than Average Power.	
NEG	Displays Power distribution less than Average Power.	
POSNEG	Displays total Power distribution.	*

■ Restrictions

- This setting is possible only when Measure Method is APD (*cf.* DSPL).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Trace Format to Positive & Negative.

<Program>
DSPL CCDF,APD
TRFORM_CCDF POSNEG
TRFORM_CCDF?

<Response>
POSENG

TRFORM_RFPWR

■ Function

Trace Format for RF Power

Sets waveform display format at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
TRFORM_RFPWR *form*	TRFORM_RFPWR?	*form*

■ Parameter

form

Waveform format

Value	Waveform Format	Initial Value
SLOT	Slot: Displays the waveform in one slot.	*
TRNSNT	Transient: Displays zoom of leading and trailing edges of burst.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets waveform display format to Transient.

<Program>

MEAS RFPWR

TRFORM_RFPWR TRNSNT

TRFORM_RFPWR?

<Response>

TRNSNT

TRG

■ Function

Trigger

Chooses whether to start the measurement using internal timing or external timing.

■ Syntax

Program Message	Query Message	Response Message
TRG *trg*	TRG?	*trg*

■ Parameter

trg

Trigger setting

Value	Trigger Setting	Initial value
FREE	Free Run: Starts a measurement using internal timing.	*
WIDEIF	Wide IF: Starts a measurement using Wide IF Video trigger.	
EXT	External: Starts a measurement using external trigger.	

■ Restrictions

- Usable only when the displayed measurement screen is CCDF screen (*cf.* DSPL).
- The setting of WIDEIF is not enabled when Terminal is IQ.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Starts a measurement using external trigger.

<Program>

DSPL SETCOM
TRG EXT
TRG?

<Response>

EXT

TRGDLY

■ Function

Trigger Delay

Sets the time delay from the trigger input to the actual timing execution.

■ Syntax

Program Message	Query Message	Response Message
TRGDLY *time*	TRGDLY?	*time*

■ Parameter

time

Trigger delay value

Range	Resolution	Initial Value	Unit
−10000.00 to 10000.00	0.01	0.0	μsec

■ Restrictions

- Trigger delay setting is not possible when Trigger is set to Free Run (*cf.* TRG).

■ Initialization command

PRE
INI
IP
∗RST

■ Use example

Sets the Trigger Delay value to 100 μsec.

<Program>
DSPL SETCOM
TRG EXT
TRGDLY 100.0
TRGDLY?

<Response>
100.0

TRGEDGE

■ Function

Trigger Edge

Sets the trigger-signal rise or fall slops as the trigger timing reference.

■ Syntax

Program Message	Query Message	Response Message
TRGEDGE *timing*	TRGEDGE?	*timing*

■ Parameter

timing

Trigger reference

Value	Trigger Reference	Initial value
RISE	Sets trigger-signal rise slope as the trigger reference.	*
FALL	Sets trigger-signal fall slope as the trigger reference.	

■ Restrictions

- This setting is not possible when Trigger is set to Free Run (*cf.* TRG).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets trigger-signal rise slope as the trigger reference.

<Program>
DSPL SETCOM
TRG EXT
TRGEDGE RISE
TRGEDGE?

<Response>
RISE

TRGLVL

■ Function

Trigger Level

Sets the trigger level of Wide IF Video trigger.

■ Syntax

Program Message	Query Message	Response Message
TRGLVL *level*	TRGLVL?	*level*

■ Parameter

level

Trigger level setting

Value	Trigger Reference	Initial value
LOW	Sets the trigger level to Low.	*
MIDDLE	Sets the trigger level to Middle.	
HIGH	Sets the trigger level to High.	

■ Restrictions

- This setting is not possible except when trigger is Wide IF (*cf.* TRG).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Trigger Level to Middle.

<Program>
DSPL SETCOM
TRGLVL MIDDLE
TRGLVL?

<Response>
MIDDLE

TS

■ Function

Single Measure/Sweep

Executes a measurement or sweeping once.

This command functions the same as the SWP command.

Unlike the SNGLS command, when the measuring instrument accepts a command during measurement, the command is not processed immediately but is queued until the current measurement is completed.

Since the command following the TS command is processed after the current measurement is completed, this means that the synchronization (between the measuring instrument operation and the program to send the command) is ensured.

■ Syntax

Program Message	Query Message	Response Message
TS	---	---

■ Use example

Executes a measurement or sweeping once.

<Program>

TS

TXPWR

■ Function

Transmitter Power

Outputs average power in one slot at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	TXPWR?	*pwr1,pwr2*

■ Parameter

pwr1/pwr2

Average power

Power	Resolution	Unit
pwr1	0.01	dBm
pwr2	Four significant digits	W

■ Use example

Reads out measured results of TX Power.

<Program>

MEAS RFPWR

TXPWR?

<Response>

12.34,0.01714

UNIT_ADJ

■ Function

Unit for Adjacent Channel Power

Sets the unit for displaying the measured results at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
UNIT_ ADJ *unit*	UNIT_ ADJ?	*unit*

■ Parameter

unit

Unit

Value	Unit	Initial value
DB	dB	*
DBM	dBm	
MW	mW	
UW	uW	
NW	nW	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the unit to dBm at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

UNIT_ADJ DBM

UNIT_ADJ?

<Response>

DBM

UNIT_IQL

■ Function

Sets the unit f for IQ Level screen.

■ Syntax

Program Message	Query Message	Response Message
UNIT_IQL *unit*	UNIT_IQL?	*unit*

■ Parameter

unit

Unit for level readout

Value	Unit for Level Readout	Initial value
DBMV	dBmV	*
MV	mV	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the unit for level readout to mV.

<Program>

UNIT_IQL MV

UNIT_IQL?

<Response>

MV

UNIT_RFPWR

■ Function

Unit for RF Power

Sets waveform display unit at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
UNIT_RFPWR *unit*	UNIT_RFPWR?	*unit*

■ Parameter

unit

Display unit

Value	Display Unit	Initial Value
DB	Display in dB units	*
DBM	Display in dBm units	
PC	Display in % units	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets the display unit to %.

<Program>

DSPL RFPWR

UNIT_RFPWR PC

UNIT_RFPWR?

<Response>

PC

UNIT_SMASK

■ Function

Unit for Spectrum Mask
Sets the unit for displaying the measured results at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
UNIT_SMASK *unit*	UNIT_SMASK?	*unit*

■ Parameter

unit
Unit

Value	Unit	Initial value
DB	dB	*
DBM	dBm	
MW	mW	
UW	uW	
NW	nW	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets Unit to dBm at Spectrum Mask measurement.
<Program>
DSPL SMASK
UNIT_SMASK DBM
UNIT_SMASK?

<Response>
DBM

UNIT_SPU

■ Function

Unit for Spurious Emission

Sets the unit for displaying the level measured results at spurious emission measurement.

■ Syntax

Program Message	Query Message	Response Message
UNIT_SPU *unit*	UNIT_SPU?	*unit*

■ Parameter

unit

Unit

Value	Unit	Initial Value
DB	dB	
DBM	dBm	*
W_MHz	Watt per a 1 MHz bandwidth	
W	Watt	

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the unit to dBm at spurious emission measurement.

<Program>

```
DSPL SPURIOUS, SPOT
UNIT_SPU DBM
UNIT_SPU?
```

<Response>

```
DBM
```

VBM_ADJ

■ Function

VBW: Auto/Manual for Adjacent Channel Power

Sets whether VBW for Spectrum Analyzer is set automatically or manually at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
VBM_ADJ *mode*	VBM_ADJ?	*mode*

■ Parameter

mode

VBW setting mode

Value	Mode	Initial value
AUTO	Sets the VBW setting mode to automatic mode	
MAN	Sets the VBW setting mode to manual mode	*

■ Restrictions

- If VBW is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of VBW is automatically set by the values of RBW and Ratio when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the VBW setting mode to automatic mode at Adjacent Channel Power measurement

<Program>
DSPL ADJ
VBM_ADJ AUTO
VBM_ADJ?

<Response>
AUTO

VBM_OBW

■ Function

VBW: Auto/Manual for Occupied Bandwidth

Sets whether VBW for Spectrum Analyzer is set automatically or manually at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
VBM_OBW *mode*	VBM_OBW?	*mode*

■ Parameter

mode

VBW setting mode

Value	Mode	Initial value
AUTO	Sets the VBW setting mode to automatic mode	
MAN	Sets the VBW setting mode to manual mode	*

■ Restrictions

- If VBW is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of VBW is automatically set by the values of RBW and Ratio when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the VBW setting mode to automatic mode at Occupied Bandwidth measurement.

<Program>
DSPL OBW
VBM_OBW AUTO
VBM_OBW?

<Response>
AUTO

VBM_SMASK

■ Function

VBW: Auto/Manual for Spectrum Mask

Sets whether VBW for Spectrum Analyzer is set automatically or manually at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
VBM_SMASK *mode*	VBM_SMASK?	*mode*

■ Parameter

mode

VBW setting mode

Value	Mode	Initial value
AUTO	Sets the VBW setting mode to automatic mode	
MAN	Sets the VBW setting mode to manual mode	*

■ Restrictions

- If VBW is changed when the setting mode is set to Auto, the setting is forcibly switched to Manual.
- The value of VBW is automatically set by the values of RBW and Ratio when the setting mode is Auto.

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the VBW setting mode to automatic mode at Spectrum Mask measurement.

<Program>
DSPL SMASK
VBM_SMASK AUTO
VBM_SMASK?

<Response>
AUTO

VBR_ADJ

■ Function

VBW/RBW Ratio for Adjacent Channel Power

Sets the ratio between VBW and RBW when VBW is set automatically at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
VBR_ADJ *r*	VBR_ADJ?	*r*

■ Parameter

r

VBW/RBW Ratio

Range	Resolution	Unit	Initial value
0.0001 to 100	0.0001	None	1

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0.0001, 0.0003, 0.001, 0.003, 0.01, 0.03, 0.1, 0.3, 1, 3, 10, 30, 100

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets VBW/RBW Ratio to 3 at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

VBR_ADJ 3

VBR_ADJ?

<Response>

3

VBR_OBW

■ Function

VBW/RBW Ratio for Occupied Bandwidth

Sets the ratio between VBW and RBW when VBW is set automatically at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
VBR_OBW *r*	VBR_OBW?	*r*

■ Parameter

r

VBW/RBW Ratio

Range	Resolution	Unit	Initial value
0.0001 to 100	0.0001	None	1

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0.0001, 0.0003, 0.001, 0.003, 0.01, 0.03, 0.1, 0.3, 1, 3, 10, 30, 100

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets VBW/RBW Ratio to 3 at Occupied Bandwidth measurement.

<Program>
DSPL OBW
VBR_OBW 3
VBR_OBW?

<Response>
3

VBR_SMASK

■ Function

VBW/RBW Ratio for Spectrum Mask

Sets the ratio between VBW and RBW when VBW is set automatically at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
VBR_SMASK *r*	VBR_SMASK?	*r*

■ Parameter

r

VBW/RBW Ratio

Range	Resolution	Unit	Initial value
0.0001 to 100	0.0001	None	1

■ Restrictions

- Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0.0001, 0.0003, 0.001, 0.003, 0.01, 0.03, 0.1, 0.3, 1, 3, 10, 30, 100

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Sets VBW/RBW Ratio to 3 at Spectrum Mask measurement.

<Program>

DSPL SMASK

VBR_SMASK 3

VBR_SMASK?

<Response>

3

VBW_ADJ

■ Function

Select Video Bandwidth for Adjacent Channel Power
Sets VBW for Spectrum Analyzer at Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
VBW_ADJ *f*	VBW_ADJ?	*f*

■ Parameter

f
VBW

Range	Resolution	Unit	Initial value
0 (OFF) to 3000000	1	Hz	100000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Restrictions

- This setting is not possible when RBW Type is set to Digital (*cf.* RBWTP_ADJ).
  Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0 Hz (OFF), 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets VBW to 30 kHz at Adjacent Channel Power measurement.

<Program>

DSPL ADJ

VBW_ADJ 30KHZ

VBW_ADJ?

<Response>

30000

VBW_OBW

■ Function

Select Video Bandwidth for Occupied Bandwidth
Sets VBW for Spectrum Analyzer at Occupied Bandwidth measurement.

■ Syntax

Program Message	Query Message	Response Message
VBW_OBW *f*	VBW_OBW?	*f*

■ Parameter

f
VBW

Range	Resolution	Unit	Initial value
0 (OFF) to 3000000	1	Hz	100000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHZ, GZ: GHz

■ Restrictions

- This setting is not possible when RBW Type is set to Digital (*cf.* RBWTP_OBW).
  Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0 Hz (OFF), 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets VBW to 30 kHz at Occupied Bandwidth measurement.

<Program>

DSPL OBW

VBW_OBW 30KHZ

VBW_OBW?

<Response>

30000

VBW_SMASK

■ Function

Select Video Bandwidth for Spectrum Mask
Sets VBW for Spectrum Analyzer at Spectrum Mask measurement.

■ Syntax

Program Message	Query Message	Response Message
VBW_SMASK *f*	VBW_SMASK?	*f*

■ Parameter

f

VBW

Range	Resolution	Unit	Initial value
0 (OFF) to 3000000	1	Hz	100000

□ Suffix code

None: Hz
HZ: Hz
KHZ, KZ: kHz
MHZ, MZ: MHz
GHz, GZ: GHz

■ Restrictions

- This setting is not possible when RBW Type is set to Digital (*cf.* RBWTP_SMASK).
  Although any value within the setting range can be input, the actual value is set according to the following list.

Setting value
0 Hz (OFF), 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets VBW to 30 kHz at Spectrum Mask measurement.

<Program>

```
DSPL SMASK
VBW_SMASK 30KHZ
VBW_SMASK?
```

<Response>

```
30000
```

VECTERR

■ Function

RMS EVM

Outputs the measured results of RMS EVM at the Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	VECTERR? *unit,mod*	*rms*
---	VECTERR? VIEW	*rms_view*

■ Parameter

unit

Output

Value	Unit
None	%
DB	dB

mod

Modulation

Value	Modulation
BPSK	BPSK modulation
QPSK	QPSK modulation
16QAM	16QAM modulation
64QAM	64QAM modulation
TOTAL	Every modulation

rms

RMS EVM

Resolution	Unit
0.01	%
0.01	dB

rms_view

RMS EVM corresponding to the display specified in View Selection (*cf.* CONSTVIEW)

Resolution	Unit
0.01	%

■ Restrictions

- Reading in dB units returns “***” when Target System is IEEE802.11b or IEEE802.11g (ERP-DSSS/CCK) (*cf.* TGTSY).
- Reading in VECTERR? VIEW returns “***” when Trace Format is other than Constellation (*cf.* TRFORM).
- A setup of mod(modulation) is enabled only when Target System is HiSWANa and Data Rate is Auto.

■ Use example

Reads out the measured result of RMS EVM.

<Program>

TGTSY 11A

DSPL MODANAL

SWP

VECTERR? DB

<Response>

−23.48

VIEW_BCH

■ Function

Batch Measurement

Switches the display screen for batch measurement.

■ Syntax

Program Message	Query Message	Response Message
VIEW_BCH *a*	VIEW_BCH?	*a*

■ Parameter

a

View Screen

a	Screen	Initial Value
1	Screen displaying modulation analysis, Tx power , etc.	*
2	Spurious 1 screen	
3	Spurious 2 screen	
4	Result list screen	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Switches to the Spurious 1 screen for batch measurement.

<Program>

DSPL BATCH

VIEW_BCH 2

VIEW_BCH?

<Response>

2

VIEW_SPU

■ Function

View Items for Spurious Emission

Sets the view items displayed on the right pane of Spurious Emission.

■ Syntax

Program Message	Query Message	Response Message
VIEW_SPU *a*	VIEW_SPU?	*a*

■ Parameter

a

View Items

a	Description	Initial Value
BWSWT	Displays RBW, VBW, or SWT at sweep measurement or at search measurement and search.	
REFATT	Displays reference level and attenuator.	
JDG	Displays judgement result.	*
LVLMS	Displays RBW, VBW, or SWT at search measurement.	

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays RBW, VBW, or SWT at Spurious Emission measurement.

<Program>

DSPL SPURIOUS, SPOT

VIEW_SPU BWSWT

VIEW_SPU?

<Response>

BWSWT

VSCALE

■ Function

Vertical Scale for EVM, Phase Error and Magnitude Error

Sets the upper limit value of the vertical scale of the displayed coordinates, when Trace Format is set to EVM, Phase Error or Magnitude Error on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
VSCALE *limit*	VSCALE?	*limit*

■ Parameter

limit

Upper limit value of vertical scale

Trace Format: EVM vs. Symbol, EVM vs. Sub-carrier

Value	Upper limit of vertical scale	Initial value
5	5%	
10	10%	
20	20%	*
50	50%	
100	100%	

Trace Format: Phase Error vs. Symbol

Value	Upper limit of vertical scale	Initial value
5	5 deg	
10	10 deg	*
20	20 deg	
50	50 deg	
100	100 deg	

Trace Format: Spectrum Flatness

Value	Upper limit of vertical scale	Initial value
5	5 dB	
10	10 dB	*
20	20 dB	
50	50 dB	
100	100 dB	

■ Restrictions

- This setting is not possible when Trace Format is No Trace (*cf.* TRFORM).

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Sets the upper limit of vertical scale of Phase Error to 50 deg.

<Program>
MEAS MODANAL
TRFORM PHASE
VSCALE 50
VSCALE?

<Response>
50

WAVEFORM_SPU

■ Function

Waveform Display for Spurious Emission

Sets Waveform window on the Spurious Emission to On/Off.

■ Syntax

Program Message	Query Message	Response Message
WAVEFORM_SPU *a*	WAVEFORM_SPU?	*a*

■ Parameter

a

Waveform Window On/Off

Value	Description	Initial Value
ON	Displays waveform window	
OFF	Does not display waveform window	*

■ Initialization command

PRE

INI

IP

*RST

■ Use example

Displays Waveform window at spurious emission measurement.

<Program>

DSPL SPURIOUS, SWEEP

WAVEFORM_SPU ON

WAVEFORM_SPU?

<Response>

ON

WAVETBLNO_SPU

■ Function

Wave Table Number for Spurious Emission

Specifies the frequency table number for spurious emission displayed on waveform window.

■ Syntax

Program Message	Query Message	Response Message
WAVETBLNO_SPU *n*	WAVETBLNO_SPU?	*n*

■ Parameter

n

Table Number

Range	Resolution	Unit	Initial Value
F1 to F15	1	None	F1

■ Initialization command

PRE
INI
IP
*RST

■ Use example

Displays wave pattern of the third frequency table for spurious emission on waveform window.

<Program>
DSPL SPURIOUS, SWEEP
WAVEFORM_SPU ON
WAVETBLNO_SPU F3
WAVETBLNO_SPU?

<Response>
F3

ZAJ

■ Function

Zero Set

Executes zero-point calibration for the power meter. This command functions the same as the ZEROSET command.

■ Syntax

Program Message	Query Message	Response Message
ZAJ	---	---

■ Restrictions

- This function cannot be executed when the displayed measurement screen is other than the Power Meter screen. (*cf.* DSPL)

■ Use example

Executes “Zero Set”.

<Program>

DSPL PWRMTR

ZAJ

ZEROSET

■ Function

Zero Set

Executes zero-point calibration for the power meter. This command functions the same as the ZAJ command.

■ Syntax

Program Message	Query Message	Response Message
ZEROSET	---	---

■ Restrictions

- This function cannot be executed when the displayed measurement screen is other than the Power Meter screen. (*cf.* DSPL)

■ Use example

Executes “Zero Set”.

<Program>

DSPL PWRMTR

ZEROSET