MX860805A/MX860905A
MX268105A/MX268305A/MX268705A
π/4 DQPSK Measurement Software
(For MS8608A/ MS8609A
/MS2681A /MS2683A/ MS2687A/B)
Operation Manual

Fifth Edition

Read this manual before using the equipment.
To ensure that the equipment is used safely, read the "For Safety" in the MS8608A/MS8609A Digital Mobile Radio Transmitter Tester Operation Manual or MS2681A/ MS2683A/MS2687A/MS2687B Spectrum Analyzer Operation Manual first.
Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W1866AE-5.0

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. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

Symbols used in manual

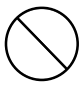
DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

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

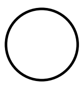
CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

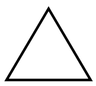
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



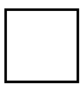
This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



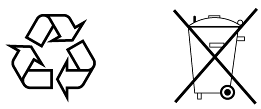
This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates 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.

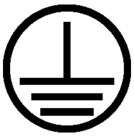
MX860805A /MX860905A /MX268105A /MX268305A /MX268705A
π/4 DQPSK Measurement Software (For MS8608A /MS8609A /MS2681A /MS2683A /MS2687A/B)
Operation Manual

19 September 2001 (First Edition)
21 September 2004 (Fifth 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. When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin 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.

Repair

WARNING ⚠

3. 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

4. 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.

For Safety

WARNING ⚠

5. 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.
   Battery Fluid
   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.

6. 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.
   LCD
   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.

   T5A 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:

   High Power Input and Low Power Input connectors: ±DC 0 V

   Maximum AC power (continuous wave) ratings:

   For MS8608A

   High Power Input connector: +40 dBm

   Low Power Input connector: +20 dBm

   For MS8609A

   +20 dBm

   For MS2681A/ MS2683A/ MS2687A/ MS2687B

   +30 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

4. The power for memory backup is supplied by a Poly-carbonmonofluoride Lithium Battery. This battery should only be replaced by a battery of the same type; since replacement can only be made by Anritsu, contact the nearest Anritsu representative when replacement is required.

   Note: *The Battery life is about 7 years. Early battery replacement is recommended.*

Storage mediun

5. This equipment stores data and programs using Plug-in memory card. Data and programs may be lost due to improper use or failure. ANRITSU therefore recommends that you backup the memory.

   <u>Anritsu Corporation will not accept liability for lost data.</u>

   Please 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 in this 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.

Trade Mark

Windows is a registered trademark of Microsoft Corporation US.

CE marking, C-tick marking

The applied directive and standards of this software is conformed to the MS8608A/MS8609A mainframe.

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 46 "Auto Power Recovery" to equipment.

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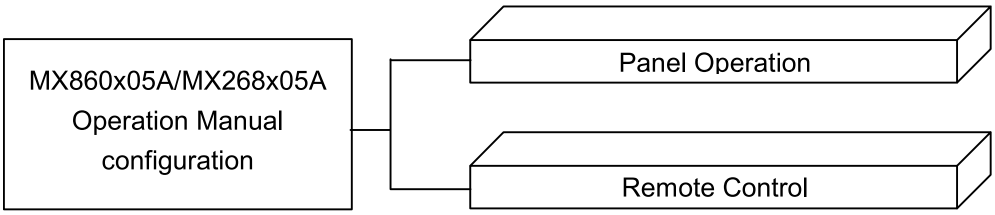
(3) Upon termination of this License for any reason, you must either immediately destroy this software and related documentation, or return it to Anritsu.

About This Manual

1. This manual provides information assuming that this software is installed in the MS8608A/MS8609A Digital Mobile Radio Transmitter Tester or the MS2681A/MS2683A/MS2687A/B Spectrum Analyzer.

   In this manual, MX860x05A means MX860805A or MX860905A, MX268x05A means MX268105A or MX268305A or MX268705A.
   MS860x means MS8608A or MS8609A, MS268x means MS2681A or MS2683A or MS2683A or MS2687A or MS2687B.
   MX860805A/MX860905A is π /4DQPSK Measurement Software for MS8608A/MS8609A, respectively.
   MX268105A/MX268305A/MX268705A is π /4DQPSK Measurement Software for MS2681A/MS2683A/MS2687A/B, respectively.

2. Manual configuration:
   The MX860x05A/MX268x05A π/4DQPSK measurement software operation manual consists of the following two documents.



Panel Operation:
Explains overview, panel description, operation and performance test of the MX860x05A/MX268x05A.

Remote Control:
Explains remote control of the MX860x05A/MX268x05A via RS-232C/ GPIB interface.

MX860805A/MX860905A/
MX268105A/MX268305A/MX268705A
π/4 DQPSK Measurement Software
(For MS8608A/MS8609A/
MS2681A/MS2683A/MS2687A/B)
Operation Manual
(Panel Operation)

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Section 1 Overview

This section describes the overview and product configuration of this software.

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Overview

The MS8608A/MS8609A Digital Mobile Radio Transmitter Tester (hereinafter, referred to as “transmitter tester”) is a unit that allows speedy, accurate and easy measurement of the transmitter characteristics of base/mobile stations for various mobile communications. In addition to the RF/IF signal evaluation function, it has an IQ (base band) signal analysis function to evaluate devices. The standard transmitter tester is equipped with a high-performance spectrum analyzer and power meter. With measurement software installed, the transmitter tester provides a modulation analysis function that supports various digital modulation modes. In addition, employment of high-speed digital signal processing technology enables fast and accurate measurement.

The MS2681A/MS2683A/MS2687A/MS2687B Spectrum Analyzer (hereinafter, referred to as “spectrum analyzer”) is a unit that allows speedy, accurate and easy measurement of the transmitter characteristics of base/mobile stations for various mobile communications. In addition to the RF/IF signal evaluation function, it has an IQ (base band) signal analysis function to evaluate devices. With measurement software installed, the Spectrum Analyzer provides a modulation analysis function that supports various digital modulation modes. In addition, employment of high-speed digital signal processing technology enables fast and accurate measurement.

With the MX860805A/MX860905A/MX268105A/MX268305A/MX268705A π/4 DQPSK measurement software (hereinafter, referred to as “π/4 DQPSK software”) installed, this transmitter tester/spectrum analyzer is converted into universal measurement equipment that allows easy measurement of the functions and performance of radio units for PDC/PHS/NADC digital mobile phones and STD-39/T79/T61 public radio.

The transmitter tester/spectrum analyzer installed with the π/4 DQPSK software provides the measurement functions given below.

- Modulation accuracy analysis and carrier frequency measurement
- Transmission power measurement
- Occupied bandwidth measurement
- Adjacent channel leakage power measurement
- Spurious measurement, etc.

Configuration

Combinations of transmitter testers/spectrum analyzers and π/4 DQPSK software and product configurations are given below.

- For transmitter tester MS8608A

	Product name	Qty	Model/Ordering No.	Remarks
Software	π/4 DQPSK measurement software	1	MX860805A	Supplied with Memory card
Accessory	Operation manual	1	W1866AE	

- For transmitter tester MS8609A

	Product name	Q'ty	Model/Ordering No.	Remarks
Software	π/4 DQPSK measurement software	1	MX860905A	Supplied with Memory card
Accessory	Operation manual	1	W1866AE	

- For spectrum analyzer MS2681A

	Product name	Q'ty	Model/Ordering No.	Remarks
Software	π/4 DQPSK measurement software	1	MX268105A	Supplied with Memory card
Accessory	Operation manual	1	W1866AE	

- For spectrum analyzer MS2683A

	Product name	Q'ty	Model/Ordering No.	Remarks
Software	π/4 DQPSK measurement software	1	MX268305A	Supplied with Memory card
Accessory	Operation manual	1	W1866AE	

- For spectrum analyzer MS2687A/B

	Product name	Q'ty	Model/Ordering No.	Remarks
Software	π/4 DQPSK measurement software	1	MX268705A	Supplied with Memory card
Accessory	Operation manual	1	W1866AE	

Specifications

MX860805A π/4 DQPSK measurement software specifications (for MS8608A)

Item	Specifications	Remarks
Model/Unit name	MX860805A π/4 DQPSK measurement software (MS8608A)	
Purpose	Measures transmission characteristics of the mobile radio unit for π/4 DQPSK modulation type.	
Electric performance (RF input)	The specifications given below are guaranteed after executing MS8608A level optimization (executed automatically by pressing a key).	
Modulation/Frequency measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	−20 to +40 dBm (Average power during burst): High Power input −40 to +20 dBm (Average power during burst): Low Power input −60 to +10 dBm (Average power during burst): Low Power input, with preamplifier ON*1	
Carrier frequency accuracy	Input level (average power during burst): ≥−10 dBm (High Power input), ≥−30 dBm (Low Power input), ≥−40 dBm (Low Power input, with preamplifier ON*1) ± (Reference crystal oscillator accuracy+10 Hz)	
Modulation accuracy		
Residual EVM	Input level (average power during burst): ≥−10 dBm (High Power input), ≥−30 dBm (Low Power input), ≥−40 dBm (Low Power input, with preamplifier ON*1) At 10 times avarage < 0.5% (rms) (PDC, NADC) < 0.7% (rms) (PHS)	
Origin offset accuracy	Input level (average power during burst): ≥−10 dBm (High Power input), ≥−30 dBm (Low Power input), ≥−40 dBm (Low Power input, with preamplifier ON*1) for a signal with origin offset −30 dBc ±0.50 dB	
Transmission rate accuracy	Input level (average power during burst): ≥−10 dBm (High Power input), ≥−30 dBm (Low Power input), ≥−40 dBm (Low Power input, with preamplifier ON*1) ±1 ppm (except Trigger:Wide IF)	
Waveform display	Eye pattern EVM vs. Symbol No. Phase error vs. Symbol No. Amplitude error vs. Symbol No. Constellation	

*1. The preamplifier can be set to ON when main unit option MS8608A-08 is installed.

Item	Specifications	Remarks
Amplitude measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	–20 to +40 dBm (Average power during burst): High Power input –40 to +20 dBm (Average power during burst): Low Power input –60 to +10 dBm (Average power during burst): Low Power input, with preamplifier ON*1	
Transmission power measurement	After level calibration using built-in power meter (executed automatically by pressing a key)	
Measurement range	+10 to +40 dBm (Average power during burst): High Power input –10 to +20 dBm (Average power during burst): Low Power input –10 to +10 dBm (Average power during burst): Low Power input, with preamplifier ON*1	
Accuracy	±0.40 dB	
Power measurement linearity	Input level (average power during burst): ≥+10 dBm (High Power input), ≥–10 dBm (Low Power input), ≥–20 dBm (Low Power input, with preamplifier ON*1), without changing the reference level setting after range optimization ±0.20 dB (0 to –30 dB)	
Power measurement with carrier OFF	Input level (average power during burst): ≥+10 dBm (High Power input), ≥–10 dBm (Low Power input), ≥–20 dBm (Low Power input, with preamplifier ON*1)	
Normal mode measurement range	≥65 dB (PDC, NADC) ≥60 dB (PHS) (Compared with average power during burst)	
Wide dynamic range mode measurement range	Average power during burst: 1 W (High Power input), 10 mW (Low Power input) ≥90 dB (PDC, NADC) The measurement limit is determined by average noise level: ≤–60 dBm (High Power input, 50 MHz to 2.1 GHz). ≥80 dB (PHS) The measurement limit is determined by average noise level: ≤–50 dBm (High Power input, 50 MHz to 2.1 GHz).	
Rising/falling characteristics	Displays waveform in synchronization with the measured signal data. Standard line display available and pass/fail judgment function provided.	

*1. The preamplifier can be set to ON when main unit option MS8608A-08 is installed.

Item	Specifications	Remarks
Occupied frequency bandwidth measurement		
Frequency range	50 MHz to 2.1 GHz	
Input level range	−20 to +40 dBm (Average power during burst): High Power input −40 to +20 dBm (Average power during burst): Low Power input −60 to +10 dBm (Average power during burst): Low Power input, with preamplifier ON*1	
Measurement method		
Sweep method	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
FFT method	Analyzes the target signal by FFT and displays the calculated result.	
Adjacent channel leakage power measurement		
Frequency range	100 MHz to 2.1 GHz	
Input level range	+10 to +40 dBm (Average power during burst): High Power input −10 to +20 dBm (Average power during burst): Low Power input −20 to +10 dBm (Average power during burst): Low Power input, with preamplifier ON*1	
Measurement method		
Sweep method (all)	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
Sweep method (separate)	Measures the adjacent and next channels with a sweep-type spectrum analyzer and displays the calculated result.	
High speed method	Measures the power (RMS value) at the adjacent and next channels after passing through the built-in reception filter and displays the result.	
Measurement range	CW signal input, in High Speed method 50 kHz detuning: ≥60 dB (PDC) 100 kHz detuning: ≥65 dB (PDC) 600 kHz detuning: ≥60 dB (PHS) 900 kHz detuning: ≥60 dB (PHS) 30 kHz detuning: ≥30 dB (NADC) 60 kHz detuning: ≥60 dB (NADC) 90 kHz detuning: ≥65 dB (NADC)	

*1. The preamplifier can be set to ON when main unit option MS8608A-08 is installed.

Item	Specifications	Remarks
Spurious measurement		
Measurement frequency range	100 kHz to 7.8 GHz Except for carrier frequency ±50 MHz	
Input level range (Transmission power)	+20 to +40 dBm (Average power during burst): High Power input 0 to +20 dBm (Average power during burst): Low Power input	
Measurement method		
Sweep method	Sweeps the specified frequency range with a spectrum analyzer and displays the detected peak value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Spot method	Measures the specified frequency with a spectrum analyzer in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Search method	Sweeps the specified frequency range with a spectrum analyzer, detects the frequency at the peak value, measures the frequency in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Electric performance (IQ input)		
Input method	Balanced/unbalanced selectable	
Input impedance	Select between 1 MΩ (parallel capacity < 100 pF) and 50 Ω.	
Input level range		
Balanced input	Differential voltage range: 0.1 to 1 Vpp (at input connector) In-phase voltage range: ±2.5 V (at input connector)	
Unbalanced input	0.1 to 1Vpp (at input connector) DC/AC coupling selectable	
Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level	
Modulation accuracy measurement	Input level: ≥0.1V (rms), temperature range 18 to 28 °C	
Residual EVM	< 0.5% (rms), DC coupling (PDC, NADC) typical value < 0.7% (rms), DC coupling (PHS) typical value	
I/Q level measurement		
Level measurement	Measures and displays the I and Q input voltages (rms and peak-to-peak values).	
I/Q phase difference measurement	When CW signal is input to the I and Q input connectors, measures and displays the phase difference between the I-and Q-phase signals.	

*1. The preamplifier can be set to ON when main unit option MS8608A-08 is installed.

MX860905A π/4 DQPSK measurement software specifications (for MS8609A)

Item	Specifications	Remarks
Model/unit name	MX860905A π/4 DQPSK measurement software (MS8609A)	
Purpose	Measures transmission characteristics of the mobile radio unit for π/4 DQPSK modulation type.	
Electric performance (RF input)	The specifications given below are guaranteed after executing MS8609A level optimization (executed automatically by pressing a key).	
Modulation/frequency measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	–40 to +20 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Carrier frequency accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ± (Reference crystal oscillator accuracy + 10 Hz)	
Modulation accuracy		
Residual EVM	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) < 0.5% (rms) (PDC, NADC) < 0.7% (rms) (PHS)	
Origin offset accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) for signal with origin offset –30 dBc ±0.50 dB	
Transmission rate accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ±1 ppm (except Trigger:Wide IF)	
Waveform display	Eye pattern EVM vs. Symbol No. Phase error vs. Symbol No. Amplitude error vs. Symbol No. Constellation	

*1. The preamplifier can be set to ON when main unit option MS8609A-08 is installed.

Item	Specifications	Remarks
Amplitude measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	–40 to +20 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Transmission power measurement	After level calibration using built-in power meter (executed automatically by pressing a certain key)	
Measurement range	–10 to +20 dBm (Average power during burst): With preamplifier OFF –10 to +10 dBm (Average power during burst): With preamplifier ON*1	
Accuracy	±0.40 dB	
Power measurement linearity	Input level (average power during burst): ≥–10 dBm (With preamplifier OFF), ≥–20 dBm (With preamplifier ON*1), without changing the reference level setting after range optimization ±0.20 dB (0 to –30 dB)	
Power measurement with carrier OFF	Input level (average power during burst): ≥–10 dBm (With preamplifier OFF), ≥–20 dBm (With preamplifier ON*1)	
Normal node measurement range	≥65 dB (PDC, NADC) ≥60 dB (PHS) (Compared with average power during burst)	
Wide dynamic range mode measurement range	Average power during burst: Comparing to 10mW (Low Power input) ≥90 dB (PDC, NADC) The measurement limit is determined by average noise level: ≤–80 dBm (50 MHz to 2.1 GHz). ≥80 dB（PHS） The measurement limit is determined by average noise level: ≤–70 dBm (50 MHz to 2.1 GHz).	
Rising/falling characteristics	Displays waveform in synchronization with the measured signal data. Standard line display available and pass/fail judgment function provided.	
Occupied frequency bandwidth measurement		
Frequency range	50 MHz to 2.1 GHz	
Input level range	–40 to +20 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
FFT method	Analyzes the target signal by FFT and displays the calculated result.	

*1. The preamplifier can be set to ON when main unit option MS8609A-08 is installed.

Item	Specifications	Remarks
Adjacent channel leakage power measurement		
Frequency range	100 MHz to 2.1 GHz	
Input level range	−10 to +20 dBm (Average power during burst): With preamplifier OFF −20 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method (all)	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
Sweep method (separate)	Measures the adjacent and next channels with a sweep-type spectrum analyzer and displays the calculated result.	
High speed method	Measures the power (RMS value) at the adjacent and next channels after passing through the built-in reception filter and displays the result.	
Measurement range	CW signal input, in High Speed method 50 kHz detuning: ≥60 dB (PDC) 100 kHz detuning: ≥65 dB (PDC) 600 kHz detuning: ≥60 dB (PHS) 900 kHz detuning: ≥60 dB (PHS) 30 kHz detuning: ≥30 dB (NADC) 60 kHz detuning: ≥60 dB (NADC) 90 kHz detuning: ≥65 dB (NADC) (Ratio of the average power during burst to the adjacent channel leakage power average value in the burst-ON period)	
Spurious measurement		
Measurement frequency range	100 kHz to 12.75 GHz Except for carrier frequency ±50 MHz	
Input level range (transmission power)	0 to +20 dBm (Average power during burst): With preamplifier OFF	
Measurement method		
Sweep method	Sweeps the specified frequency range with a spectrum analyzer and displays the detected peak value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Spot method	Measures the specified frequency with a spectrum analyzer in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Search method	Sweeps the specified frequency range with a spectrum analyzer, detects the frequency at the peak value, measures the frequency in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	

*1. The preamplifier can be set to ON when main unit option MS8609A-08 is installed.

Item	Specifications	Remarks
Electric performance (IQ input)		
Input method	Balanced/unbalanced selectable	
Input impedance	Select between 1 MΩ (parallel capacity < 100 pF) and 50 Ω.	
Input level range		
Balanced input	Differential voltage range: 0.1 to 1 Vpp (at input connector) In-phase voltage range: ±2.5 V (at input connector)	
Unbalanced input	0.1 to 1 Vpp (at input connector) DC/AC coupling selectable	
Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level	
Modulation accuracy measurement	Input level: ≥0.1V (rms), temperature range 18 to 28°C	
Residual EVM	< 0.5% (rms), DC coupling (PDC, NADC) typical value < 0.7% (rms), DC coupling (PHS) typical value	
IQ level measurement		
Level measurement	Measures and displays the I and Q input voltages (rms and peak-to-peak values).	
IQ phase difference measurement	When CW signal is input to the I and Q input connectors, measures and displays the phase difference between the I- and Q-phase signals.	

MX268105A π/4 DQPSK measurement software specifications (for MS2681A)

Item	Specifications	Remarks
Model/unit name	MX268105A π/4 DQPSK measurement software (MS2681A)	
Purpose	Measures transmission characteristics of the mobile radio unit for π/4 DQPSK modulation type.	
Electric performance (RF input)	The specifications given below are guaranteed after executing MS2681A level optimization (executed automatically by pressing a key).	
Modulation/frequency measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	–40 to +30 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Carrier frequency accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ± (Reference crystal oscillator accuracy + 10 Hz)	
Modulation accuracy		
Residual EVM	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) At 10 times average < 0.5% (rms) (PDC, NADC) < 0.7% (rms) (PHS)	
Origin offset accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) for signal with origin offset –30 dBc ±0.50 dB	
Transmission rate accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ±1 ppm (except Trigger:Wide IF)	
Waveform display	Eye pattern EVM vs. Symbol No. Phase error vs. Symbol No. Amplitude error vs. Symbol No. Constellation	

*1. The preamplifier can be set to ON when main unit option MS2681A-08 is installed.

Item	Specifications	Remarks
Amplitude measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	−40 to +30 dBm (Average power during burst): With preamplifier OFF −60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Transmission power measurement		
Measurement range	−10 to +30 dBm (Average power during burst): With preamplifier OFF −10 to +10 dBm (Average power during burst): With preamplifier ON*1	
Accuracy	±2.0 dB typical	
Power measurement linearity	Input level (average power during burst): ≥−10 dBm (With preamplifier OFF), ≥−20 dBm (With preamplifier ON*1), without changing the reference level setting after range optimization ±0.20 dB (0 to −30 dB)	
Power measurement with carrier OFF	Input level (average power during burst): ≥−10 dBm (With preamplifier OFF), ≥−20 dBm (With preamplifier ON*1)	
Normal node measurement range	≥65 dB (PDC, NADC) ≥60 dB (PHS) (Compared with average power during burst)	
Wide dynamic range mode measurement range	Compared with average power during burst: 10mW ≥90 dB (PDC, NADC) The measurement limit is determined by average noise level: ≤−80 dBm (50 MHz to 2.1 GHz). ≥80 dB (PHS) The measurement limit is determined by average noise level: ≤−70 dBm (50 MHz to 2.1 GHz).	
Rising/falling characteristics	Displays waveform in synchronization with the measured signal data. Standard line display available and pass/fail judgment function provided.	

*1. The preamplifier can be set to ON when main unit option MS2681A-08 is installed.

Item	Specifications	Remarks
Occupied frequency bandwidth measurement		
Frequency range	50 MHz to 2.1 GHz	
Input level range	−40 to +30 dBm (Average power during burst): With preamplifier OFF −60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
FFT method	Analyzes the target signal by FFT and displays the calculated result.	
Adjacent channel leakage power measurement		
Frequency range	100 MHz to 2.1 GHz	
Input level range	−10 to +30 dBm (Average power during burst): With preamplifier OFF −20 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method (all)	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
Sweep method (separate)	Measures the adjacent and next channels with a sweep-type spectrum analyzer and displays the calculated result.	
High Speed method	Measures the power (RMS value) at the adjacent and next channels after passing through the built-in reception filter and displays the result.	
Measurement range	CW signal input, in High Speed method 50 kHz detuning: ≥60 dB (PDC) 100 kHz detuning: ≥65 dB (PDC) 600 kHz detuning: ≥60 dB (PHS) 900 kHz detuning: ≥60 dB (PHS) 30 kHz detuning: ≥30 dB (NADC) 60 kHz detuning: ≥60 dB (NADC) 90 kHz detuning: ≥65 dB (NADC)	

*1. The preamplifier can be set to ON when main unit option MS2681A-08 is installed.

Item	Specifications	Remarks
Spurious measurement		
Measurement frequency range	100 kHz to 3.0 GHz Except for carrier frequency ±50 MHz	
Input level range (transmission power)	0 to +30 dBm (Average power during burst)	
Measurement method		
Sweep method	Sweeps the specified frequency range with a spectrum analyzer and displays the detected peak value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Spot method	Measures the specified frequency with a spectrum analyzer in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Search method	Sweeps the specified frequency range with a spectrum analyzer, detects the frequency at the peak value, measures the frequency in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Electric performance (IQ input)	This function is available when MS2681A-17 or 18 option is installed.	
Input method	When MS2681A-17 is installed: Either Balanced or Unbalanced When MS2681A-18 is installed: Unbalanced	
Input impedance	Select between 1 MΩ (parallel capacity < 100 pF) and 50 Ω.	
Input level range		
Balanced input	Differential voltage range: 0.1 to 1 Vpp (at input connector) In-phase voltage range: ±2.5 V (at input connector)	
Unbalanced input	0.1 to 1 Vpp (at input connector) DC/AC coupling selectable	
Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level	
Modulation accuracy measurement	Input level: ≥0.1V (rms), temperature range 18 to 28°C	
Residual EVM	< 0.5% (rms), DC coupling (PDC, NADC) typical value < 0.7% (rms), DC coupling (PHS) typical value	
IQ level measurement		
Level measurement	Measures and displays the I and Q input voltages (rms and peak-to-peak values).	
IQ phase difference measurement	When CW signal is input to the I and Q input connectors, measures and displays the phase difference between the I- and Q-phase signals.	

MX268305A π/4 DQPSK measurement software specifications (for MS2683A)

Item	Specifications	Remarks
Model/unit name	MX268305A π/4 DQPSK measurement software (MS2683A)	
Purpose	Measures transmission characteristics of the mobile radio unit for π/4 DQPSK modulation type.	
Electric performance (RF input)	The specifications given below are guaranteed after executing MS2683A level optimization (executed automatically by pressing a key).	
Modulation/frequency measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	–40 to +30 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Carrier frequency accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ± (Reference crystal oscillator accuracy + 10 Hz)	
Modulation accuracy		
Residual EVM	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) At 10 times average < 0.5% (rms) (PDC, NADC) < 0.7% (rms) (PHS)	
Origin offset accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) for signal with origin offset –30 dBc ±0.50 dB	
Transmission rate accuracy	Input level (average power during burst): ≥–30 dBm (with preamplifier OFF), ≥–40 dBm (with preamplifier ON*1) ±1 ppm (except Trigger:Wide IF)	
Waveform display	Eye pattern EVM vs. Symbol No. Phase error vs. Symbol No. Amplitude error vs. Symbol No. Constellation	

*1. The preamplifier can be set to ON when main unit option MS2683A-08 is installed.

Item	Specifications	Remarks
Amplitude measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	−40 to +30 dBm (Average power during burst): With preamplifier OFF −60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Transmission power measurement		
Measurement range	−10 to +30 dBm (Average power during burst): With preamplifier OFF −10 to +10 dBm (Average power during burst): With preamplifier ON*1	
Accuracy	±2.0 dB typical	
Power measurement linearity	Input level (average power during burst): ≥–10 dBm (With preamplifier OFF), ≥–20 dBm (With preamplifier ON*1), without changing the reference level setting after range optimization ±0.20 dB (0 to −30 dB)	
Power measurement with carrier OFF	Input level (average power during burst): ≥–10 dBm (With preamplifier OFF), ≥–20 dBm (With preamplifier ON*1)	
Normal node measurement range	≥65 dB (PDC, NADC) ≥60 dB (PHS) (Compared with average power during burst)	
Wide dynamic range mode measurement range	Compared with average power during burst: 10mW ≥90 dB (PDC, NADC) The measurement limit is determined by average noise level: ≤−80 dBm (50 MHz to 2.1 GHz). ≥80 dB（PHS） The measurement limit is determined by average noise level: ≤−70 dBm (50 MHz to 2.1 GHz).	
Rising/falling characteristics	Displays waveform in synchronization with the measured signal data. Standard line display available and pass/fail judgment function provided.	

*1. The preamplifier can be set to ON when main unit option MS2683A-08 is installed.

Item	Specifications	Remarks
Occupied frequency bandwidth measurement		
Frequency range	50 MHz to 2.1 GHz	
Input level range	–40 to +30 dBm (Average power during burst): With preamplifier OFF –60 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
FFT method	Analyzes the target signal by FFT and displays the calculated result.	
Adjacent channel leakage power measurement		
Frequency range	100 MHz to 2.1 GHz	
Input level range	–10 to +30 dBm (Average power during burst): With preamplifier OFF –20 to +10 dBm (Average power during burst): With preamplifier ON*1	
Measurement method		
Sweep method (all)	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
Sweep method (separate)	Measures the adjacent and next channels with a sweep-type spectrum analyzer and displays the calculated result.	
High Speed method	Measures the power (RMS value) at the adjacent and next channels after passing through the built-in reception filter and displays the result.	
Measurement range	CW signal input, in High Speed method 50 kHz detuning: ≥60 dB (PDC) 100 kHz detuning: ≥65 dB (PDC) 600 kHz detuning: ≥60 dB (PHS) 900 kHz detuning: ≥60 dB (PHS) 30 kHz detuning: ≥30 dB (NADC) 60 kHz detuning: ≥60 dB (NADC) 90 kHz detuning: ≥65 dB (NADC)	

*1. The preamplifier can be set to ON when main unit option MS2683A-08 is installed.

Item	Specifications	Remarks
Spurious measurement		
Measurement frequency range	100 kHz to 7.8 GHz Except for carrier frequency ±50 MHz	
Input level range (transmission power)	0 to +30 dBm (Average power during burst)	
Measurement method		
Sweep method	Sweeps the specified frequency range with a spectrum analyzer and displays the detected peak value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Spot method	Measures the specified frequency with a spectrum analyzer in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Search method	Sweeps the specified frequency range with a spectrum analyzer, detects the frequency at the peak value, measures the frequency in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Electric performance (IQ input)	This function is available when MS2683A-17 or 18 option is installed.	
Input method	When MS2683A-17 is installed: Either Balanced or Unbalanced When MS2683A-18 is installed: Unbalanced	
Input impedance	Select between 1 MΩ (parallel capacity < 100 pF) and 50 Ω.	
Input level range		
Balanced input	Differential voltage range: 0.1 to 1 Vpp (at input connector) In-phase voltage range: ±2.5 V (at input connector)	
Unbalanced input	0.1 to 1 Vpp (at input connector) DC/AC coupling selectable	
Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level	
Modulation accuracy measurement	Input level: ≥0.1V (rms), temperature range 18 to 28°C	
Residual EVM	< 0.5% (rms), DC coupling (PDC, NADC) typical value < 0.7% (rms), DC coupling (PHS) typical value	
IQ level measurement		
Level measurement	Measures and displays the I and Q input voltages (rms and peak-to-peak values).	
IQ phase difference measurement	When CW signal is input to the I and Q input connectors, measures and displays the phase difference between the I- and Q-phase signals.	

MX268705A π/4 DQPSK measurement software specifications (for MS2687A/B)

Item	Specifications	Remarks
Model/unit name	MX268705A π/4 DQPSK measurement software (MS2687A/B)	
Purpose	Measures transmission characteristics of the mobile radio unit for π/4 DQPSK modulation type.	
Electric performance (RF input)	The specifications given below are guaranteed after executing MS2687A/B level optimization (executed automatically by pressing a key).	
Modulation/frequency measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	−30 to +30 dBm (Average power during burst)	
Carrier frequency accuracy	Input level (average power during burst): ≥−30 dBm ± (Reference crystal oscillator accuracy + 10 Hz)	
Modulation accuracy		
Residual EVM	Input level (average power during burst): ≥−30 dBm At 10 times average < 0.5% (rms) (PDC, NADC) < 0.7% (rms) (PHS)	
Origin offset accuracy	Input level (average power during burst): ≥−30 dBm for signal with origin offset −30 dBc ±0.50 dB	
Transmission rate accuracy	Input level (average power during burst): ≥−30 dBm ±1 ppm (except Trigger:Wide IF)	
Waveform display	Eye pattern EVM vs. Symbol No. Phase error vs. Symbol No. Amplitude error vs. Symbol No. Constellation	

Item	Specifications	Remarks
Amplitude measurement		
Measurement frequency range	50 MHz to 2.1 GHz	
Measurement level range	−30 to +30 dBm (Average power during burst)	
Transmission power measurement		
Measurement range	−10 to +30 dBm (Average power during burst)	
Accuracy	±2.0 dB typical	
Power measurement linearity	Input level (average power during burst): ≥−10 dBm, without changing the reference level setting after range optimization ±0.20 dB (0 to −30 dB)	
Power measurement with carrier OFF	Input level (average power during burst): ≥−10 dBm	
Normal node measurement range	≥65 dB (PDC, NADC) ≥60 dB (PHS) (Compared with average power during burst)	
Wide dynamic range mode measurement range	Compared with average power during burst: 10mW ≥90 dB (PDC, NADC) The measurement limit is determined by average noise level: ≤−80 dBm (50 MHz to 2.1 GHz). ≥80 dB（PHS） The measurement limit is determined by average noise level: ≤−70 dBm (50 MHz to 2.1 GHz).	
Rising/falling characteristics	Displays waveform in synchronization with the measured signal data. Standard line display available and pass/fail judgment function provided.	

Item	Specifications	Remarks
Occupied frequency bandwidth measurement		
Frequency range	50 MHz to 2.1 GHz	
Input level range	–30 to +30 dBm (Average power during burst)	
Measurement method		
Sweep method	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
FFT method	Analyzes the target signal by FFT and displays the calculated result.	
Adjacent channel leakage power measurement		
Frequency range	100 MHz to 2.1 GHz	
Input level range	–10 to +30 dBm (Average power during burst)	
Measurement method		
Sweep method (all)	Measures the target signal with a sweep-type spectrum analyzer and displays the calculated result.	
Sweep method (separate)	Measures the adjacent and next channels with a sweep-type spectrum analyzer and displays the calculated result.	
High Speed method	Measures the power (RMS value) at the adjacent and next channels after passing through the built-in reception filter and displays the result.	
Measurement range	CW signal input, in High Speed method 50 kHz detuning: ≥60 dB (PDC) 100 kHz detuning: ≥65 dB (PDC) 600 kHz detuning: ≥60 dB (PHS) 900 kHz detuning: ≥60 dB (PHS) 30 kHz detuning: ≥30 dB (NADC) 60 kHz detuning: ≥60 dB (NADC) 90 kHz detuning: ≥65 dB (NADC)	

Item	Specifications	Remarks
Spurious measurement		
Measurement frequency range	100 kHz to 12.75 GHz Except for carrier frequency ±50 MHz	
Input level range (transmission power)	0 to +30 dBm (Average power during burst): Low power input	
Measurement method		
Sweep method	Sweeps the specified frequency range with a spectrum analyzer and displays the detected peak value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Spot method	Measures the specified frequency with a spectrum analyzer in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Search method	Sweeps the specified frequency range with a spectrum analyzer, detects the frequency at the peak value, measures the frequency in time domain and displays the average value. For the power ratio, displays the calculated ratio to the Tx Power. (Specifications are values measured when detection mode is set to Average.)	
Electric performance (IQ input)	This function is available when MS2687A/B-18 option is installed.	
Input method	Unbalanced	
Input impedance	Select between 1 MΩ (parallel capacity < 100 pF) and 50 Ω.	
Input level range		
Unbalanced input	0.1 to 1 Vpp (at input connector) DC/AC coupling selectable	
Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level	
Modulation accuracy measurement	Input level: ≥0.1V (rms), temperature range 18 to 28°C	
Residual EVM	< 0.5% (rms), DC coupling (PDC, NADC) typical value < 0.7% (rms), DC coupling (PHS) typical value	
IQ level measurement		
Level measurement	Measures and displays the I and Q input voltages (rms and peak-to-peak values).	
IQ phase difference measurement	When CW signal is input to the I and Q input connectors, measures and displays the phase difference between the I- and Q-phase signals.	

Section 2 Panel Layout and Operation Overview

This section describes the front and rear panels, basic operations, how to install the measurement software, change the measurement system and set the screen colors.

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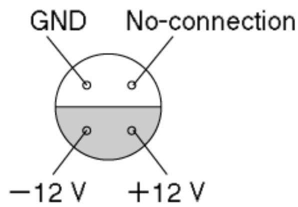
List of Controls on Front and Rear Panels

List of Controls on Front and Rear Panels for MS860x

No.	Panel Marking	Description	
1	(LCD)	6.5” color TFT liquid crystal display (LCD). Displays scales, trace waveforms, parameter settings, measurement values at marker points, soft-key menus, etc.	
2	Spectrum	Key to set this unit in the ordinary spectrum analyzer mode.	
3	Tx Tester	Key to set this unit in the transmitter tester mode for measurement software execution.	
4	Config	Key to set the interface to GPIB, printer, etc.	
5	F1 to F6	Soft keys to select soft-key menus displayed by pressing a panel key.	
		[More]	Key to display the next soft-key menu page.
6	Freq/Ampl	Section to input data for the frequency and level parameters.	
		[Freq/Channel]	Sets the frequency.
		[Span]	Sets the frequency span.
		[Amplitude]	Sets the reference level, etc
		[->CF]	Sets the peak-level signal frequency displayed on the screen as the center frequency.
		[->RLV]	Sets the peak-level value displayed on the screen as the reference level.
7	Marker	Section to operate the marker function.	
		[Marker]	Sets a marker.
		[Multi Mkr]	Sets multi-markers. Press this key after pressing the [Shift] key.
		[Peak Search]	Moves the marker to the peak-level point on the screen.
		[Marker->]	Sets a parameter using the marker value. Press this key after pressing the [Shift] key.
8	System	Key used in transmitter tester mode to switch the measurement system.	
9	Single	Sets the sweep mode.	
		[Single]	Executes single sweep.
		[Continuous]	Executes continuous sweep. Press this key after pressing the [Shift] key. The unit is pre-set to the continuous mode.
10	Recall	Key to execute recall or 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.
11	Measure	Key to measure various items such as frequency, noise, adjacent channel leakage power, etc. depending on the applications.	
12	Hi Power	Key to set the input connectors. This key is not provided on MS8609A.	
		[Hi Power]	Enables High Power input connector.
		[Low Power]	Enables Low Power input connector.

No.	Panel Marking	Description
13	Display	Section to select the trace waveform. An ordinary frequency domain allows displaying of up to two trace waveforms. [A, B] Displays the trace-A or trace-B waveform of frequency domain. [A/B, A/BG] Displays two waveforms at a time; trace-A and trace-B waveforms, or trace-A and trace-BG (background frequency including trace A) waveforms. [Time] Switches to zero-span mode displaying the time-domain waveform. [A/Time] Displays trace-A and time-domain waveforms simultaneously.
14	Trig/Gate	Key to execute the trigger and gate functions. [Trig/Gate] Sets the sweep starting trigger and gate (controlling waveform data write timings) functions.
15	Coupled Function	Keys to set the RBW, VBW, sweep time and input attenuator.
16	Entry	Section to set numeric data, units and special functions. [Rotary knob] Used to move the marker and input data. [∨, ∧] Used to step up or down the input data. [Shift] Used to execute a panel function indicated with blue letters. First press this key, and then press the key indicated with blue letters. [BS] Backspace key to correct input errors. [0 to 9, +/-] Keys to enter numeric data. [GHz, MHz, kHz, Hz] Keys to set units of frequency, level, time, etc. [Set] Key to set parameters. [Cancel] Key to cancel an entry before setting with the [Set] key.
17	Preset	Key to reset measurement parameters to their default values.
18	Local	Key to place this unit from remote to local mode.
19	Disp On/Off	Key to set the LCD On/Off.
20	Copy	Key to output the screen hardcopy to the printer or memory card.
21	Stby/On	Power switch that is enabled when the Off/On power switch (58) on the rear panel is On. In Stby mode, pressing and holding this key approximately 1 second turns the power ON. In power On mode, pressing this key approximately 1 second turns the power Off.
22	RF Input	RF input connector.
23	I/Q Input	IQ input connectors (I/Q inputs for Unbalance and $I/\overline{I}$ or $Q/\overline{Q}$ input for Balance).
24	Prove Power	Connector to supply ±12V for FET probe. The pin assignments are shown below. 
25	Memory Card	Slot for a memory card that saves or loads the waveform data, measurement parameters, etc.

No.	Panel Marking	Description
50	(Fan)	Cooling fan to ventilate the internal heat. Leave at least 10-cm clearance around the fan.
51	10 MHz STD	Input and output connectors for an external 10 MHz reference crystal oscillator. Inputting an external Ref In signal automatically switches the unit from the internal to external signal mode. (When an external signal is input, the internal OCXO heater is switched OFF.)
52	IF OUT	IF output connector to output band-limited IF signals.
53	Wideband IF Out	IF output connector to output band-unlimited IF signals.
54	Sweep (X)	Connector for sweep output (X).
55	Video (Y)	Connector to output Y-axis signal in proportion to the video detection signal output. This signal is band-limited by the RBW set value and logarithmically compressed at log scaling.
56	Sweep Status (Z)	Connector to output sweep status (Z).
57	Trig/Gate In (±10 V)	Connector to input external trigger/gate signal.
58	Off/On	Power switch
59	(Inlet)	AC power inlet to connect the attached power cord. It contains a time-lag fuse.
60	(Ground terminal)	Protective ground terminal. To prevent electric shocks, connect this terminal to ground.
61	Parallel	Printer connector
62	VGA Out	VGA signal output connector
63	GPIB	GPIB interface connector for an external system controller
64	RS-232C	RS-232C connector for an external system controller.
65	Ethernet	Ethernet 10 Base-T connector for an external system controller.
66	Name plate	Indicates the serial number and options of this unit.

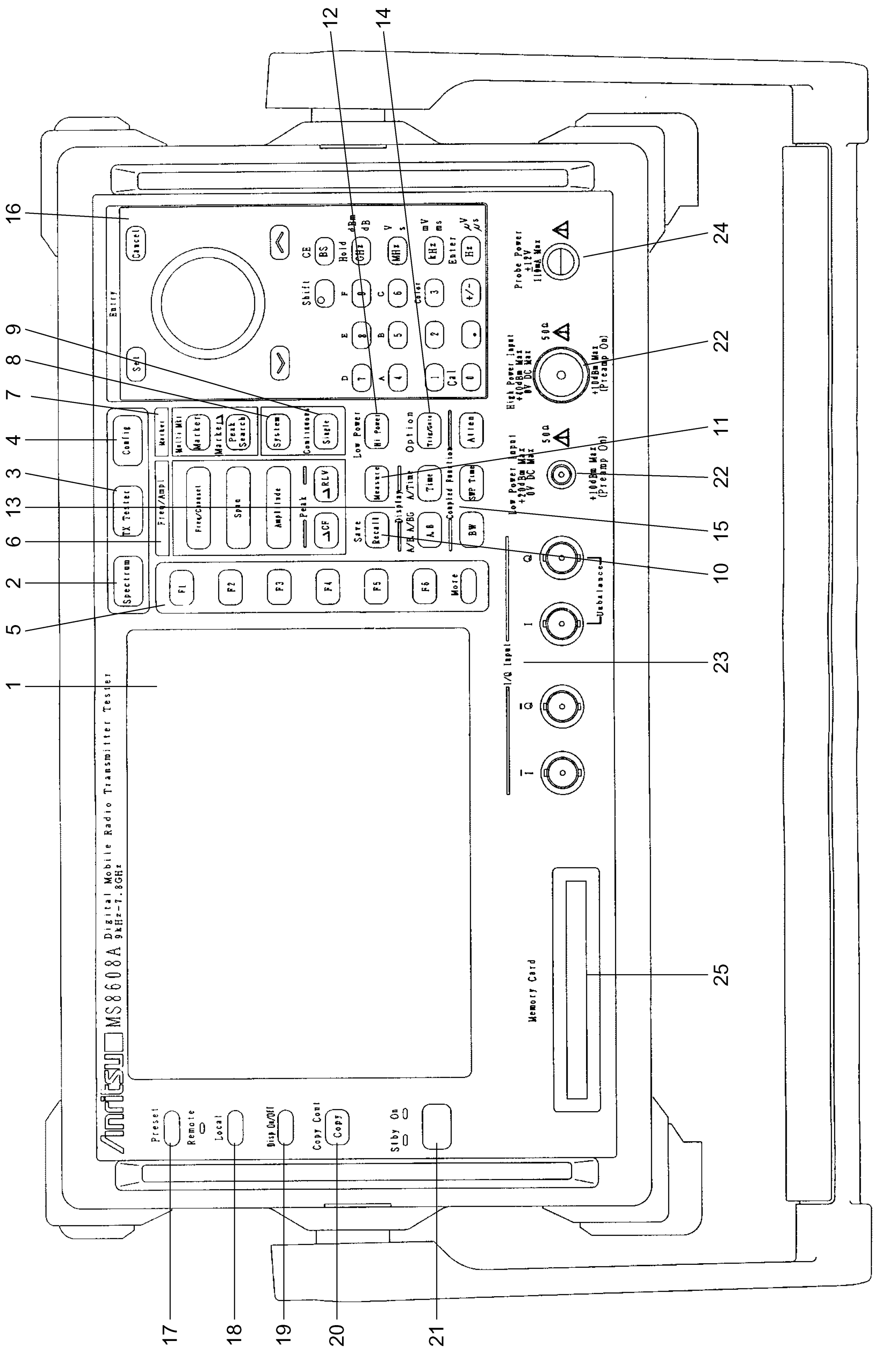


Fig. 2-1 MS8608A front panel

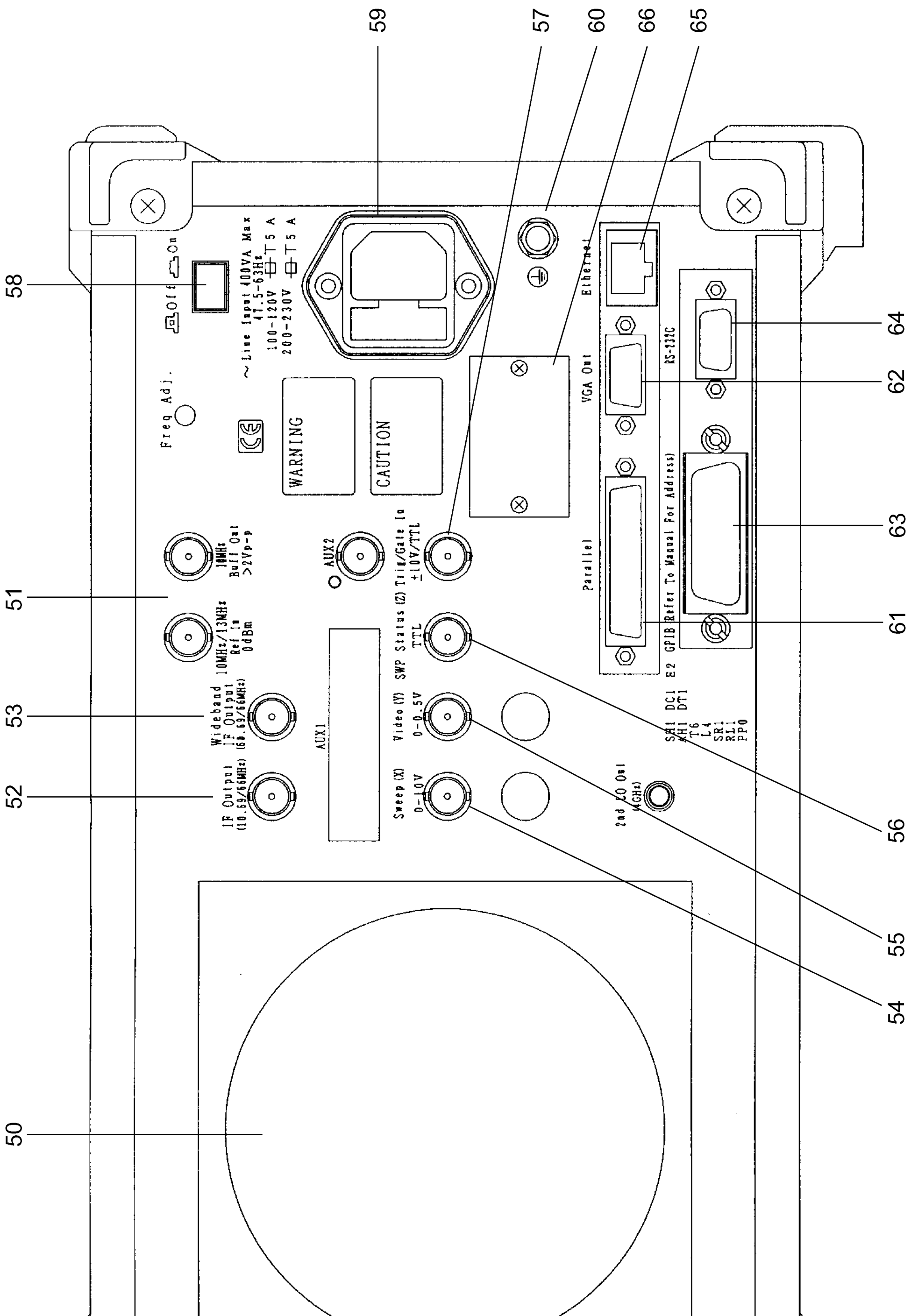
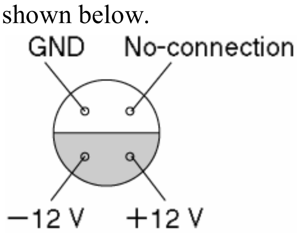


Fig. 2-2 MS8608A rear panel

List of Controls on Front and Rear Panels for MS268x

No.	Panel Marking	Description	
1	(LCD)	6.5” color TFT liquid crystal display (LCD). Displays scales, trace waveforms, parameter settings, measurement values at marker points, soft-key menus, etc.	
2	Spectrum	Key to set this unit in the ordinary spectrum analyzer mode.	
3	Signal Analysis	Key to set this unit in the spectrum analysis mode for measurement software execution.	
4	Config	Key to set the interface to GPIB, printer, etc.	
5	F1 to F6	Soft keys to select soft-key menus displayed by pressing a panel key.	
		[More]	Key to display the next soft-key menu page.
6	Freq/Ampl	Section to input data for the frequency and level parameters.	
		[Freq/Channel]	Sets the frequency.
		[Span]	Sets the frequency span.
		[Amplitude]	Sets the reference level, etc
		[->CF]	Sets the peak-level signal frequency displayed on the screen as the center frequency.
		[->RLV]	Sets the peak-level value displayed on the screen as the reference level.
7	Marker	Section to operate the marker function.	
		[Marker]	Sets a marker.
		[Multi Mkr]	Sets multi-markers. Press this key after pressing the [Shift] key.
		[Peak Search]	Moves the marker to the peak-level point on the screen.
		[Marker->]	Sets a parameter using the marker value. Press this key after pressing the [Shift] key.
8	System	Key used in transmitter tester mode to switch the measurement system.	
9	Single	Sets the sweep mode.	
		[Single]	Executes single sweep.
		[Continuous]	Executes continuous sweep. Press this key after pressing the [Shift] key. The unit is pre-set to the continuous mode.
10	Recall	Key to execute recall or 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.
11	Measure	Key to measure various items such as frequency, noise, adjacent channel leakage power, etc. depending on the applications.	

No.	Panel Marking	Description	
12	Display	Section to select the trace waveform. An ordinary frequency domain allows displaying of up to two trace waveforms.	
		[A, B]	Displays the trace-A or trace-B waveform of frequency domain.
		[A/B, A/BG]	Displays two waveforms at a time; trace-A and trace-B waveforms, or trace-A and trace-BG (background frequency including trace A) waveforms.
		[Time]	Switches to zero-span mode displaying the time-domain waveform.
		[A/Time]	Displays trace-A and time-domain waveforms simultaneously.
13	Trig/Gate	Key to execute the trigger and gate functions.	
		[Trig/Gate]	Sets the sweep starting trigger and gate (controlling waveform data write timings) functions.
14	Coupled Function	Keys to set the RBW, VBW, sweep time and input attenuator.	
15	Entry	Section to set numeric data, units and special functions.	
		[Rotary knob]	Used to move the marker and input data.
		[∨, ∧]	Used to step up or down the input data.
		[Shift]	Used to execute a panel function indicated with blue letters. First press this key, and then press the key indicated with blue letters.
		[BS]	Backspace key to correct input errors.
		[0 to 9, +/-]	Keys to enter numeric data.
		[GHz, MHz, kHz, Hz]	Keys to set units of frequency, level, time, etc.
		[Set]	Key to set parameters.
		[Cancel]	Key to cancel an entry before setting with the [Set] key.
16	Preset	Key to reset measurement parameters to their default values.	
17	Local	Key to place this unit from remote to local mode.	
18	Disp On/Off	Key to set the LCD On/Off.	
19	Copy	Key to output the screen hardcopy to the printer or memory card.	
20	Stby/On	Power switch that is enabled when the Off/On power switch (58) on the rear panel is On. In Stby mode, pressing and holding this key approximately 1 second turns the power ON. In power On mode, pressing this key approximately 1 second turns the power Off.	
21	RF Input	RF input connector.	
22	I/Q Input	IQ input connectors (I/Q inputs for Unbalance, and I/$\overline{I}$ and Q/$\overline{Q}$ inputs for Balance). These connectors are mounted when MS2681A/MS2683A-17 or 18, or MS2687A/B-18 option is installed.	
23	Prove Power	Connector to supply ±12V for FET probe. The pin assignments are shown below.  	
24	Memory Card	Slot for a memory card that saves or loads the waveform data, measurement parameters, etc.	

No.	Panel Marking	Description
50	(Fan)	Cooling fan to ventilate the internal heat. Leave at least 10-cm clearance around the fan.
51	10 MHz STD	Input and output connectors for an external 10 MHz reference crystal oscillator. Inputting an external Ref In signal automatically switches the unit from the internal to external signal mode. (When an external signal is input, the internal OCXO heater is switched OFF.)
52	IF OUT	IF output connector to output band-limited IF signals.
53	Wideband IF Out	IF output connector to output band-unlimited IF signals.
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56	Sweep Status (Z)	Connector to output sweep status (Z).
57	Trig/Gate In (±10 V)	Connector to input external trigger/gate signal.
58	Off/On	Power switch
59	(Inlet)	AC power inlet to connect the attached power cord. It contains a time-lag fuse.
60	(Ground terminal)	Protective ground terminal. To prevent electric shocks, connect this terminal to ground.
61	Parallel	Printer connector
62	VGA Out	VGA signal output connector
63	GPIB	GPIB interface connector for an external system controller
64	RS-232C	RS-232C connector for an external system controller.
65	Ethernet	Ethernet 10 Base-T connector for an external system controller.
66	Name plate	Indicates the serial number and options of this unit.

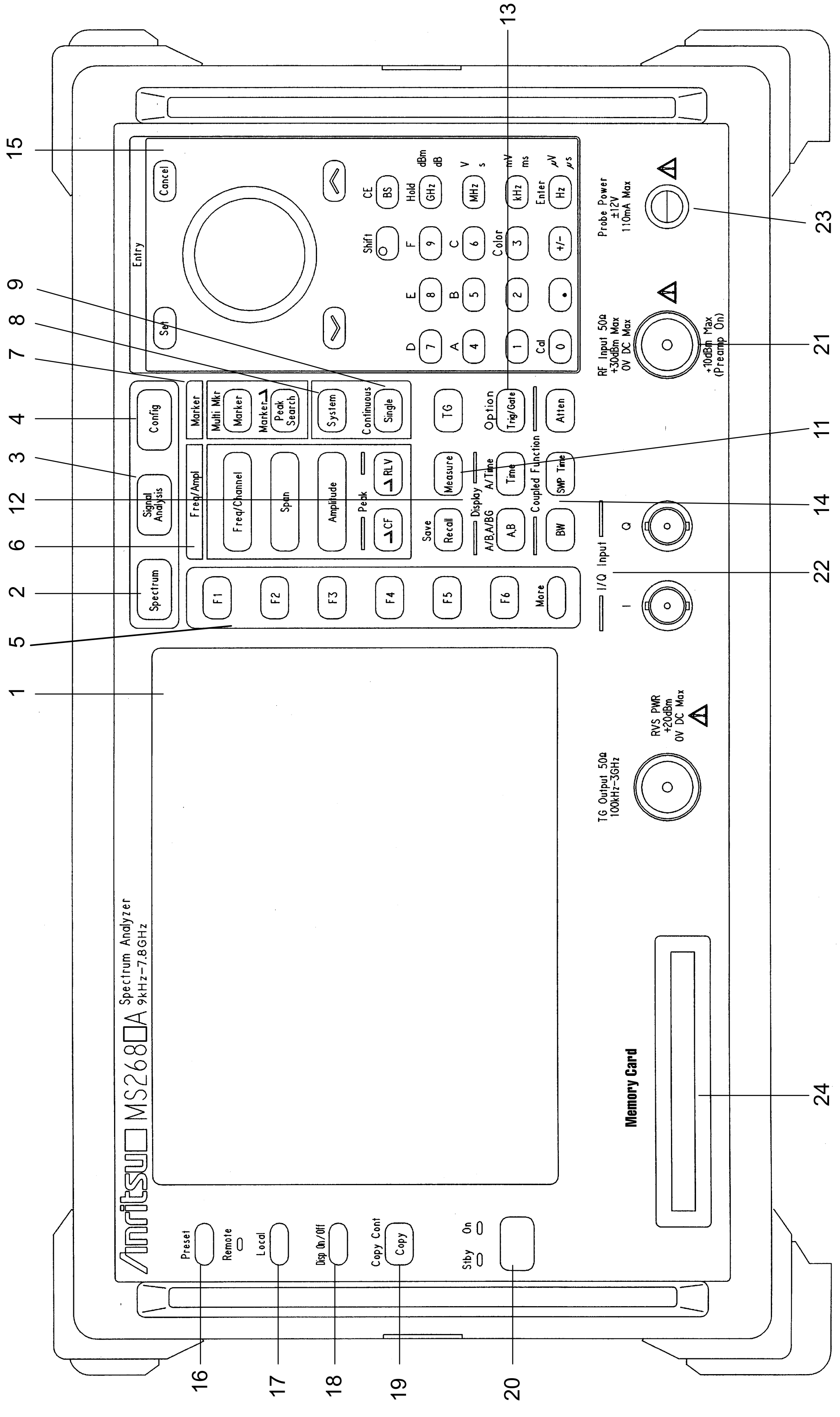


Fig. 2-3 MS2681A/MS2683A/MS2687A/B front panel

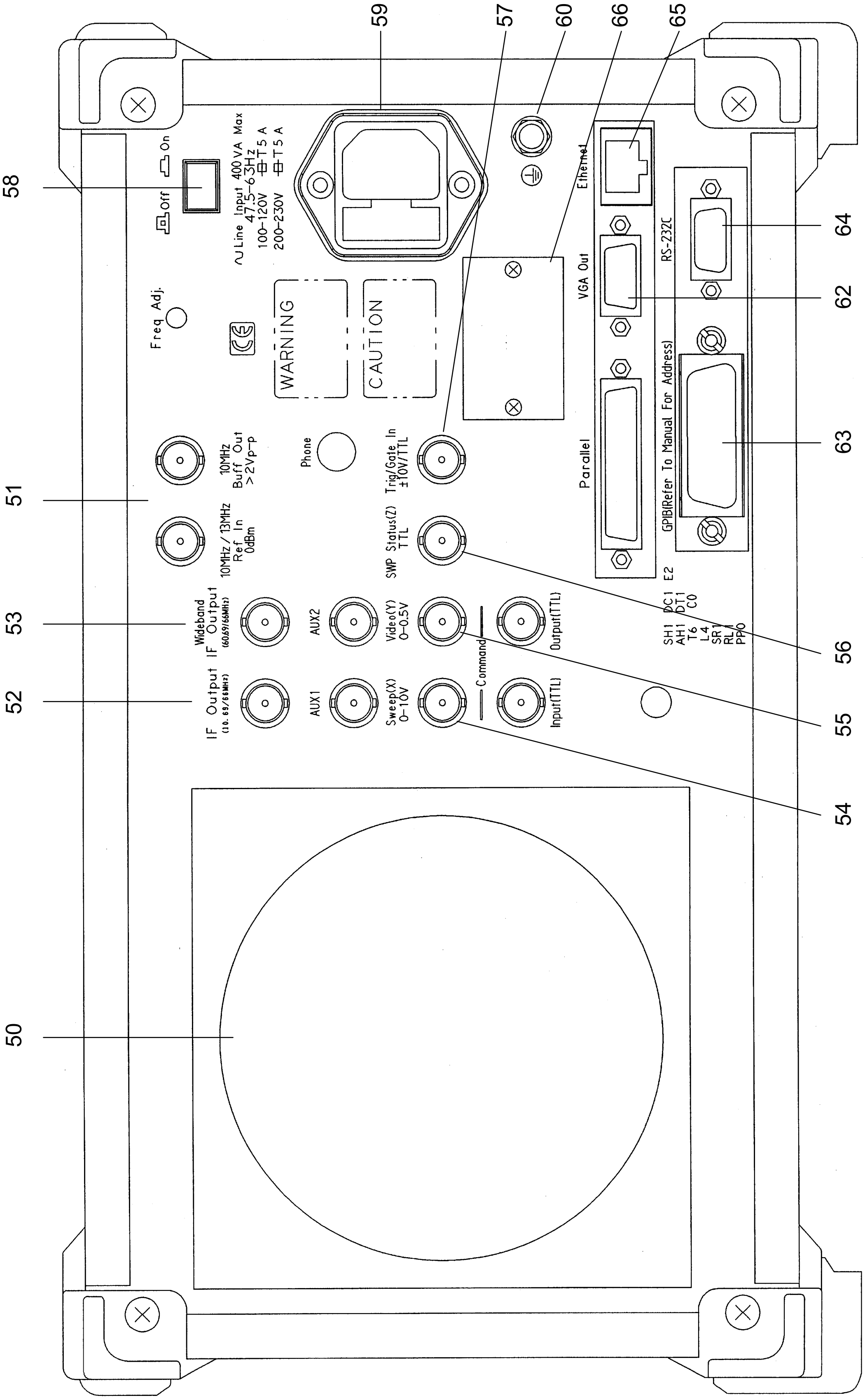


Fig. 2-4 MS2681A/MS2683A/MS2687A/B rear panel

Basic Operation

This section describes basic operations and typical parameter settings.

Turning the power ON

Press the Off/On switch on the rear panel and then press the Stby/On switch on the front panel for 1 second or more.

> To prevent the power from being turned On/Off by mistake, the power is turned On/Off only after pressing the Stby/On switch for 1 second or more.

To make full use of the performance of this unit, turn on the Off/On switch on the rear panel at least 30 minutes before using it (the "Stby" power LED on the front panel goes on). It pre-heats the internal reference frequency oscillator for stable unit operation.

Selecting items

Parameters for items indicated by the cursor are changeable.
Some parameters can be set after pressing the related function keys.

Setting an item indicated by the cursor

Move the cursor to the target item using [∧] and [∨] or the rotary knob in the Entry section.
Press [Set] in the Entry section to confirm the item selected.
The parameter setup window opens.

Setting an item indicated by a function label

Press one of the F1 to F6 function keys and the parameter setup window opens.
Some parameters are set only by pressing the function key.

Setting parameters

After selecting an item, the parameters can be set in two ways:

(1) Selecting a parameter from those listed in the window.

(2) Entering a numeric value.

Selecting a parameter from those listed in the window.

Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the parameter to be selected.
Press Set in the Entry section to confirm selection.

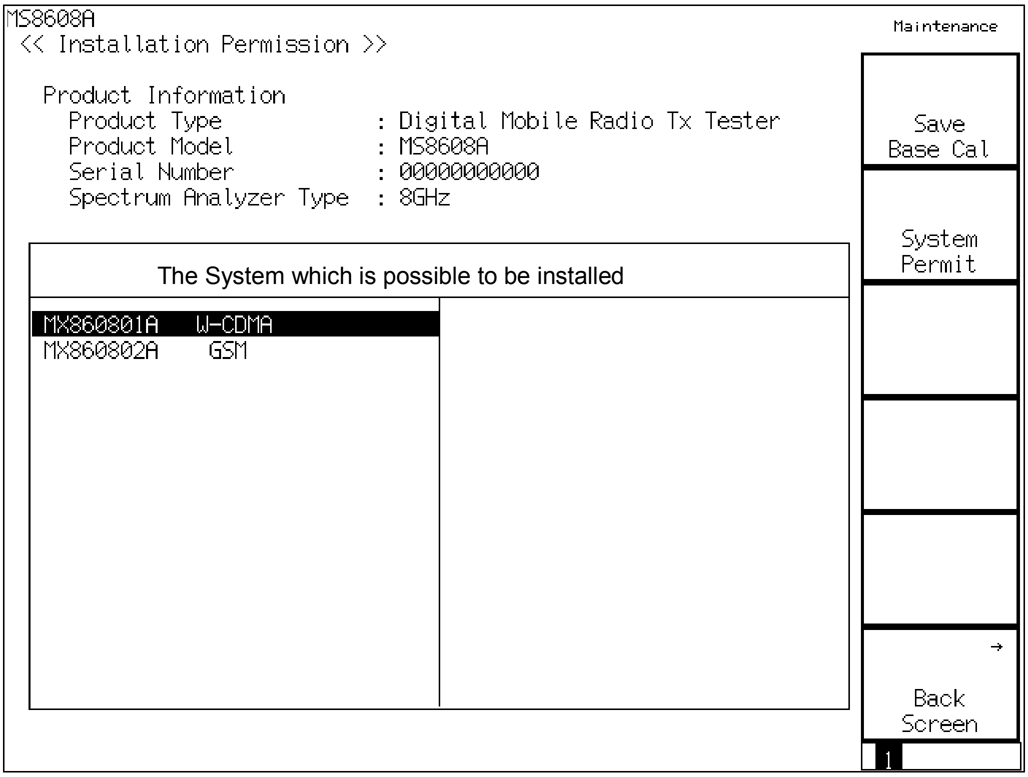
Entering a numeric value

Using the ten-key pad or rotary knob, enter a numeric value.
Press the Unit key or Set key in the Entry section to confirm the parameter.
The window closes.

Registering the Installation Key

To install new measurement software in this unit, the installation key for the measurement system must be registered. This section explains how to register the installation key.

1. Insert the memory card containing the installation key into the memory card slot.
2. Press Config to display the Configuration screen.
3. Press F2 (Maintenance Parameter) to display the Maintenance Parameter screen.
4. Press F3 (Installation Permission) to display the Installation Permission screen shown below.



5. Press F2 (System Permit).
6. The new measurement software is registered in the Permission table.
7. Press F1 (Save Base Cal).

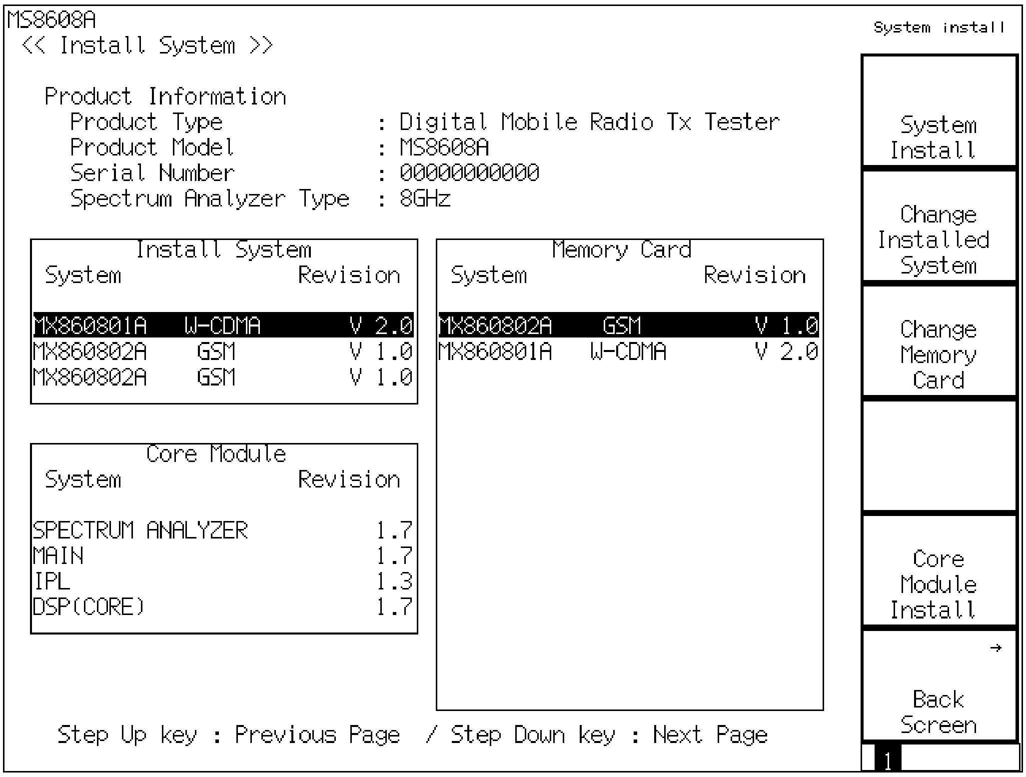
Note:

Performing Step 5 causes the installation key to be registered in the table, but it is not recorded in internal memory before performing Step 7. The installation key becomes active only after it is recorded in internal memory.

Installing Core Module Software

This section describes how to install new Core Module software in this unit.

1. Insert the memory card containing the new Core Module software into the memory card slot.
2. Press Config to display the Configuration screen.
3. Press F4 (System Install) to display the Install System screen shown below.

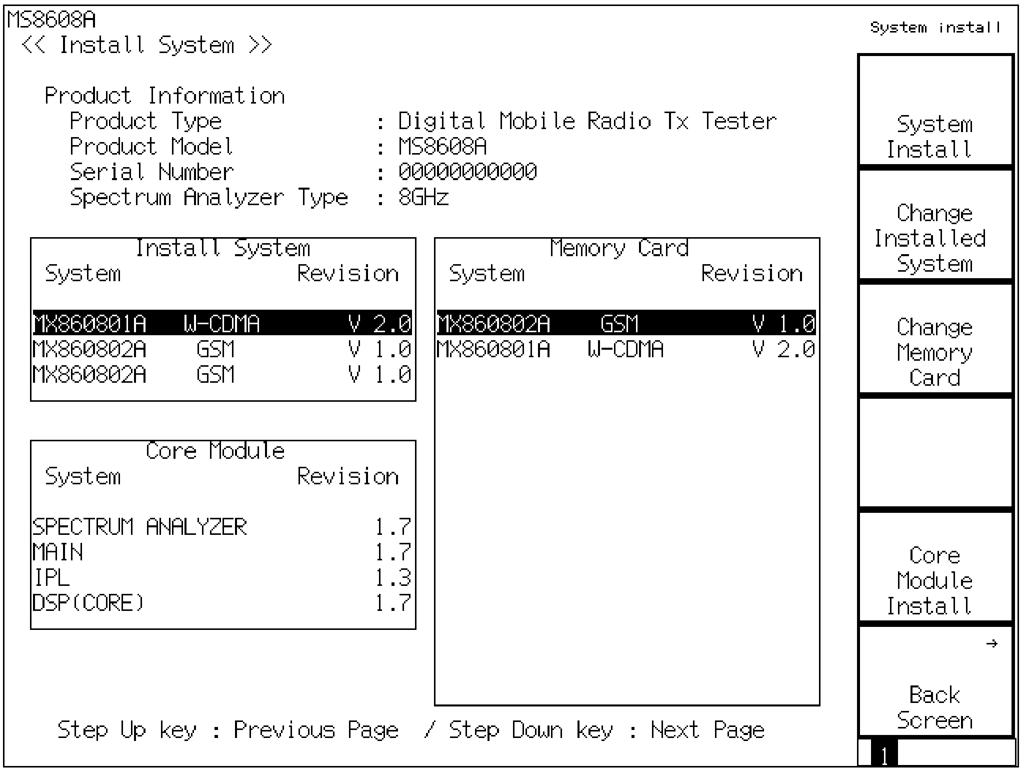


4. Press F5 (Core Module Install).
5. The confirmation window opens. Using the rotary knob, move the cursor to Yes.
6. Press Set in the Entry section to start installation.
7. After installation, turn the power OFF according to the message displayed.
8. Turn the power ON while pressing Preset. Continue pressing Preset until beeping starts, that is, approximately 5 seconds.

Installing Measurement Software

This section explains how to install the measurement software required to use this unit in transmitter tester mode (MS860x)/signal analysis mode (MS268x).

1. Insert the memory card containing the measurement software to the memory card slot.
2. Press Config to display the Configuration screen.
3. Press F4 (System Install) to display the Install System screen shown below.

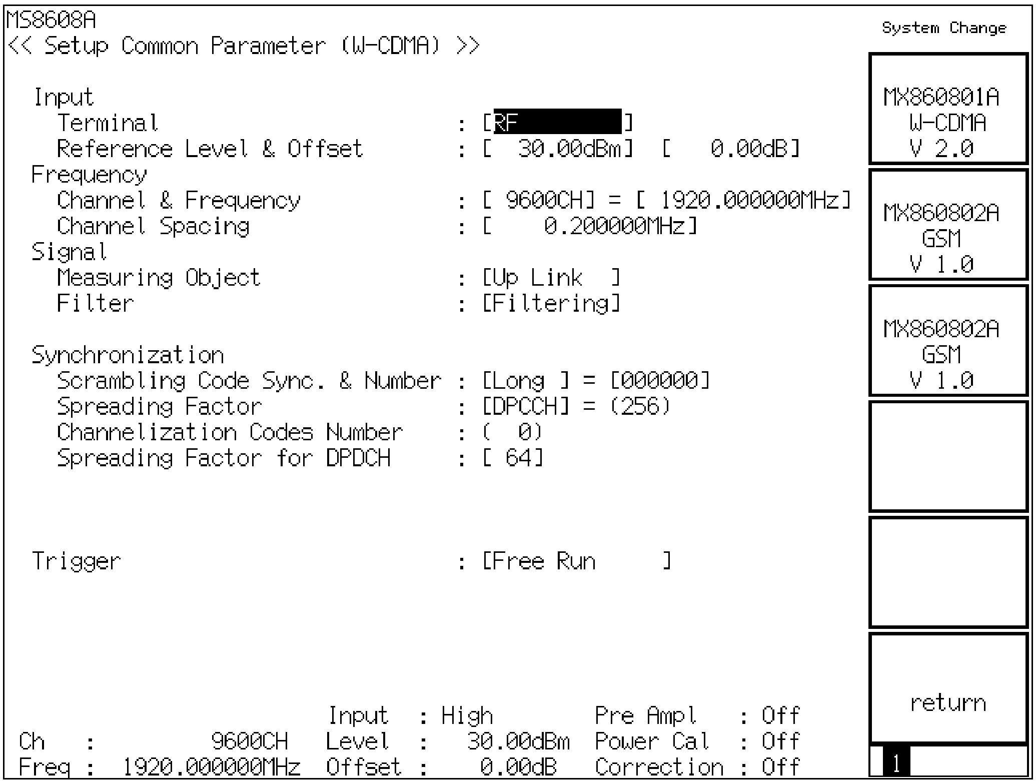


4. Press F2 (Change Installed System) to activate the Install System box.
5. Using the rotary knob, select the installation destination for the new measurement software.
6. Press F3 (Change Memory Card) to activate the Memory Card box.
7. Using the rotary knob, select the new measurement system.
8. Press F1 (System Install) to install the new system.
9. The confirmation window opens. Using the rotary knob, move the cursor to Yes.
10. Press Set in the Entry section to start installation.

Changing the Measurement System

When there are multiple measurement software systems (optional) registered to use this unit in transmitter tester mode (MS860x)/signal analysis mode (MS268x), select the measurement system to be used in the procedure described in this section.
When there is only one measurement software registered, the procedure described in this section cannot be performed.

1. Press [Tx Tester] (MS860x) / [Signal Analysis] (MS268x) to display the measurement system screen.
2. Press [System] to display System Change function labels shown below.



3. The installed measurement systems are listed at the function labels.
4. Press the function key to set the desired measurement system.
5. Changing of the measurement system is started.
6. When the measurement system is changed, a new system screen appears.

Measurement systems not listed at function labels cannot be selected. For procedures in installing a new measurement system, refer to “Installing Measurement Software.”

Setting Screen Colors

This section explains how to set screen colors.
Screen colors can be selected from the four predetermined color patterns or a user-defined one.

Pressing Shift + 3 (Color) causes the following function labels to appear. Select the desired color pattern.

- F1 (Color Pattern 1): Sets Color Pattern 1 (default color pattern set before shipment).
- F2 (Color Pattern 2): Sets Color Pattern 2.
- F3 (Color Pattern 3): Sets Color Pattern 3.
- F4 (Color Pattern 4): Sets Color Pattern 4.
- F5 (Define User Color): Sets the user-defined color pattern.

Setting a user-defined color pattern

Pressing F5 (Define User Color) changes the screen colors to the user-defined color pattern and displays the function labels shown below.

- F1 (Copy Color Ptn from): Displays the function labels to select Color Patterns 1 to 4 as the base colors for setting the user-defined color pattern.
- F2 (Select Item): Selects the 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 explains parameters and how to set them from a screen.

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Setting Measurement Parameters

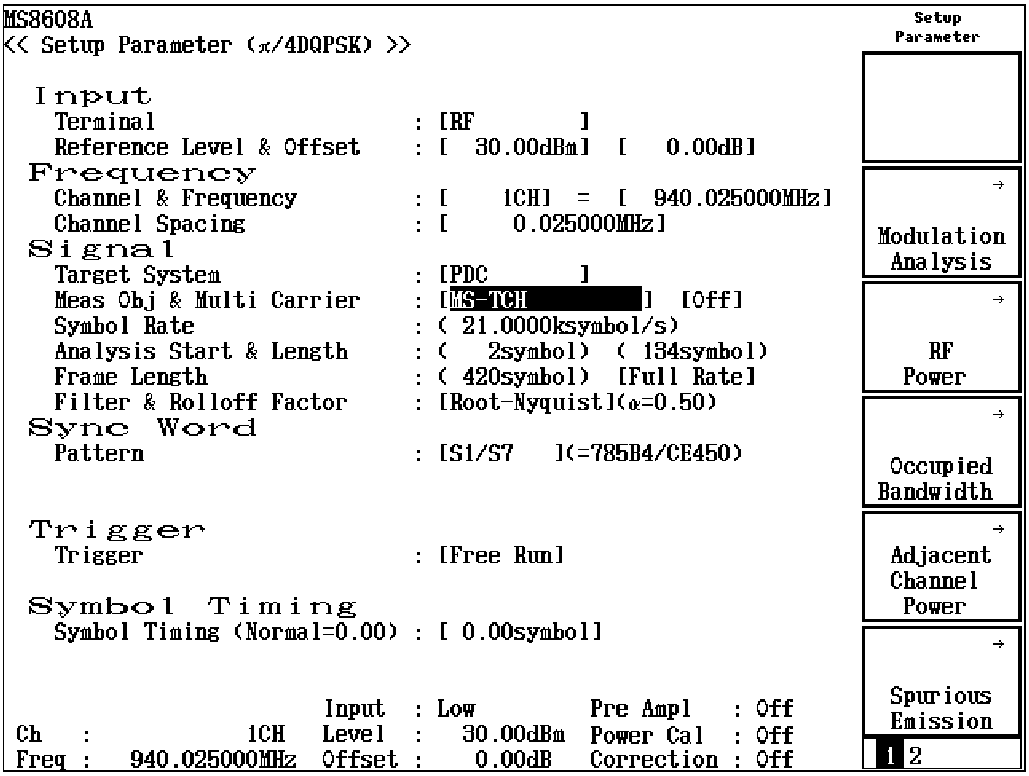
This section describes how to set measurement parameters such as input terminals and frequencies necessary for measurement.

Set the measurement parameters from the Setup Common Parameter screen.

To display this screen, press Tx Tester (MS860x) / Signal Analysis (MS268x).

(If a measurement screen appears, press Preset.)

The Setup Common Parameter screen is shown below.



Signal input terminals (Terminal)

Select the terminal for inputting a signal from the Device Under Test (DUT).

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Terminal item.
2. Press [Set] in the Entry section.
3. The selection window opens.
4. Using [∧] and [∨] or the rotary knob, move the cursor to the item to be selected.
5. Press [Set].

When setup is completed, the set terminal appears in the Terminal item [ ].
Available terminals are as follows:

- RF: Selects the RF input terminal.
  For MS8608A, High Power or Low Power input can be selected. High Power or Low Power input can be switched as follows:
  Setting High Power input: Press [Hi Power].
  Setting Low Power input: Press [Hi Power] while pressing [Shift].
- IQ-DC: Selects the IQ input terminal.
  Of the IQ input terminals, the one grouped and marked as Unbalance is used.
  This terminal is connected to the internal circuit by DC coupling.
- IQ-AC: Selects the IQ input terminal.
  Of the IQ input terminals, the one grouped and marked as Unbalance is used.
  This terminal is connected to the internal circuit by AC coupling.
- IQ-Balance: Selects the IQ input terminal.
  $I/\overline{I}$ and $Q/\overline{Q}$ are used for inputting differential signals.

When IQ input is selected, the Impedance item is displayed on the right, allowing selection of 50 Ω or 1 MΩ as the input impedance. Select the impedance appropriate to the DUT output impedance.

For MS268x, IQ-DC, IQ-AC and IQ-balance inputs are available when option 17 or 18 is installed.

RF input level (Reference Level)

Set the RF signal level input from the DUT.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Reference Level item.
2. Press [Set] or enter the desired RF input level using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set level appears in the Reference Level item [ ].

When the IQ input terminal has been selected, this item will not appear.
This value is changed to the optimum value by using the Adjust Range function from the measurement screen.

Level offset factor (Level Offset)

Set the user-defined level correction factor.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Offset item.
2. Press [Set] or enter the level correction factor using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set level correction factor appears in the Offset item [ ].

The displayed RF level measurement results are calculated with the following expression:

Measurement value displayed = Measurement value + Offset

Example:

When a 20 dB amplifier is inserted between the DUT and this unit, the correction factor for obtaining the measurement result at the DUT output terminal is –20 dB.
When a 10 dB attenuator is inserted between the DUT and this unit, the correction factor for obtaining the measurement result at the DUT output terminal is +10 dB.

When the IQ input terminal has been selected, this item will not appear.

Channel and frequency (Channel & Frequency)

Set the signal frequency from the DUT.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Channel or Frequency item.
2. Press [Set] or enter the desired numeric value using the ten-key pad.
3. The setup window appears.
4. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set value appears in the set item [ ].
In the Channel Spacing item, set the frequency interval for the channel. The setup procedure is the same as that for frequency.

When the channel is changed, the frequency also changes depending on the frequency interval. But, note that changing the frequency does not cause the channel to be changed. Therefore, when associating a frequency with a channel, first set the channel and then set the frequency.

When the IQ input terminal has been selected, this item will not appear.

Target system (Target System)

Set the target system for measurement.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the Target System item.
2. Press Set in the Entry section.
3. The selection window opens.
4. Using ∧ and ∨ or the rotary knob, move the cursor to the item to be selected.
5. Press Set.

When setup is completed, the set system appears in the Target System item [ ].
Available selections are given below.

- π/4 DQPSK: Allows changing various parameters such as Symbol Rate and analysis length, etc.
- PDC: Sets various parameters for PDC.
- PHS: Sets various parameters for PHS.
- NADC: Sets various parameters for NADC.
- STD-39, T79: Sets various parameters for RCR STD-39 and ARIB STD-T79.
- STD-T61: Sets various parameters for ARIB STD-T61 ver1.0.
- STD-T61 v1.1: Sets various parameters for ARIB STD-T61 ver1.1.

Multi Carrier (Multi Carrier)

Set the measured signal to a multi-carrier or a single carrier.
Valid only when Target System is set to PDC or PHS.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the Multi Carrier item.
2. Press Set in the Entry section.
3. The selection window opens.
4. Using ∧ and ∨ or the rotary knob, move the cursor to the item to be selected.
5. Press Set.

When setup is completed, the set system appears in the Multi Carrier item [ ].
Available selections are ON/OFF.

- ON: Measures multi Carrier signal.
- OFF: Measures single Carrier signal..

Target physical channel (Measuring Object)

Set the measuring object and physical channel.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Measuring Object item.
2. Press [Set] in the Entry section.
3. The selection window opens.
4. Using [∧] and [∨] or the rotary knob, move the cursor to the item to be selected.
5. Press [Set].

When setup is completed, the measuring object appears in the Measuring Object item [ ].
Available selections are given below.

When Target System is π/4 DQPSK

- Burst: Measures burst wave.
- Continuous: Measures continuous wave.

When Target System is PDC

- MS-TCH: Measures the mobile station communication channel.
- MS-CCH: Measures the mobile station control channel.
- MS-SYNC: Measures the mobile station synchronous burst.

When MS-*** is selected, a signal containing one burst in one frame is to be measured.

- BS-CH: Measures the base station communication and control channels.
- BS-SYNC: Measures the base station synchronous burst.

When BS-*** is selected, a continuous signal is to be measured.

When Target System is PHS

- PS-TCH: Measures the mobile station communication channel.
- PS-SYNC: Measures the mobile station synchronous burst and control channel.
- CS-TCH: Measures the base station communication channel.
- CS-SYNC: Measures the base station synchronous burst and control channel.
- Continuous: Measures continuous wave.

When an item other than Continuous is selected, a signal containing one burst in one frame is to be measured.

When Target System is NADC

- Mobile: Measures the mobile station communication channel.
- Shortened Burst:
  Measures the mobile station shortened burst.
- Base: Measures the base station communication channel.
  When Mobile or Shortened Burst is selected, a signal containing one burst in one frame is to be measured.
  When Base is selected, continuous wave is to be measured.

When Target System is STD-39, T79

- MS-TCH: Measures the communication channel for mobile stations.
- MS-CCH: Measures the control channel for mobile stations.
- MS-SYNC: Measures the synchronous burst for mobile stations.

When MS-*** is selected, signals with one burst in one frame are to be measured.

- BS-CH: Measures the communication/control channels for the base station.
- BS-SYNC: Measures the synchronous burst for the base station.

When BS-*** is selected, continuous waves are to be measured.

- DC-CH: Measures the communication/control channels for direct communication.
- DC-SYNC: Measures the synchronous burst for direct communication.

When DC-*** is selected, signals with one burst in one frame are to be measured.

When Target System is STD-T61

- SC: Measures communication channel.
- SB: Measures synchronous bursts.

When Target System is STD-T61v1.1

- SC (Burst): Measures burst communication channel.
- SC (Continuous): Measures continuous communication channel.
- MC (Burst): Measures burst multipurpose channel.
- MC (Continuous): Measures continuous multipurpose channel.

Symbol rate (Symbol Rate)

Set the symbol rate of the signal to be measured.

When Target System is other than π/4 DQPSK, this item has a fixed value.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Symbol Rate item.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.

4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set symbol rate appears in the Symbol Rate item [ ].

Analysis range (Analysis Start & Length)

Set the waveform range to be analyzed.
When Target System is other than π/4 DQPSK, this item has a fixed value.

Setting analysis starting position

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the item on the left side of the Analysis Start & Length item.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set analysis starting position appears in [ ] on the left side of the Symbol Rate item.

Setting analysis length

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the item on the right side of the Analysis Start & Length item.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set analysis length appears in [ ] on the right side of the Analysis Start & Length.

Frame length (Frame Length)

Set the frame length of the signal to be measured.
When Target System is other than π/4 DQPSK, this item has a fixed value.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the Frame Length item.
2. Press Set or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using ∧ and ∨, the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press Set.

When setup is completed, the set frame length appears in the Frame Length item [ ].

Full- and half-rates

Set the full- and half-rates.
This item is available when Target System is PDC or NADC.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the item on the right side of the Frame Length item.
2. Press Set in the Entry section.
3. The selection window opens.
4. Using ∧ and ∨ or the rotary knob, move the cursor to the item to be set.
5. Press Set.

When setup is completed, the set value appears in [ ].

Basic frame and sub frame

Set the basic frame and sub frame.
This item is available when Target System is STD-T61v1.1.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the item on the right side of the Frame Length item.
2. Press Set in the Entry section.
3. The selection window opens.
4. Using ∧ and ∨ or the rotary knob, move the cursor to the item to be set.
5. Press Set.

When setup is completed, the set value appears in [ ].

Filter (Filter & Rolloff Factor)

Set the type of the (reception) filter that passes the signal from the DUT.

1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the Filter item.
2. Press Set in the Entry section.
3. The selection window opens.
4. Using ∧ and ∨ or the rotary knob, move the cursor to the item to be selected.
5. Press Set.

When setup is completed, the set filter appears in the Filter item [ ].
Available selections are given below.

- Root-Nyquist: Analyzes the signal after it has passed through the root-Nyquist filter. Select this item to analyze an ordinary RF signal.
- Nyquist: Analyzes the signal after it has passed through the Nyquist filter.

When Target System is $\pi/4$ DQPSK, the filter roll-off factor is settable. When Target System is other than $\pi/4$ DQPSK, this item has a fixed value.

Synchronization mode (Sync Word)

Set using a synchronous word, amplitude change or user-specific pattern to detect and position a signal from the DUT.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Pattern item.
2. Press [Set] in the Entry section.
3. The selection window opens.
4. Using [∧] and [∨] or the rotary knob, move the cursor to the item to be selected.
5. Press [Set].

When setup is completed, the set pattern appears in the Pattern item [ ].
Available selections are given below.

- Not: Uses an amplitude change to detect or position the signal to be measured.
- User: Uses a user-defined pattern to detect or position the signal to be measured.
- Others: Uses the set pattern to detect or position the signal to be measured.

Setting user pattern:

(1) Set the user-defined pattern data length.
- Set in the User Pattern Length item.
- Set the pattern data length in symbols.

(2) Set the user-defined pattern data length.
- Set in the User Bit Length item.
- Set the pattern data in hexadecimal.

(3) Set the user-defined pattern starting position.
- Set in start point item.

Supplement:

When the Target System is set to STD-39, T71 and the Measuring Object is set to MS-TCH or BS-CH, the bit-inverted patterns are also subjected to synchronous word while “S1/S5”, “S2/S6”, “S3/S7” or “S4/S8” is selected.

When the Target System is set to STD-39, T71 and the Measuring Object is set to DC-CH, the bit-inverted patterns are also subjected to synchronous word while “S9/S10”, “S1/S11”, “S6/S7”, “S2/S8”, “S4/S5” or “S12/S3” is selected.

When the Target System is set to STD-61 and the Measuring Object is set to SC, the bit-inverted patterns are also subjected to synchronous word while “S2R/S1R” is selected.

Trigger (Trigger)

Set trigger mode.

Setting trigger mode

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Trigger item.
2. Press [Set] in the Entry section.
3. The selection window opens.
4. Using [∧] and [∨] or the rotary knob, move the cursor to the item to be selected.
5. Press [Set].

When setup is completed, the set trigger mode appears in the Trigger item [ ].

- Free Run: Measures the signal detected in the internal timing.
- Wide IF: Starts measurement with Wide IF Video Trigger.
- External: Measures the first signal detected after receiving a trigger signal from Trig/Gate In on the rear panel.

The edge and delay of the trigger signal must be set when Wide IF or External is selected as trigger mode. The trigger level must also be set for Wide IF.

Setting trigger edge

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Trigger Edge item.
2. Press [Set] in the Entry section.
3. The selection window opens.
4. Using [∧] and [∨] or the rotary knob, move the cursor to the item to be selected.
5. Press [Set].

When setup is completed, the set result appears in the Trigger Edge item [ ].

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

Setting trigger delay

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Trigger Delay item.
2. Press [Set] or enter the desired numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set delay value appears in the Trigger Delay item [ ].

Setting trigger level

1. Press [∧][∨] Entry keys or turn the rotary knob to move the cursor to “Trigger Level” item.
2. Press [Set] Entry key.
3. A 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 setup is completed, the set trigger level appears in square brackets [] at the right of the “Trigger Level” line.

- Low: Sets the starting trigger measurement level to Low.
- Middle: Sets the starting trigger measurement level to Middle
- High: Sets the starting trigger measurement level to Low

Changing symbol timing (Symbol Timing)

Change the internal symbol timing of this unit.

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Symbol Timing item.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set value appears in the Symbol Timing item [ ].

Frequency characteristics correction data table (Correction)

When correcting frequency-dependent values such as the characteristics or loss of the cable connecting the DUT and transmitter tester, save the correction factors in the transmitter tester internal memory. These can then be added to the measurement values before they are displayed.
By using this function, the required measurement values can be displayed directly on the transmitter tester.

For procedures on saving the frequency characteristics correction factors in transmitter tester/spectrum analyzer internal memory, refer to "MS8608A/MS8609A Digital Mobile Radio Transmitter Tester Operation Manual, Vol. 2 (on Spectrum Analyzer Function)" or "MS268x Spectrum Analyzer Operation Manual, Vol. 2 (Detailed Operating Instructions)".

The transmitter tester/spectrum analyzer internal memory can store five tables of correction factors.
The procedure for selecting one of five correction factor tables is given below.

Selecting correction factor table

1. Press [Amplitude] to display the Amplitude function label.
2. Press [F4] (Correction) to open the correction factor table selection window.
3. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the correction factor table to be selected.
4. Press [Set].

When setup is completed, the selected correction factor table appears in the Correction display area in the lower-right part of the screen.

Preamplifier (Pre Ampl.)

This function is available when main unit option MS8608A-08/MS8609A-08/ MS2681A-08/MS2683A-08 is installed.

Setting preamplifier

1. Press [Amplitude] to display the Amplitude function label.
2. Press [F5] (Pre Ampl.) to switch alternately between On and Off.

When setup is completed, On or Off appears in the Ampl display area in the lower-right part of the screen.

Measuring Modulation Accuracy

On the Setup Common Parameter screen, pressing F2 (Modulation Analysis) brings up the modulation accuracy measurement screen.

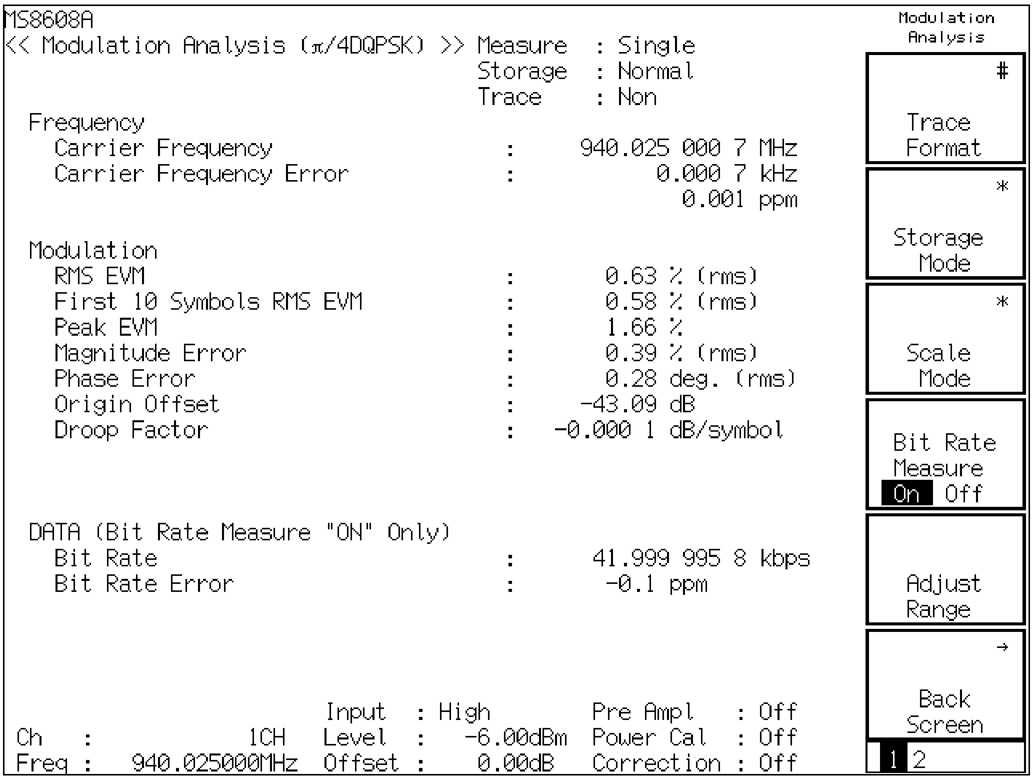
This section describes the measurement results displayed on the Modulation Analysis screen (modulation accuracy measurement), parameter settings and operation precautions.

Explanation of measurement results

This section explains the measurement results displayed on the Modulation Analysis screen (modulation accuracy measurement). To start the measurement, press F5 (Adjust Range) to optimize the level settings inside the measurement unit. For range optimization (Adjust Range), refer to “Optimizing Measurement Range (Adjust Range).”

Modulation accuracy measurement results

The screen given below appears when Non is selected for Trace Format. To set Trace Format, refer to “Changing Waveform Display Format (Trace Format).”



Frequency

(1) Carrier Frequency

Shows the measured signal frequency obtained by the phase locus method in MHz.

(2) Carrier Frequency Error

Shows errors in the above carrier frequency from the set frequency in kHz and ppm.

Modulation

(1) RMS EVM

Shows the root mean square (RMS) value for the vector error (Error Vector Magnitude in %) of the measured signal.

(2) First 10 Symbols RMS EVM

Shows the RMS value for the vector error (Error Vector Magnitude in %) for 10 symbols from the analysis starting position of the measured signal.

(3) Peak EVM

Shows the maximum vector error value (in %) of the measured signal.

(4) Magnitude Error

Shows the RMS value of the amplitude error (in %) for the measured signal.

(5) Phase Error

Shows the RMS value of phase error (in degrees) for the measured signal.

(6) Origin Offset

Shows the measured signal origin offset (carrier leakage component) in dB.

(7) Droop Factor

Shows the measured signal droop factor in dB/symbol.

The following measurement results appear when Bit Rate Measure is On: Data

(1) Bit Rate

Shows the measured signal transmission rate in kbps.

(2) Bit Rate Error

Shows the measured signal transmission rate error in ppm.

The measurement results given are obtained by analyzing the range set by Analysis Start and Length on the Setup Common Parameter screen.

Changing waveform display format (Trace Format)

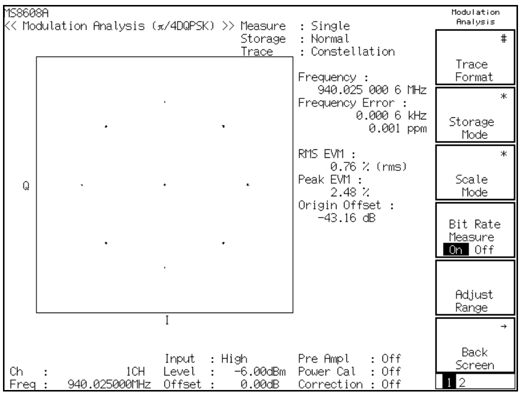
This section describes how to change the waveform display format.

Selecting display format

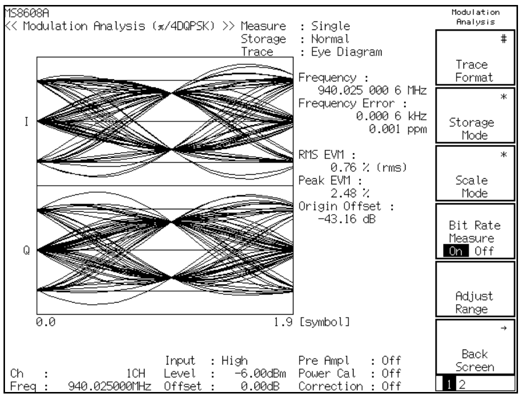
1. Press [F1] (Trace Format) on the Modulation Analysis screen.
2. The format selection window opens.
3. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the item to be selected.
4. Press [Set].

When setup is completed, the displayed waveform changes and the selected format appears in the Trace display area in the upper-right part of the screen. Available formats are listed below.

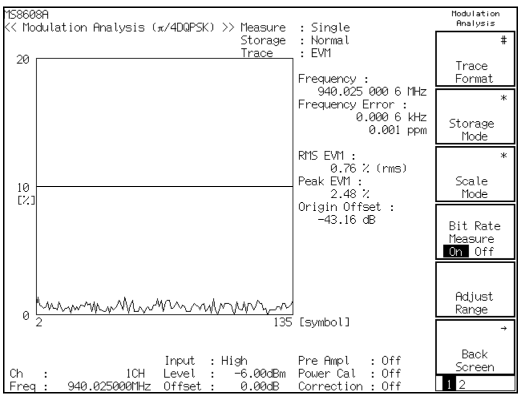
- Non: Shows only numeric results.
- Constellation: Shows the constellation.
- Eye Diagram: Shows the eye diagram.
- EVM: Shows EVM vs. symbols.
- Phase Error: Shows phase error vs. symbols.
- Magnitude Error: Shows amplitude error vs. symbols.



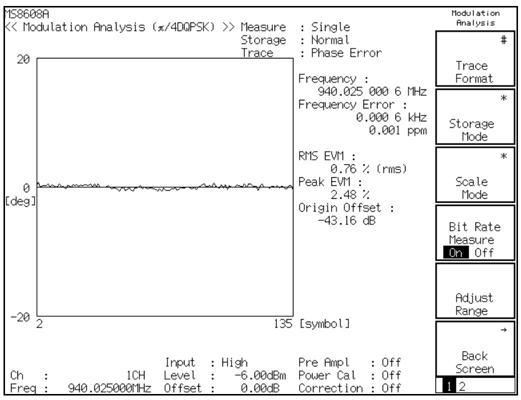
Constellation



Eye diagram



EVM vs. symbols



Phase error vs. symbols

Averaging (Storage Mode)

This section explains the storage mode through the measurement result averaging process.

Setting averaging process

1. On the Modulation Analysis screen, press [F2] (Storage Mode) to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setup window.
3. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. The selection window opens.
7. Using [∧] and [∨] or the rotary knob in the Entry section, select Average.
8. Press [Set].

When setup is completed, the measurement restarts.
Also when the averaging count is changed with Storage Mode set to Average, the measurement restarts on completion of the setup. If the values are not changed or changing is canceled, the measurement is not restarted.

Refresh Interval: Set the interval for updating the average display.

- Every: Updates the display at every measurement.
- Once: Updates the display after measurement of the specified averaging count is completed.

In addition to Average, the following storage modes are also available:

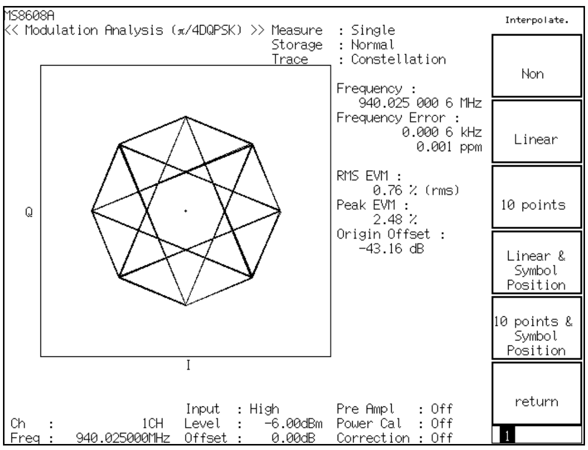
- Normal: Updates and displays the measurement results at every measurement.
- Average: Averages and displays the measurement results at every measurement. The waveform is not averaged.
- Overwrite: Updates the measurement results and overwrites the waveform at every measurement without averaging. The waveform is not overwritten if the waveform display format is Non.

Changing constellation display (Scale Mode)

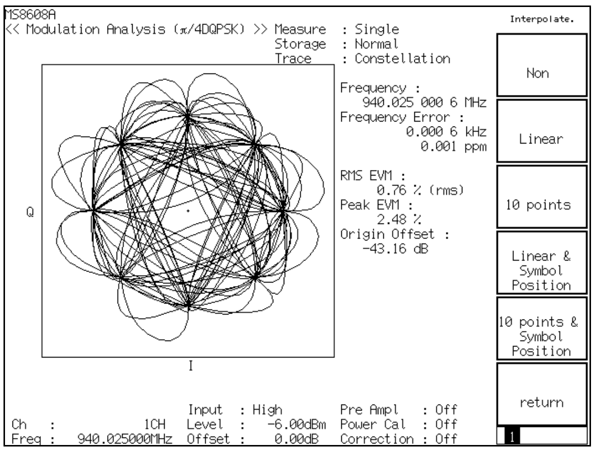
This section describes how to change the constellation waveform display.

Setting waveform interpolation display

1. On the Modulation Analysis screen, press F3 (Scale Mode) to display the Scale Mode function label.
2. Press F1 (Interpolation) to display the function labels shown below, allowing selection of the interpolation type.
   - F1 (Non): Shows a symbol point with a dot.
   - F2 (Linear): Shows a straight line between two adjacent symbol points.
   - F3 (10 points): Interpolates between two symbol points with nine dots (interpolating by ten times) and shows a straight line between two adjacent dots.
   - F4 (Linear & Symbol Position): Shows a symbol point with a dot and a straight line between two adjacent symbol points.
   - F5 (10 points & Symbol Position): Shows a symbol point with a dot and interpolates between two adjacent symbol points with a straight line by ten times.
   - F6 (return): Returns to the preceding function label display.



Linear display



10-point display

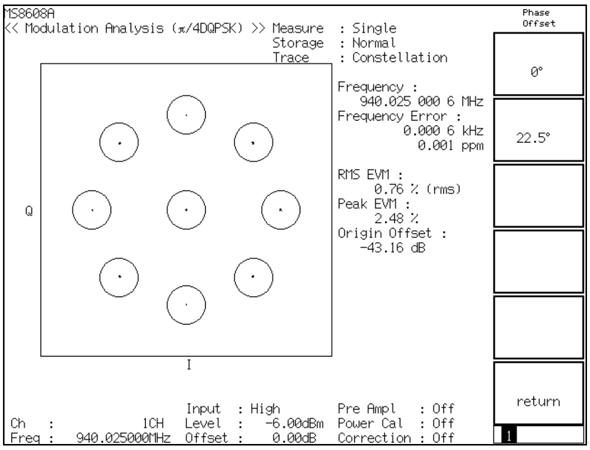
Setting error scale display

1. On the Modulation Analysis screen, press F3 (Scale Mode) to display the Scale Mode function label.
2. Press F2 (Error Scale) to display the function labels given below.
   - F1 (5%): Draws a circle with 5% error.
   - F2 (10%): Draws a circle with 10% error.
   - F3 (20%): Draws a circle with 20% error.
   - F4 (OFF): Erases the error circle.
   - F6 (return): Returns to the preceding function label display.

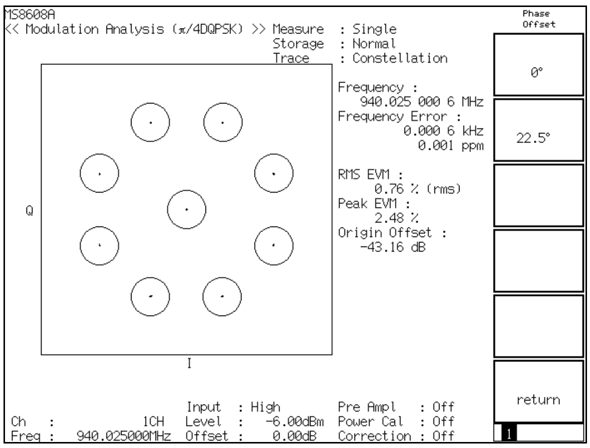
Setting phase offset display

1. On the Modulation Analysis screen, press F3 (Scale Mode) to display the Scale Mode function label.
2. Press F3 (Phase Offset) to display the function labels given below.
   - F1 (0°): Displays the waveform with no rotation.
   - F2 (22.5°): Displays the waveform rotated 22.5 degrees.
   - F6 (return): Returns to the preceding function label display.

The Phase Offset setting is available for waveform display format Constellation or Eye diagram.



Phase offset 0°
(Error scale display: 20%)



Phase offset 22.5°
(Error scale display: 20%)

Changing EVM error waveform scale (Vertical Scale)

Change the ordinate scale for the EVM error waveform display. The ordinate scale for phase error and amplitude error waveform can also be changed in the same way.

1. On the Modulation Analysis screen, press F3 (Scale Mode) to display the Scale Mode function label.
2. Press F4 (Vertical Scale) to display the function labels shown below, allowing selection of the scale.
   - F1 (5%): Sets the ordinate scale maximum value to 5%.
   - F2 (10%): Sets the ordinate scale maximum value to 10%.
   - F3 (20%): Sets the ordinate scale maximum value to 20%.
   - F4 (50%): Sets the ordinate scale maximum value to 50%.
   - F5 (100%): Sets the ordinate scale maximum value to 100%.
   - F6 (return): Returns to the preceding function label display.

For phase error, the function labels are the same except that the unit is degree.

Displaying marker

When the waveform display format is other than Non, a marker can be displayed on the waveform.

Displaying marker

1. Press Marker to display the Marker function label.
2. Press F1 (Marker) to alternately switch between Normal and Off.

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

Measuring transmission rate

Press F4 (Bit Rate Measure) to alternately switch Bit Rate Measure On and Off. When Bit Rate Measure is On, the transmission rate is measured.

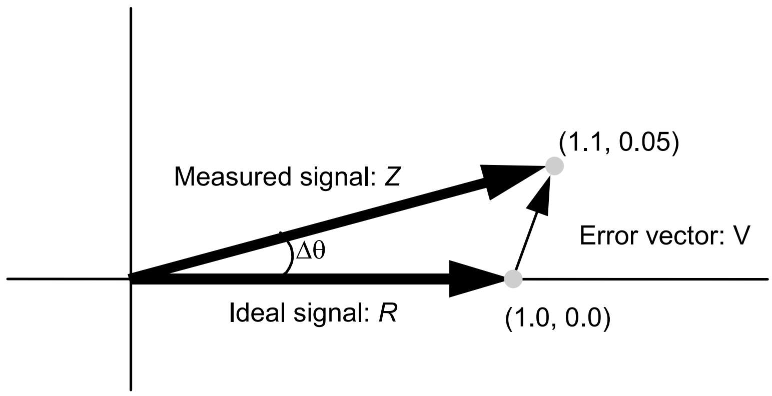
If Trigger is set to Wide IF, the transmission rate can be measured only when Storage Mode is set to Average.

Defining modulation accuracy

This section explains about the definition for modulation accuracy.

Modulation accuracy

Modulation accuracy indicates the degree of error that the digitally-modulated measured signal has compared to the ideal signal. The measurement items are EVM, amplitude error, phase error, origin offset, etc., which are defined as described below.



The modulation accuracy is described simply using the diagram above.

When the ideal signal is *R* (1.0, 0.0) and the measured signal is *Z* (1.1, 0.05), EVM, amplitude error, phase error and origin offset are represented by the following expressions:

EVM: $$V = \frac{|Z-R|}{|R|} = \frac{\sqrt{(1.1-1.0)^2+(0.05-0.0)^2}}{\sqrt{(1.0)^2+(0.0)^2}} = 0.112 = 11.2\%$$

Amplitude error:

$$M = \frac{|Z|-|R|}{|R|} = \frac{\sqrt{(1.1)^2+(0.05)^2}-\sqrt{(1.0)^2+(0.0)^2}}{\sqrt{(1.0)^2+(0.0)^2}} = 0.101 = 10.1\%$$

Phase error:

$$\Delta\theta = \theta - \theta_i = \tan^{-1}(0.05/1.1) - \tan^{-1}(0.0/1.0) = 2.60\,\text{deg}$$

These values are those for one point. The root mean square (RMS) value is obtained by calculating the square root of the average of the sum of squares for all point values.

The origin offset shows the carrier leakage component, with the amplitude represented in dB.

Optimizing measurement range (Adjust Range)

Performing measurement range optimization (Adjust Range) is recommended before starting measurement. While inputting signals of mostly the same level, it is not necessary to execute Adjust Range frequently.

Adjust Range automatically modifies the internal level diagram so that the internal AD converter for analysis can be used under the optimum conditions. That is, it adjusts the internal circuit so that the AD converter has the maximum dynamic range (S/N). At the same time, it also adjusts the power meter range.
Because the internal level diagram is modified depending on the measured signal level, the measured signal should be continuously input during measurement range optimization. If the signal experiences large fluctuation or Trigger is set to Wide IF, Adjust Range may not correctly function.

Adjust Range is not available for IQ input.

Power calibration function (Power Calibration)

MS860x unit is equipped with a Power Calibration function that uses an internal power meter. This allows accurate level measurement. Executing the Power Calibration function is recommended for level measurement. When the temperature condition is stable, it is not necessary to execute the Power Calibration function frequently. It is best to restart Power Calibration if the frequency changes significantly.

The Power Calibration function compares the signal measurement value in tester mode with the value measured with the built-in power meter. It calibrates the measurement value in tester mode using the power meter measurement value. Therefore, this function can only be executed with the measured signal input. Before starting Power Calibration, the power meter must be zero-calibrated.

For MS268x, to increase the accuracy of level measurement, execute internal calibration in the spectrum analyzer mode.
Refer to the separate “MS268x Spectrum Analyzer Operation Manual, Vol. 2 (Detailed Operating Instructions)” for more information.

Power calibration function (Multi Carr. Power Calibration)

This function corrects internal signal route based on the built-in calibration signal. Level measurement thus can be performed without using the built-in power meter.

Use this function when the input signal is a multi-carrier signal. Due to the difference between the measurement bandwidth in the tester mode and that of the power meter, power calibration using the power meter (when the input signal is a multi-carrier signal) may not be performed correctly. For a single-carrier signal, perform power calibration using the power meter for highly-accurate calibration.

Setting Burst Threshold Level

Sets the Threshold Level for judge Burst ON/OFF level. This setting value is the relative value with average power.

This function is enabled only when the displayed measurement screen is the Modulation Analysis, RF Power, Occupied Bandwidth (Measure Method: FFT), Adjacent Channel Power (Measure Method: High Speed).

Setting Judge Signal Abnormal

Sets the judge of Signal Abnormal or not. If set as On, Signal Abnormal will be judged when Signal On time differs from Analysis Length greatly.

This function is enabled only when the displayed measurement screen is the Modulation Analysis, RF Power, Occupied Bandwidth (Measure Method: FFT), Adjacent Channel Power (Measure Method: High Speed).

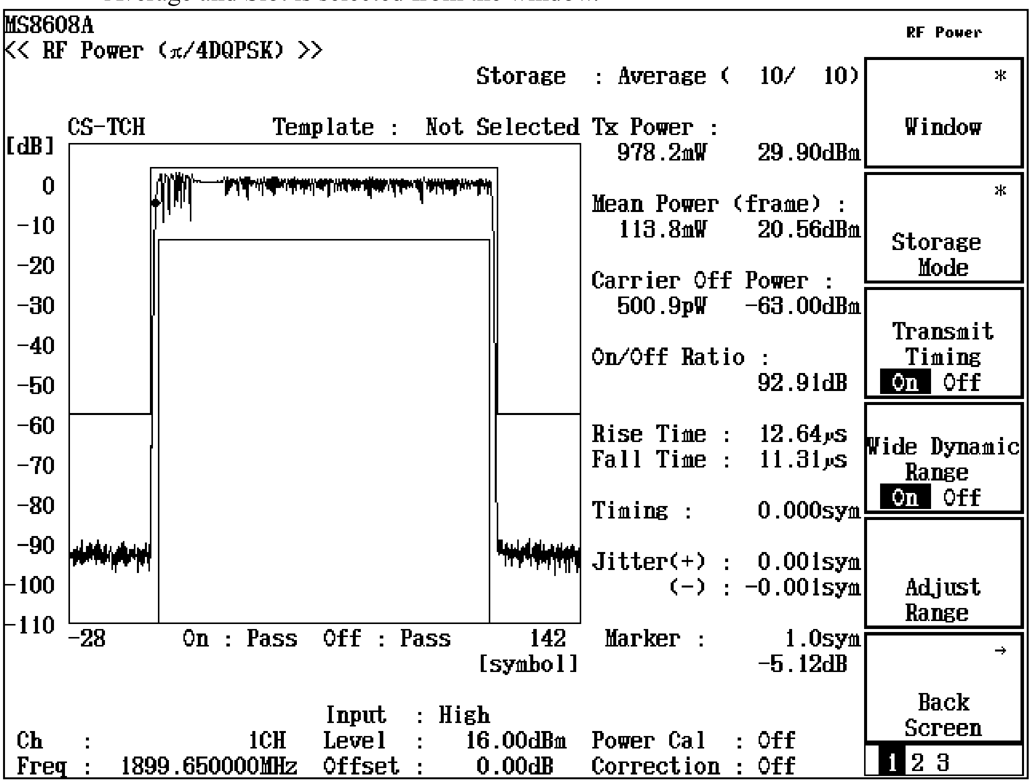
Measuring Transmission Power

On the Setup Common Parameter screen, pressing F3 (RF Power) displays the transmission power measurement screen.
This section explains the measurement results displayed on the RF Power screen (transmission power measurement), parameter settings and operation precautions.

Explanation of measurement results

This section explains the measurement results displayed on the RF Power screen (transmission power measurement).
When starting the measurement, press F5 (Adjust Range) to optimize the measurement unit level setting. For MS860x, to raise the level measurement accuracy, press F4 (Calibration) in 2nd page. Then press F1 (Power Calibration) while inputting the signal for calibration using the power meter. For MS268x, to increase the accuracy of the level measurement, execute internal calibration in the spectrum analyzer mode. Refer to the separate “MS268x Spectrum Analyzer Operation Manual, Vol. 2 (Detailed Operating Instructions)” for more information. Refer to “Optimizing Measurement Range (Adjust Range)” for range optimization and “Power Calibration Function (Power Calibration)” for power calibration.

Measurement results:
The screen below appears when Target System is set to PHS, Storage Mode is set to Average and Slot is selected from the window.



Waveform display:

The screen shows the level measurement waveform with the horizontal axis representing the symbol and the vertical axis representing the level. When measuring the burst wave with level measurement waveform set to relative level display, the screen shows a template (level standard line).

Tx Power

Burst wave: Shows the average power during burst in dBm and W.

Continuous wave: Shows the average transmission power in dBm and W.

The measurement results given below appear for burst wave measurement.

Mean Power (frame)

Shows the average power in one frame period in dBm and W.

Carrier Off Power

Shows the average power in the transmission-off period in dBm and W.

On/Off Ratio

Shows the ratio of Tx Power to Carrier Off Power in dB.

Rising Time

Shows the rising time in μs.

Falling Time

Shows the falling time in μs.

Rising Time and Falling Time are not displayed when STD-39, T79 is selected.

The measurement results given below appear for PHS with Transmit Timing On.

Timing

When Transmit Timing is On, shows the transmission timing in symbols.

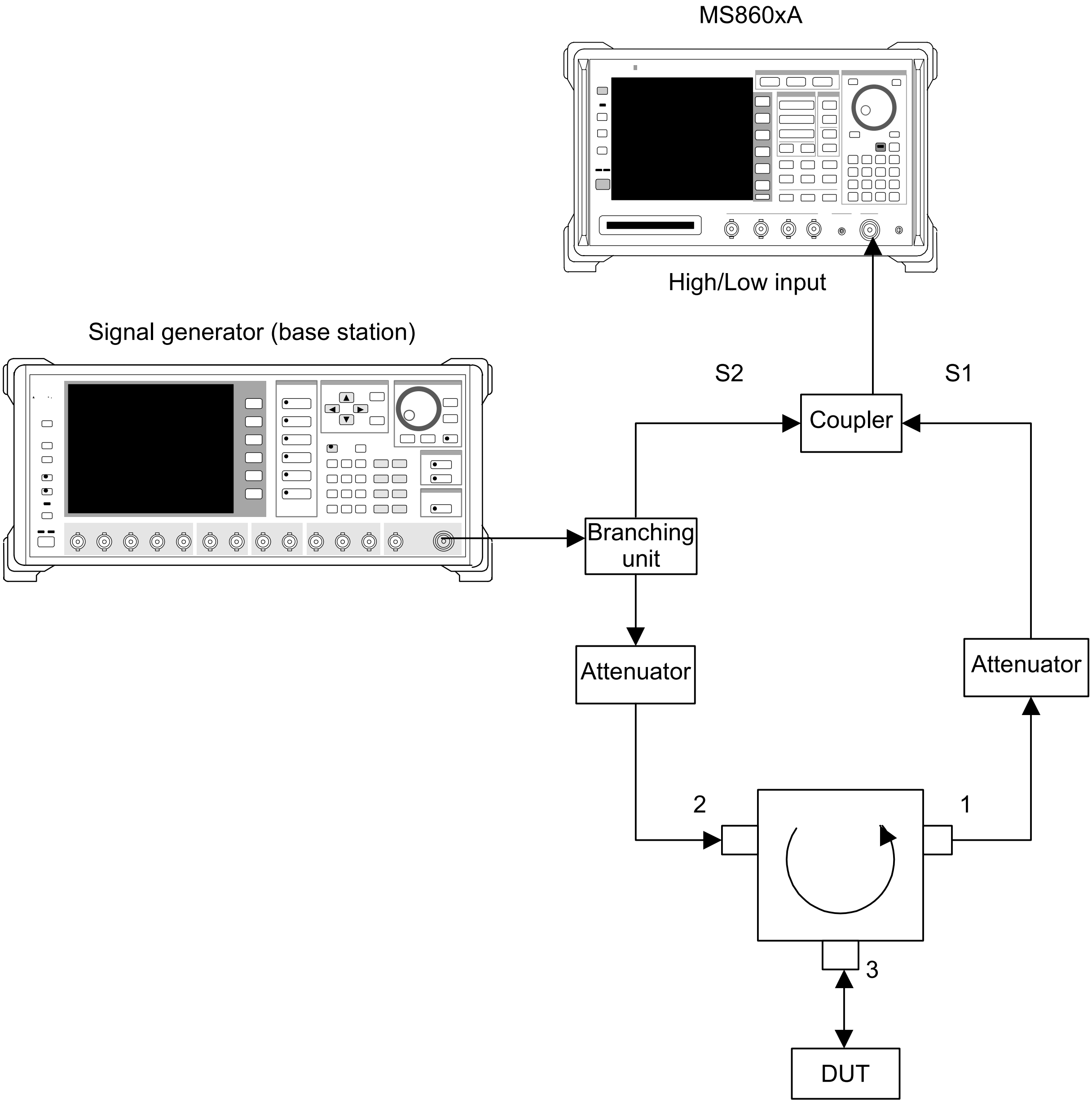
Jitter

When Storage Mode is Average and Transmit Timing is On, shows the transmission jitter in symbols.

Measuring Transmission Timing

For PHS, the transmission timing can be measured.
To measure the transmission timing, press F3 (Transmit Timing) on the RF Power screen to set Transmit Timing to On.

When measuring the PHS transmission timing, connect the units as shown below.



Set the attenuator so that level of Signal S1 from the radio unit (DUT) is almost the same as that for Signal S2 from the signal generator (within 10 dB).
The difference from the standard timing is displayed in symbols.

Displaying marker

Marker display Procedure 1

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

Marker display Procedure 2

1. Press [ ] (More) to display the second function label page.
2. Press [F2] (Marker) to alternately switch between Normal and Off.

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

Changing waveform display range (Window)

This section describes how to change the waveform window display range.

Setting display range

On the RF Power screen, press [F1] (Window) to display the function labels listed below and then select the desired range.

- [F1] (Slot): Shows the waveform centered at the Analysis Start & Length period set from the Setup Common Parameter screen.
- [F3] (Frame): Shows the waveform for one frame.
- [F4] (Leading): Shows the waveform for the burst rising edge.
- [F5] (Trailing): Shows the waveform for the burst trailing edge.
- [F6] (return): Returns to the preceding function label display.

Averaging (Storage Mode)

This section describes the storage mode through measurement result averaging.

Setting averaging process

1. On the RF Power screen, press F2 (Storage Mode) to display the Storage Mode function label.
2. Press F2 (Average Count) to open the setup window.
3. Using ∧ and ∨, the rotary knob or ten-key pad in the Entry section, enter the averaging count.
4. Press Set.
5. On the Storage Mode menu, press F1 (Storage Mode).
6. The selection window opens.
7. Using ∧ and ∨ or the rotary knob in the Entry section, select Average.
8. Press Set.

When setup is completed, measurement restarts.
Also when the averaging count is changed with Storage Mode set to Average, measurement restarts on completion of the setup. If the values are not changed or changing is canceled, the measurement is not restarted.

Refresh Interval: Set the interval for updating the average display.

- Every: Updates the display at every measurement.
- Once: Updates the display after measurement of the specified averaging count is completed.

Available storage modes are listed below.

- Normal: Updates and displays the measurement results at every measurement.
- Average: Averages and displays the measurement results at every measurement.
- Max hold: Displays the maximum measurement results at every measurement.
- Min hold: Displays the minimum measurement results at every measurement.

When the wide dynamic range is ON, Max hold or Min hold is not available.

Expanding measurement dynamic range (Wide Dynamic Range)

Press F4 (Wide Dynamic Range) to switch between Wide Dynamic Range On and Off.
When Wide Dynamic Range is On, burst-on and -off parts are measured with different RF attenuator settings to expand the measurement dynamic range.
Measurement is performed in Single mode.
This function is available only when measuring signal is burst wave and Trigger is not Wide IF.

CAUTION ⚠

When Wide Dynamic Range is On, the RF attenuator settings are changed more frequently than ordinary measurement. The life for an RF attenuator relay is 5 million switching operations.

Setting relative/absolute display of waveform (Level Rel./Abs.)

Set the relative or absolute display for waveform.

1. Press (More) to display the second RF Power function label page.
2. Press F3 (Level Rel./Abs.) to alternately switch between relative and absolute modes.

Setting Filter Type

Set Filter Type for PHS.

1. Press (More) to display the third RF Power function label page.
2. Press F1 (Filter Type) to alternately switch between Gaussian filter and Normal filter(filter before version 4.0).

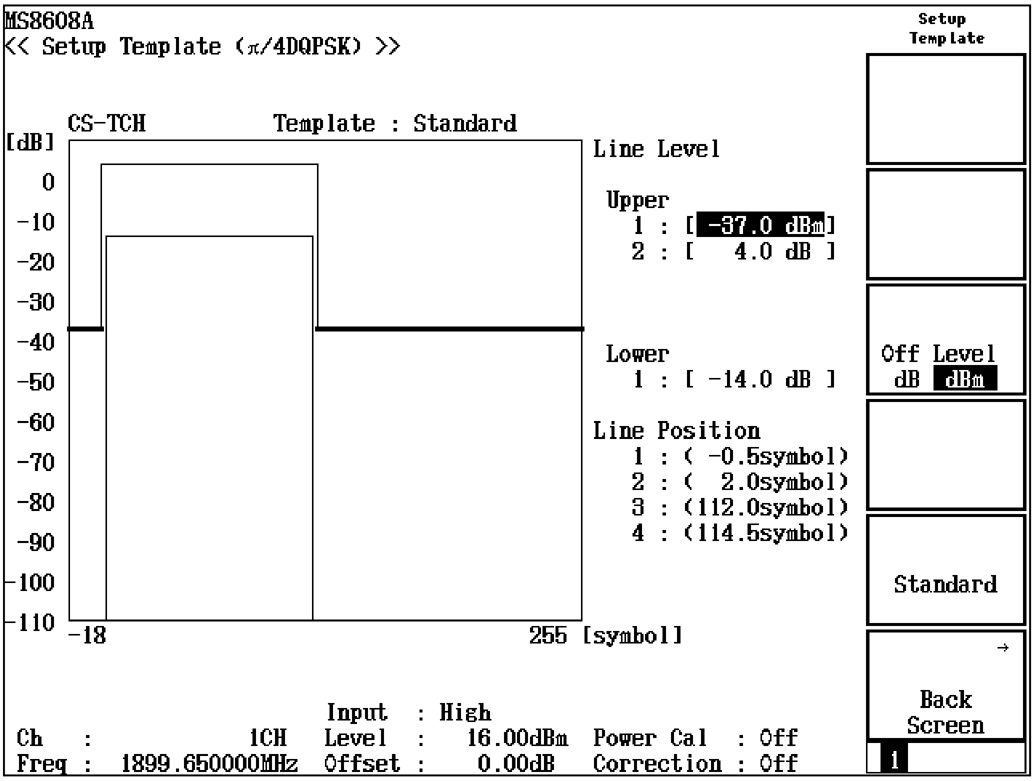
This function is enabled only when Target System is set to PHS and Multi Carrier is set to OFF.

Setting a template (Setup Template)

When measuring burst signal with Target System set to PDC, PHS or NADC or STD-39,T79 or STD-T61 or STD-T61 v1.1 in relative level display mode, a template can be set and displayed. This section explains how to set a template.

Screen explanation

On the second RF Power function label page of the RF Power screen, press F1 (Setup Template) to display the Setup Template screen.



Setting template

1. Using ∧ and ∨ or the rotary knob in the Entry section, select the standard line to be set.
2. Set the standard line level using the ten-key pad or press Set in the Entry section.
3. When Set is pressed, follow these steps.
4. The modification line appears for standard line.
5. Using ∧ and ∨ or the rotary knob, set the standard line modification line to the desired level.
6. Press Set.

When setup is completed, the standard line goes to the set level.

Setting off-level (Upper-1) unit

- Press F3 (Off Level) to alternately switch between dB and dBm.

Setting template to predetermined value

- Press F5 (Standard) to set the values given below.

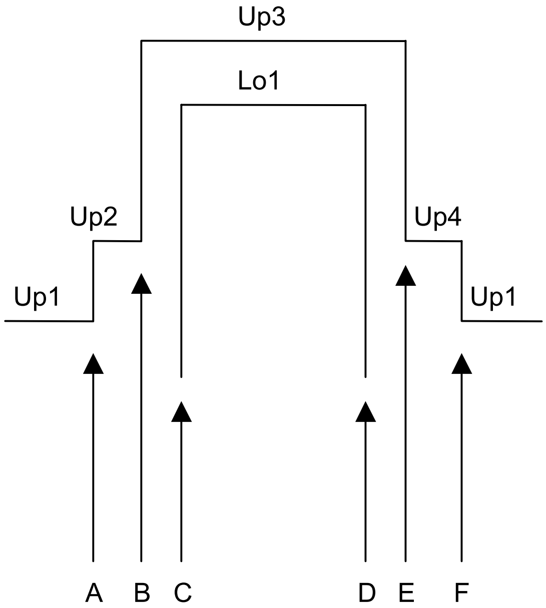
<table>
<tr><td>PDC

Level
Upper-1: –56 dBm
Upper-2: –60 dB
Upper-3: 4 dB
Upper-4: –60 dB

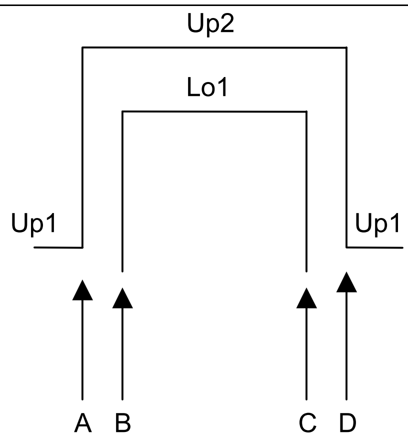
Lower-1: –14 dB

Position
MS-TCH
A: –2.5 symbol
B: –1.0 symbol
C: 2.0 symbol
D: 136.0 symbol
E: 139.0 symbol
F: 140.5 symbol

MS-CCH
A: –2.5 symbol
B: –1.0 symbol
C: 2.0 symbol
D: 130.0 symbol
E: 133.0 symbol
F: 134.5 symbol

MS-SYNC
A: 24.5 symbol
B: 26.0 symbol
C: 29.0 symbol
D: 100.0 symbol
E: 103.0 symbol
F: 104.5 symbol</td><td>
</td></tr>
<tr><td>PHS
Level
Upper-1: –37 dBm
Upper-2: 4 dB

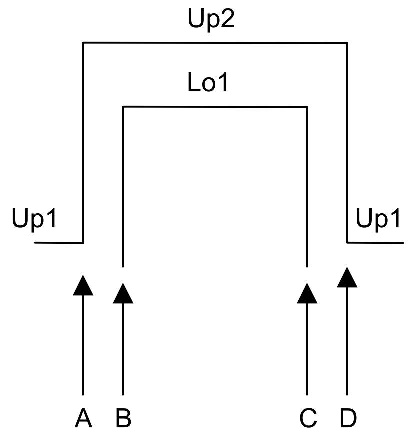
Lower-1: –14 dB

Position
A: –0.5 symbol
B: 2.0 symbol
C: 112.0 symbol
D: 114.5 symbol</td><td>
</td></tr>
</table>

<table>
<tr>
<td>NADC
Level
Upper-1: –60 dBm
Upper-2: 3 dB

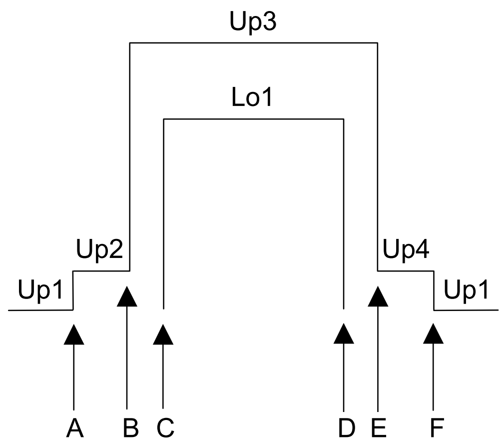
Lower-1: –14 dB

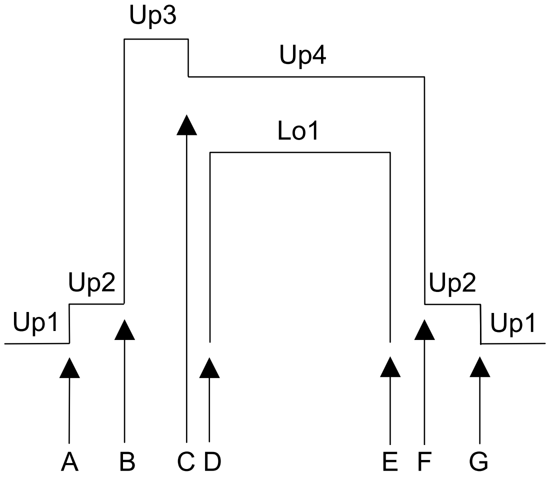
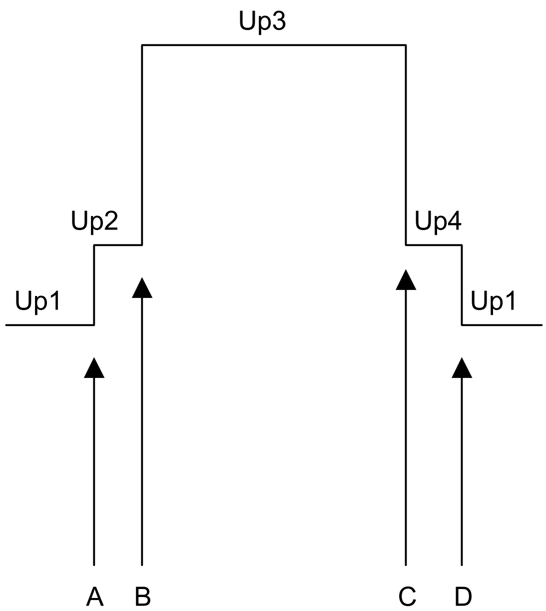
Position
Mobile
A: 3.0 symbol
B: 6.0 symbol
C: 162.0 symbol
D: 165.0 symbol

Shortened Burst
A: 3.0 symbol
B: 6.0 symbol
C: 162.0 symbol
D: 165.0 symbol</td>
<td>
</td>
</tr>
<tr>
<td>STD-39, T79
Level
Upper-1 : –50 dBm
Upper-2 : –60 dB
Upper-3 : 4 dB
Upper-4 : –60 dB

Lower-1 : –14 dB

Position
MS-TCH
A : –1.0 symbol
B : 0.0 symbol
C : 3.0 symbol
D : 156.0 symbol
E : 159.0 symbol
F : 160.0 symbol

DC-CH
A : 3.0 symbol
B : 4.0 symbol
C : 7.0 symbol
D : 152.0 symbol
E : 158.0 symbol
F : 159.0 symbol</td>
<td>
</td>
</tr>
</table>

STD-39, T79 Level Upper-1 : –50 dBm Upper-2 : –60 dB Upper-3 : 5 dB Upper-4 : 4 dB Lower-1 : –14 dB Position MS-CCH A : –1.0 symbol B : 0.0 symbol C : 18.0 symbol D : 21.0 symbol E : 148.0 symbol F : 151.0 symbol G : 152.0 symbol MS-SYNC A : 24.0 symbol B : 25.0 symbol C : 43.0 symbol D : 46.0 symbol E : 140.0 symbol F : 143.0 symbol G : 144.0 symbol DC-SYNC A : 3.0 symbol B : 4.0 symbol C : 43.0 symbol D : 46.0 symbol E : 152.0 symbol F : 155.0 symbol G : 156.0 symbol	
STD-T61 v1.1 Level Upper-1: –50 dBm Upper-2: –60 dB Upper-3: 6 dB Upper-4: –60 dB Position SC (Burst) MC (Burst) Basic (40 msec) A: –1.5 symbol B: –0.5 symbol C: 189.5 symbol D: 190.5 symbol Sub (20 msec) A: –1.5 symbol B: –0.5 symbol C: 93.5 symbol D: 94.5 symbol	

Measuring Occupied Frequency Bandwidth

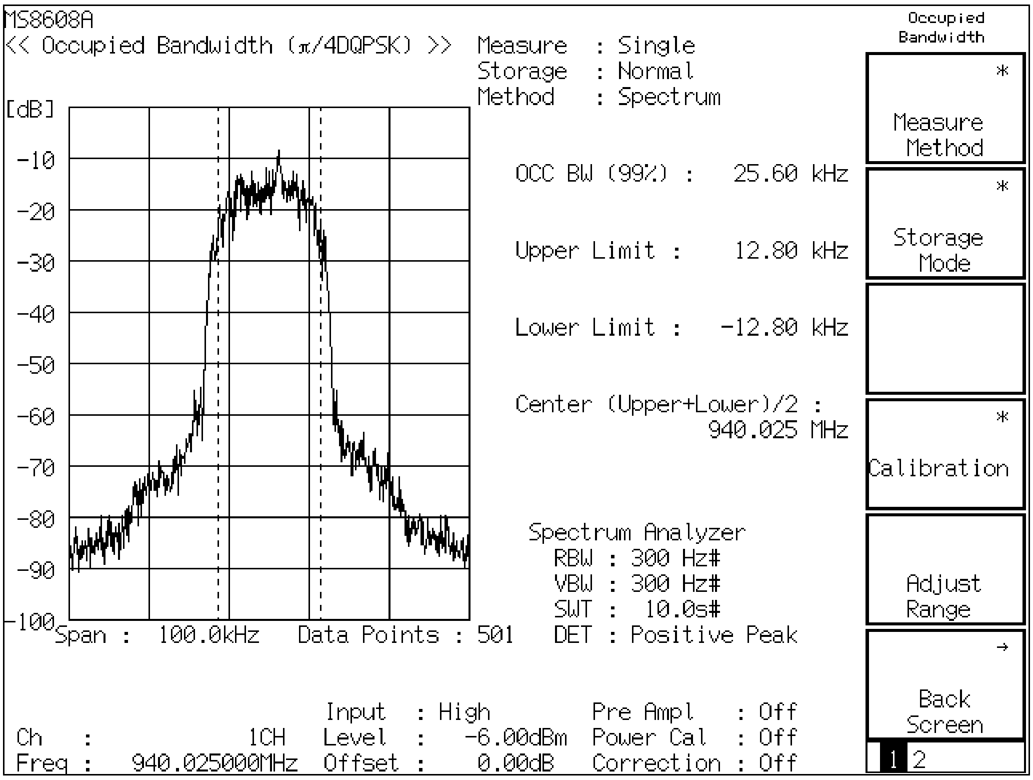
On the Setup Common Parameter screen, pressing F4 (Occupied Bandwidth) displays the occupied frequency bandwidth measurement screen.
This section describes the measurement results displayed on the Occupied Bandwidth screen (occupied frequency bandwidth measurement), parameter settings and operation precautions.
This measurement is not available for the π/4 DQPSK Target System.

Explanation of measurement results

This section explains the measurement results displayed on the Occupied Bandwidth screen (occupied frequency bandwidth measurement).
When starting the measurement, press F5 (Adjust Range) to optimize the measurement unit level setting. For range optimization, refer to “Optimizing Measurement Range (Adjust Range).”

Measurement results

The screen shown below appears when Spectrum is selected for Measure Method.



Waveform display

Shows the spectrum waveform with the horizontal axis representing the frequency and the vertical axis representing the level. When Method is set to Spectrum, the measurement is carried out in spectrum analyzer mode and the waveform is displayed. The setting status for the spectrum analyzer mode appears in the lower-right area. When Method is set to FFT, the waveform obtained by FFT operation is displayed. When the input signal is IQ, Method cannot be set to Spectrum, allowing measurement only in FFT mode.

OCC BW (99%)

Shows the occupied frequency bandwidth of the signal measured in the 99% method in kHz.

The 99% method is the method for obtaining the frequency bandwidth where 99% of the measured signal total power (by measurement) exists. It is calculated using Upper Limit and Lower Limit listed below, with the following expression:

OCC BW = (Upper Limit) – (Lower Limit)

Upper Limit

Obtains the frequency that provides 0.5% the total power from the measured waveform upper limit and displays the difference between it and the center frequency (set frequency) in kHz.

Lower Limit

Obtains the frequency that provides 0.5% the total power from the measured waveform lower limit and displays the difference between it and the center frequency (set frequency) in kHz.

Center (Upper + Lower)/2

As the expression shows, obtains the center frequency from the upper- and lower-limit frequencies and displays it in MHz.

Selecting result display

On the Occupied Bandwidth screen, press F1 (Measure Method) to display the function labels listed below and then select the result display.

- F1 (Spectrum): Measures in spectrum analyzer mode.
- F2 (FFT): Performs operation in FFT method.
- F6 (return): Returns to the preceding function label display.

Measurement time in the FFT method is shorter than that in the Spectrum method.

Averaging (Storage Mode)

This section describes the storage mode through the measurement result averaging process.
Unlike other measurement screens, averaging is performed only on the waveform for the occupied frequency bandwidth measurement. The measurement results are calculated based on the averaged waveform. Note that the numeric results are not averaged.

Setting averaging process

1. On the Occupied Bandwidth screen, press [F2] (Storage Mode) to display the Storage Mode function label.
2. Press [F2] (Average Count) to open the setup window.
3. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter the averaging count.
4. Press [Set].
5. On the Storage Mode menu, press [F1] (Storage Mode).
6. The selection window opens.
7. Using [∧] and [∨] or the rotary knob in the Entry section, select Average.
8. Press [Set].

When setup is completed, measurement restarts.
Also when the averaging count is changed with Storage Mode set to Average, measurement restarts on completion of the setup. If the values are not changed or changing is canceled, measurement is not restarted.

Refresh Interval: Set the interval for updating the average display.

- Every: Updates the display at every measurement.
- Once: Updates the display after measurement of the specified averaging count is completed.

Available storage modes are listed below.

- Normal: Updates and displays the measurement results at every measurement.
- Average: Averages and displays the measurement results at every measurement.

Sweep Time

When Target System is set to STD-T61 or STD-T61 v1.1, and Measure Method is set to Spectrum, Sweep Time can be set.

1. On the Occupied Bandwidth screen, press [ ] (More) to display the second function label page.
2. Press [F5] (Sweep Time) to open the setup window.
3. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter sweep time.

Measuring Adjacent Channel Leakage Power

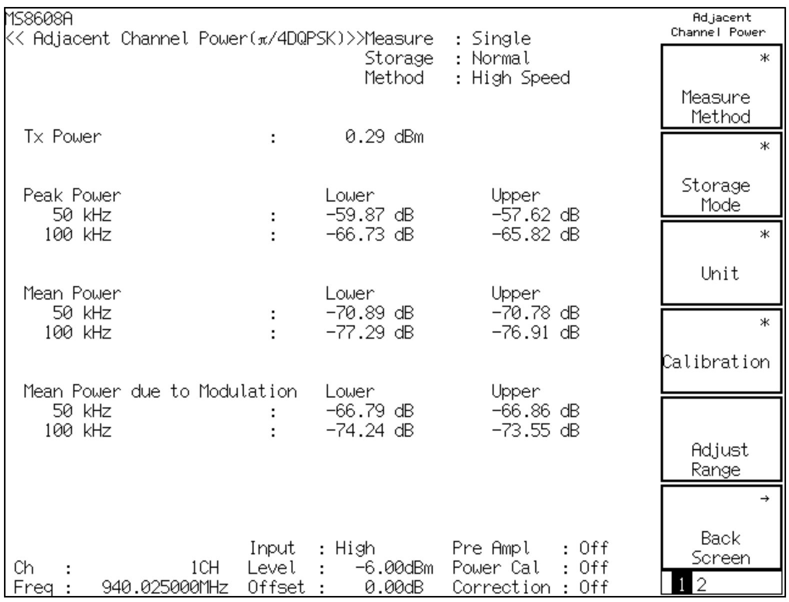
On the Setup Common Parameter screen, pressing F5 (Adjacent Channel Power) displays the adjacent channel leakage power measurement screen.
This section explains the measurement results displayed on the Adjacent Channel Power screen (adjacent channel leakage power measurement), parameter settings and operation precautions.
This measurement is not available for IQ input.

Measuring in high-speed method

This section describes the measurement results displayed on the Adjacent Channel Power screen (adjacent channel leakage power measurement). Before measurement, press F5 (Adjust Range) to optimize the measurement unit level setting. For MS860x, to raise the level measurement accuracy, press F4 (Calibration). Then press F1 (Power Calibration) while inputting the signal for calibration using the built-in power meter. For MS268x, to increase the accuracy of level measurement, execute internal calibration in the spectrum analyzer mode. Refer to the separate "MS268x Spectrum Analyzer Operation Manual, Vol. 2 (Detailed Operating Instruction)" for more information. Refer to "Optimizing Measurement Range (Adjust Range)" for range optimization and "Power Calibration Function (Power Calibration)" for power calibration.

Explanation of measurement results

The screen given below shows the measurement results in High Speed method. The procedure for selecting High Speed method is described later.



Tx Power

Shows the measured signal average power during burst in dBm.

Peak Power

Shows the maximum leakage power in a one-frame period in dBm or W, or as a ratio to the carrier wave power (in dB).

For NADC, the peak power during burst after passing through the reception filter is used as the reference level.

Mean Power

Shows the average power in a one-frame period in dBm or W, or as a ratio to the carrier wave power (in dB).

The measurement results given below appear for burst wave measurement.

Mean Power due to Modulation

Shows the average leakage power in burst-on period in dBm or W, or as a ratio to the carrier wave power (in dB).

> The measurement in High Speed method obtains the power that passes through the reception filter at each offset frequency. The reception filter used is the one set from Setup Common Parameter.

Selecting High Speed method

Select High Speed method in the procedure given below.

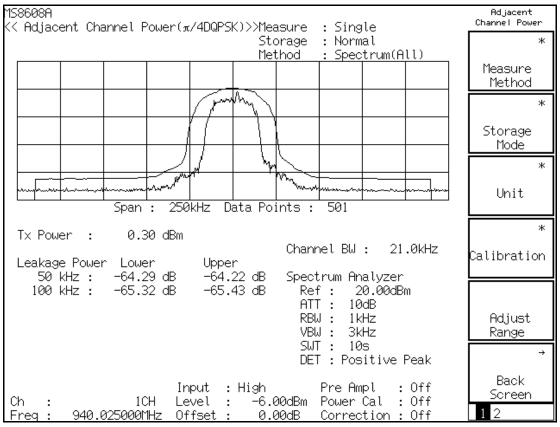
1. On the Adjacent Channel Power screen, press F1 (Measure Method) to display the Measure Method function label.
2. Press F3 (High Speed) to select the High Speed method.

Measuring in Sweep method

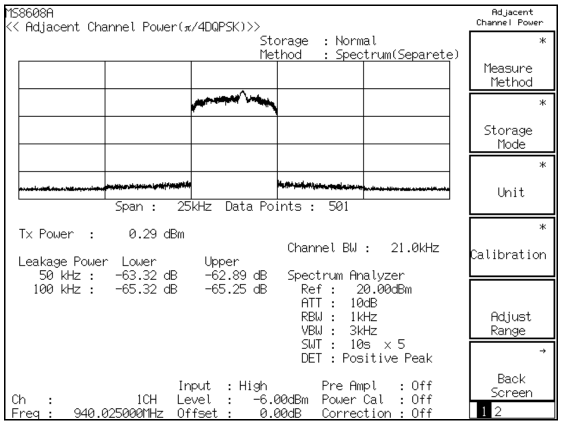
In addition to the High Speed method to measure the adjacent channel leakage power, the π/4 DQPSK Software supports the Sweep method using a spectrum analyzer.

Explanation of measurement results

The screen given below shows the measurement results in Sweep method.



Sweep method (all)



Sweep method (separate)

Wave display

The screen shows the spectrum waveform with the horizontal axis representing the frequency and the vertical axis representing the level. The All mode is provided to sweep the entire display area at one time and Separate, to sweep each carrier or offset frequency. The spectrum analyzer setting mode is shown in the lower-right part of the screen.

When All mode is selected, the adjacent channel leakage power graph can be displayed at the same time as the waveform display.
In the graph display, each data point displayed is assumed as the offset frequency. The leakage power at the offset frequency is displayed in dBm or W, or as a ratio to the carrier wave power (in dB). The measurement values are read using the marker.

> The waveform display in Separate mode shows waveforms swept at each carrier and offset frequency side by side, not in continuous frequencies.

Tx Power

Shows the measured signal average power during burst in dBm.

Leakage Power

Shows the maximum leakage power at each offset frequency in dBm or W, or as a ratio to the carrier wave power (in dB).

The power ratio of the carrier wave and each offset frequency and the power value at each offset frequency are obtained as described below. First, the waveform data for the carrier wave band is converted to power value and accumulated. In the same way, the accumulated value is obtained for each offset frequency band. The ratio of this carrier wave accumulated value to the offset frequency accumulated value becomes the power ratio of the offset frequency. The power value at each offset frequency is obtained by multiplying the Tx Power value by the power ratio of each offset frequency.

Selecting Sweep method

Select the Sweep method (All) in the procedure given below.

1. On the Adjacent Channel Power screen, press [F1] (Measure Method) to display the Measure Method function label.
2. Press [F1] (Spectrum (All)) to select the Sweep method (All).

Select the Sweep method (Separate) in the procedure given below.

1. On the Adjacent Channel Power screen, press [F1] (Measure Method) to display the Measure Method function label.
2. Press [F2] (Spectrum (Separate)) to select the Sweep method (Separate).

Displaying marker

When the sweep method (All) is set to Measure Method, the Marker can be displayed. There are two ways to display the marker.

Marker display Procedure 1

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

Marker display Procedure 2

1. Press [ ] (More) to display the second function label page.
2. Press [F2] (Marker) to alternately switch between Normal and Off.

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

Changing measurement value unit (Unit)

This section explains how to change the adjacent channel leakage power value unit.

Setting display unit

On the Adjacent Channel power screen, press F3 (Unit) to display the function labels listed below and then select the unit to be used.

- F1 (dBm): Shows the power value in dBm.
- F2 (mW): Shows the power value in mW.
- F3 (μW): Shows the power value in μW.
- F4 (nW): Shows the power value in μW.
- F5 (dB): Shows the power value in dB.
- F6 (return): Returns to the preceding function label display.

The mW, μW and nW units are individually available so that the measurement values can be compared in the same display unit. When the measurement value exceeds the display digits, it is shown as 999. When the measurement value is less than the display digits, it is shown as 0.000.

Averaging (Storage Mode)

This section explains the storage mode through the measurement result averaging process.

Setting averaging process

1. On the Adjacent Channel Power screen, press F2 (Storage Mode) to display the Storage Mode function label.
2. Press F2 (Average Count) to open the setup window.
3. Using ∧ and ∨, the rotary knob or ten-key pad in the Entry section, enter the averaging count.
4. Press Set.
5. On the Storage Mode menu, press F1 (Storage Mode).
6. The selection window opens.
7. Using ∧ and ∨ or the rotary knob in the Entry section, select Average.
8. Press Set.

When setup is completed, the measurement restarts.
Also when the averaging count is changed with Storage Mode set to Average, measurement restarts on completion of the setup. If the values are not changed or changing is canceled, measurement is not restarted.

Refresh Interval: Set the interval for updating the average display.

- Every: Updates the display at every measurement.
- Once: Updates the display after measurement of the specified averaging count is completed.

Available storage modes are listed below.

- Normal: Updates and displays the measurement results at every measurement.
- Average: Averages and displays the measurement results at every measurement.

In High Speed method, the carrier wave (Tx Power) and leakage power (W) at each offset frequency are averaged.
In Sweep method, the waveform is averaged. Note that averaging is performed in the power value level. That is, the measured waveform is converted once to power value, averaged together with the previous waveforms, and then returned to the dBm value and drawn as a waveform. The power ratio is calculated depending on the averaged waveform. The carrier wave power (Tx Power) is separately averaged and, from this carrier wave power value and power ratio, the leakage power at each offset frequency is calculated.

Sweep Time

When Target System is set to STD-T61 or STD-T61 v1.1, and Measure Method is set to Spectrum, Sweep Time can be set.

Setting Sweep Time process

1. On the Adjust Channel Power screen, press [ ] (More) to display the second function label page.
2. Press [F5] (Sweep Time) to open the setup window.
3. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter sweep time.
4. Press [Set].

When setup is completed, measurement restarts.
If the values are not changed or changing is canceled, measurement is not restarted.

Measuring Spurious

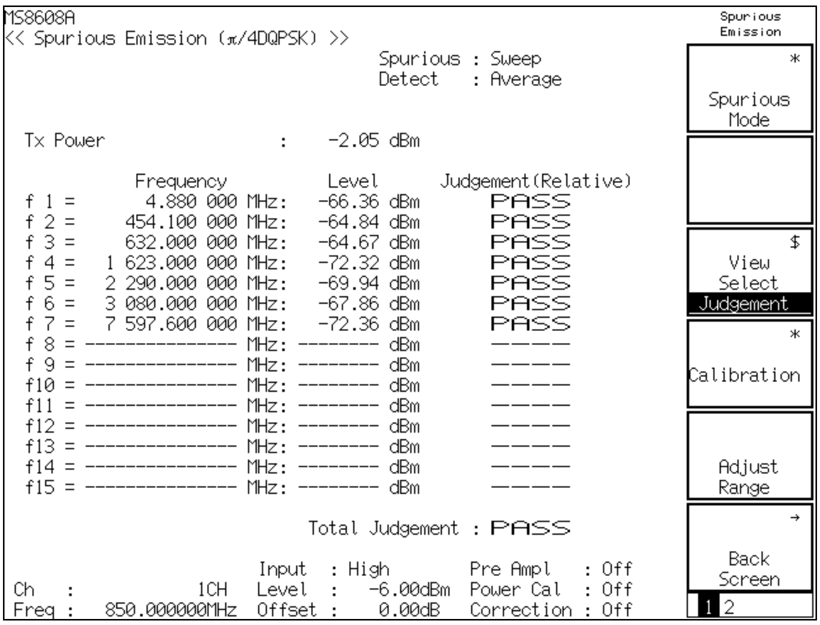
On the Setup Common Parameter screen, pressing F6 (Spurious Emission) displays the spurious measurement screen.
This section explains the measurement results displayed on the Spurious Emission screen, the parameter settings and operation precautions.
This function is not available for IQ input.

Explanation of measurement results

The measurement results displayed on the Spurious Emission screen (spurious measurement) are explained below.
When starting the measurement, press F5 (Adjust Range) to optimize the measurement unit level setting. For MS860x, to raise the level measurement accuracy, press F4 (Calibration). Then press F1 (Power Calibration) while inputting the signal for calibration using the built-in power meter. For MS268x, to increase the accuracy of level measurement, execute internal calibration in the spectrum analyzer mode. Refer to the separate “MS268x Spectrum Analyzer Operation Manual, Vol. 2 (Detailed Operating Instruction)” for more information. Refer to “Optimizing Measurement Range (Adjust Range)” for range optimization and “Power Calibration Function (Power Calibration)” for power calibration

Measurement results

The screen given below shows the measurement results in Sweep method. For the procedure for selecting Sweep method, refer to “Selecting Measurement Method.”



Tx Power

Shows the measurement signal average power during burst in dBm.

Frequency

In the Sweep or Search method, sweeps the specified range and shows the frequency at the highest level as the spurious frequency. In the Spot method, shows the specified frequency.

Level

Shows the level of the frequency shown in Frequency above.

Judgement

Makes judgement based on the upper limit level set on the Setup Spot Table or Setup Sweep/Search Table and displays the results.

This item appears only when Judgement has been selected with F3 (View Select).

RBW, VBW, SWT

Shows the spectrum analyzer RBW, VBW and Sweep Time measurement conditions.

This item appears only when BW, SWT has been selected with F3 (View Select).

Ref.Level, ATT

Shows the Reference Level and ATT measurement conditions of the spectrum analyzer.

This item appears only when RefLvl,ATT has been selected with F3 (View Select).

Spurious, Detect, Preselector

These items appear in the upper-right area of the screen.

(1) Spurious

Shows the measurement method selected in Spurious Mode.

(2) Detect

Shows the spectrum analyzer detection mode.

(3) Preselector

Shows the preselector operation mode. This item appears only when the MS8608A-03/MS2683A-03 option is installed. Refer to “Setting Preselector Mode (Preselector).”

Selecting measurement method (Spurious Mode)

On the Spurious Emission screen, press F1 (Spurious Mode) to display the function labels shown below and then select the measurement method.

- F1 (Spot): Measures the frequency level set from Setup Spot Table in the Spot method in time domain and obtains the average.
- F2 (Search): Sweeps the frequency range set from Setup Search/Sweep Table in the Search method, measures the maximum frequency level in time domain and obtains the average value.
- F3 (Sweep): Sweeps the frequency range set from Setup Search/Sweep Table in the Sweep method and displays the maximum frequency and level. The level in this case is the value obtained from the frequency domain.
- F6 (return): Returns to the preceding function label display.

Selecting screen display (View Select)

Each time F3 (View Select) is pressed on the Spurious Emission screen, the display is switched from Judgement → BW,SWT → RefLvl,ATT.

Changing measurement value unit (Unit)

This section explains how to change the spurious measurement value unit.

Setting display unit

On the Spurious Emission screen, press (More) to display the second Spurious function label page. Press F4 (Unit) to switch the unit between dB and dBm.

For dB display, the Tx Power value is used as the reference level.

Setting preselector mode (Preselector)

This function is available only when main unit option MS8608A-03/MS2683A-03 is installed. (This option cannot be installed on MS8609A/MS2681A/MS2687A/B.)
Use this function to select Band 0 (Normal) or Band 1 for preselector (Spurious) for measurement of 1.6 GHz to 3 GHz.
Measurement in Spurious mode sweeps 1.6 GHz to 3 GHz with preselector band, allows measurement of 800 MHz band signals without considering harmonic wave due to internal distortion of the spectrum analyzer.

Setting mode

1. Press [ ] (More) to display the second Spurious function label page.
2. Press [F5] (Setup Spectrum Analyzer).
3. Press [F4] (Preselector) to alternately switch between Normal and Spurious.

When MS8608A-03/MS2683A-03 option is not installed or when the measurement unit is MS8609A/MS2681A/MS2687A/B, the Preselector menu does not appear.

Setting detection mode (Detection)

This section explains how to change detection mode. Detection mode settings are kept for each spurious mode.

Setting mode

1. Press [ ] (More) to display the second Spurious function label page.
2. Press [F5] (Setup Spectrum Analyzer).
3. Press [F5] (Detection).
4. The selection window opens.
5. Using [∧] and [∨] or the rotary knob in the Entry section, input the Detection Mode to be set.
6. Press [Set].

Selecting Ref Power (Ref Power)

Selects the reference level measurement method for relative values. Note that the reference level for absolute values becomes Tx Power (same as that for RF Power) regardless of measurement method.

1. Press [ ] (More) to display the third page of the function label.
2. Press [F1] (Ref Power) to select SPA or Tx Power.

SPA: Sets the power (measured with the conditions set in the Setup Spot Table or the Setup Search/Sweep Table) to the reference level for relative values.

Tx Power: Sets the average power of one slot in the measured signal to the reference level for relative values. This value is same as Tx Power for RF Power.

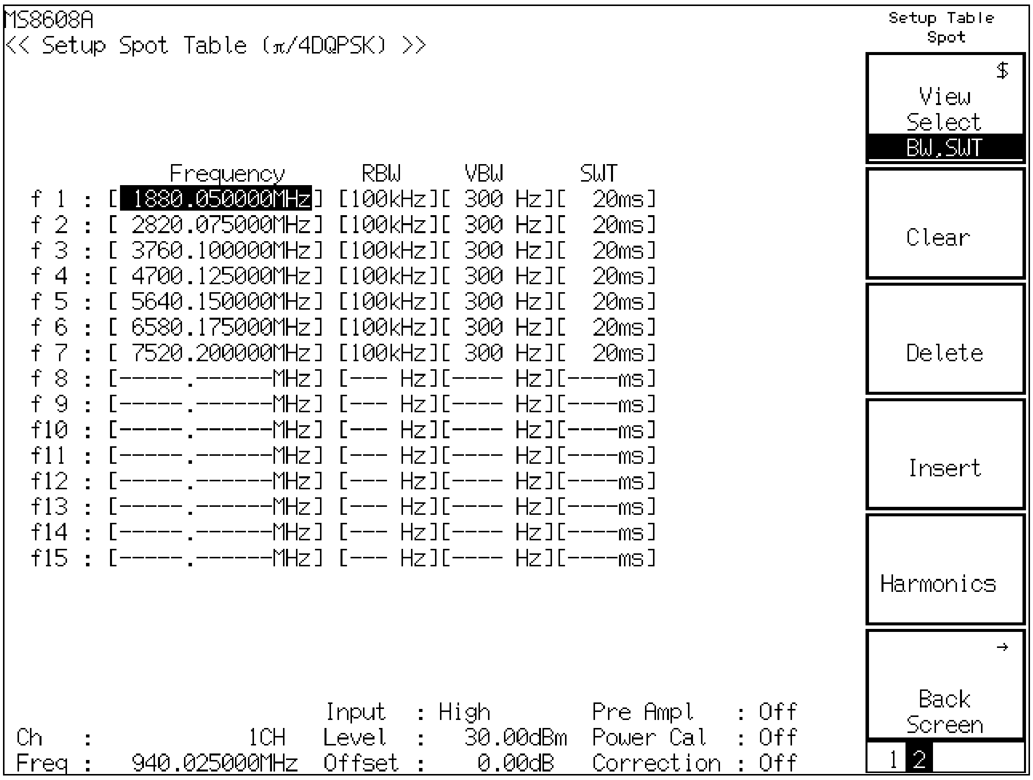
Setting frequency table for spot method

This section explains how to set the measurement frequency, etc. for measurement in the Spot method.

On the Spurious Emission screen, press [ ] (More) to display the second function label page. Then press [F1] (Setup Spot Table) to display the Setup Spot Table screen.

Setting from Setup Spot Table screen

The Setup Spot Table screen is shown below.



Switching screen displays

1. Each time [F1] (View Select) is pressed on Setup Spot Table, the display switches between RBW/VBW/SWT, Ref Level/ATT and Limit in order.

Setting measurement frequency, RBW, VBW, Sweep Time, Limit Level, Ref Level and ATT

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the item to be set.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set result appears in [ ] for the set item.

Selecting Pass/Fail judgment value

1. On the Setup Spot Table screen, press [F3] (Judgment) to use an absolute or relative value for pass/fail judgment.

Setting harmonic wave

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F5] (Harmonics) to automatically set the harmonic wave for the carrier wave frequency (frequency set from the Setup Common Parameter screen). Note that all frequencies, etc. set previously are deleted.

Deleting all settings

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F2] (Clear) to open a confirmation window asking whether to delete the set values.
3. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to Yes.
4. Press [Set] to delete all set values.

Deleting cursor line

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F3] (Delete) to delete the line where the cursor is positioned and move all lines below the cursor up one line.

Inserting empty line at cursor

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F4] (Insert) to move all lines below the cursor down one line and place a blank line (---) at the line where the cursor is positioned. When f15 has been set, no blank lines can be inserted.

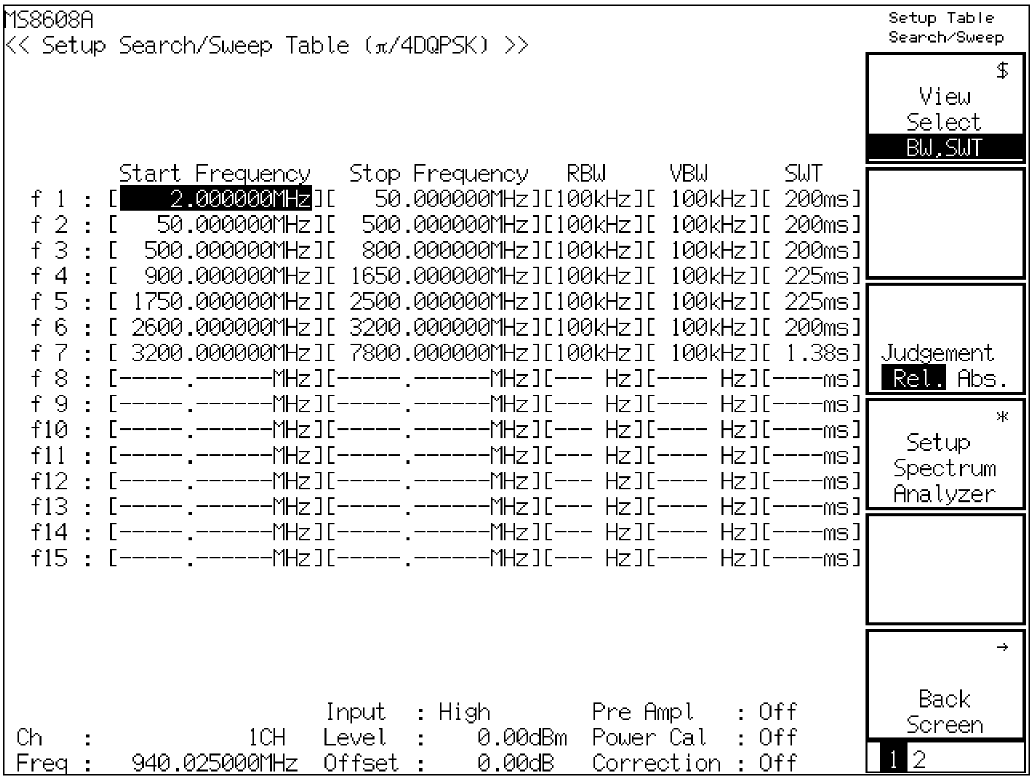
Setting sweep table for Search/Sweep method

This section explains how to set the sweep table used for the Search or Sweep method.

On the Spurious Emission screen, press (More) to display the second function label page. Then press F2 (Setup Search/Sweep Table) to display the Setup Search/Sweep Table screen.

Setting from Setup Search/Sweep Table screen

The Setup Search/Sweep Table screen is shown below.



Switching screen displays

1. Each time F1 (View Select) is pressed on the Setup Search/Sweep Table the display switches between RBW/VBW/SWT, Ref Level/ATT and Limit in order.

Setting start and stop frequencies

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the Start Frequency or Stop Frequency item.
2. Press [Set] or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set frequency appears in [ ] for the set item. The start and stop frequencies are forcibly set at least 1 kHz away from each other. For example, when both of the start and stop frequencies are set to 100 kHz, the start frequency is automatically changed to 99 kHz.

Setting RBW, VBW, Sweep Time, Limit Level, Ref Level and ATT

1. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to the item to be set.
2. Press [Set] in the Entry section or enter a numeric value using the ten-key pad.
3. The setup window opens.
4. Using [∧] and [∨], the rotary knob or the ten-key pad in the Entry section, enter a numeric value.
5. Press [Set].

When setup is completed, the set result appears in [ ] for the set item.

Selecting Pass/Fail judgment value

1. On the Setup Search/Sweep Table screen, press [F3] (Judgment) to use an absolute or relative value for pass/fail judgment.

Deleting all settings

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F2] (Clear) to open a confirmation window asking whether to delete the set values.
3. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor to Yes.
4. Press [Set] to delete all set values.

Deleting cursor line

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F3] (Delete) to delete the line where the cursor is positioned and move all lines below the cursor up one line.

Inserting empty line at cursor

1. Press [ ] (More) to display the second Setup Table Spot function label page.
2. Press [F4] (Insert) to move all lines below the cursor down one line and place a blank line (---) at the line where the cursor is positioned. When f15 has been set, no blank lines can be inserted.

Setting frequency and sweep tables in details

This section explains how to set the frequency and sweep tables in details.
While the Setup Spot Table or Setup Sweep Table screen is being displayed, press [F4] (Setup Spectrum Analyzer) on the first function label page of Setup Table Spot/Sweep to display the related setup parameter screen.

RBW automatic setting

1. Press [F2] (RBW Auto/Manual) to switch between Auto and Manual alternately.

When Auto is selected, RBW is set as shown below depending on the Target System setting.

- 100 kHz for π/4 DQPSK, PDC
- 100 kHz for PHS
- 30 kHz for NADC
- 100 kHz for STD-39, T-79, STD-T61, STD-T61 v1.1

VBW automatic setting

1. Press [F3] (VBW) to alternately switch between Auto and Manual and then select Auto.

When Auto is selected, VBW is set depending on the VBW/RBW Ratio and RBW settings.

Setting VBW/RBW Ratio

1. Press [F4] (VBW/RBW Ratio) to open the selection window.
2. Using [∧] and [∨], the rotary knob or ten-key pad in the Entry section, enter a numeric value.
3. Press [Set].

Sweep Time automatic setting

1. Press F5 (Sweep Time) to alternately switch between Auto and Manual and then select Auto.
2. When Auto is selected, values are automatically set for all Sweep Times in the set frequency table.

Setting RBW mode

This function is available when main unit option MS860xA-04 or MS268xx-04 is installed.

1. Press F1 (RBW) to alternately switch between Digital and Normal. Select one. When Digital is selected, RMS instead of Average is added to Detection.

When neither MS860xA-04 nor MS268xx-04 options are installed, the RBW mode menu does not appear.

Setting ATT, Ref Level mode

1. Press (More) to display the second function label page.
2. Press F1 (SPA ATT, Ref) to alternately switch between Auto and Manual.

When Auto is selected, the Ref Level and ATT values in the table are automatically set depending on the Reference Level of Setup Common Parameter.

Setting Attenuator mode

1. Press (More) to display the second function label page.
2. Press F4 (Attenuator) to alternately switch between Auto and Manual.

When Auto is selected, the ATT value is automatically set depending on the Ref Level set in the table.

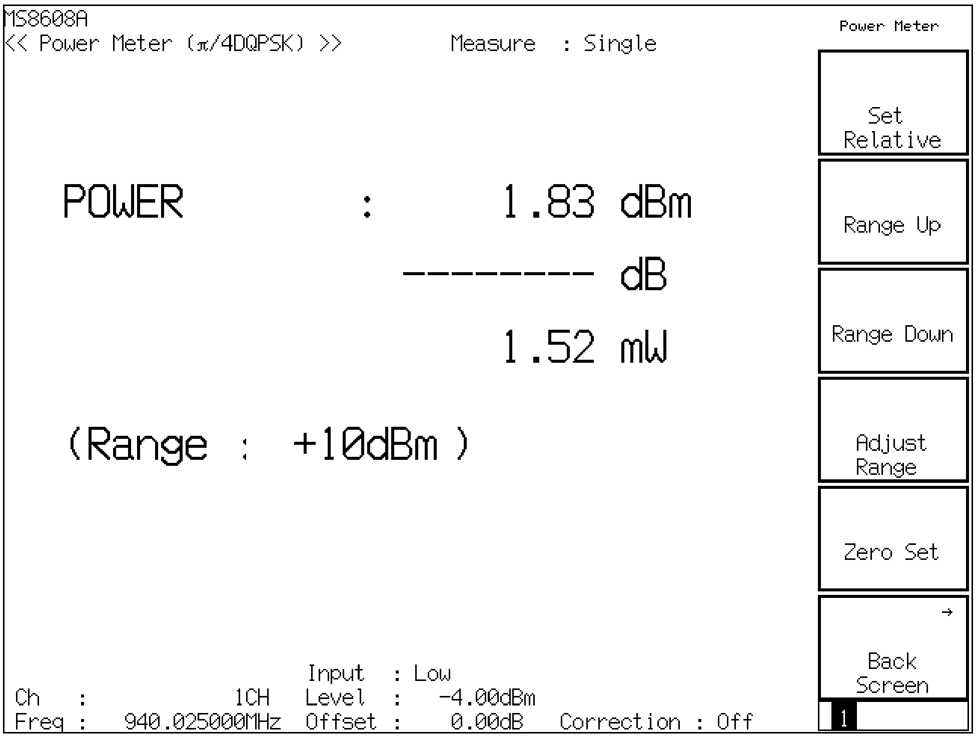
Power Meter

For MS860x, on the Setup Common Parameter screen, pressing F6 (Power Meter) on the second function label page displays the Power Meter screen.
This section explains the measurement results displayed on the Power Meter screen (power meter), parameter settings and operation precautions.
This measurement is not available for IQ input.
For MS268x, this function is not available.

Explanation of measurement results

The measurement results displayed on the Power Meter screen (power meter) are explained below. When starting the measurement, press F5 (Adjust Range) to optimize the measurement unit level settings. For range optimization (Adjust Range), see “Optimizing Measurement Range (Adjust Range).”

Measurement results



POWER

Shows the power measured with the built-in power sensor in dBm, relative level and W.

For the relative level, the measurement value obtained when pressing F1 (Set Relative) is set as the reference level (0 dB).

Range

Shows the current measurement range.

Calibrating zero-point (Zero Set)

Be sure to calibrate the zero-point before using the power meter.

To perform zero-point calibration, place the RF input terminal in no-input state and press [F5] (Zero Set).

If the zero-point calibration is not performed in advance, the power meter may not show correct measurement values.

Using relative-value display (Set Relative)

This section explains how to use the relative-value display.

Pressing [F1] (Set Relative) sets the current power value as the reference value (0 dB), allowing display of the relative values.

Setting measurement range (Range Up/Range Down)

Set the power meter measurement range.

Measurement range

Available measurement ranges are listed below.

For MS8608A high-power input:

0 dBm, +10 dBm, +20 dBm, +30 dBm, +40 dBm

For MS8608A low-power input or MS8609A:

−20 dBm, −10 dBm, 0 dBm, +10 dBm, +20 dBm

Setting range

Press [F2] (Range Up) to increase the measurement range.

Press [F3] (Range Down) to decrease the measurement range.

Press [F4] (Adjust Range) to optimize the measurement range depending on the input signal. For details, refer to "Optimizing Measurement Range (Adjust Range)."

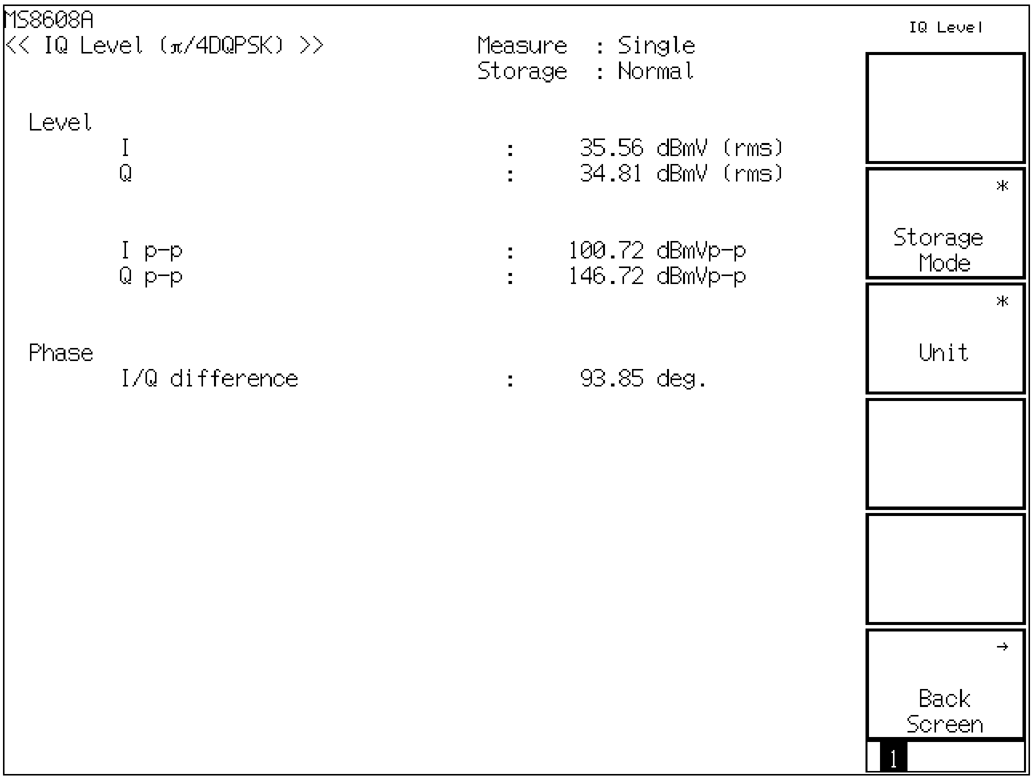
Measuring IQ Level

For MS860x, pressing F2 (IQ Level) on the second function label page of the Setup Common Parameter screen displays the IQ level measurement screen.
This section explains the measurement results displayed on the IQ Level screen (IQ level measurement), parameter settings and operation precautions.
This measurement is not available for IQ input.
For MS268x, this function is available when MS2681A/MS2683A-17, -18 or MS2687A/B-18 is installed.

Explanation of measurement results

The measurement results displayed on the IQ Level screen (IQ level measurement) are explained below.

Measurement results



Level (I and Q)

Shows the I- and Q-phase signal RMS levels in mV or dBmV.

Level (Ip-p and Qp-p)

Shows the I- and Q-phase signal peak-to-peak levels in mV or dBmV.

Phase (I/Q difference)

When CW signals of the same frequency are input to I- and Q-phase input terminals, shows the phase difference between I- and Q-phase signals in degrees. This function is available for orthogonal measurement of an orthogonal demodulator.

Averaging (Storage Mode)

This section describes the storage mode through the measurement result averaging process.

Setting averaging process

1. On the IQ Level screen, press F2 (Storage Mode) to display the Storage Mode function label.
2. Press F2 (Average Count) to open the setup window.
3. Using ∧ and ∨, the rotary knob or ten-key pad in the Entry section, enter the averaging count.
4. Press Set.
5. On the Storage Mode menu, press F1 (Storage Mode).
6. The selection window opens.
7. Using ∧ and ∨ or the rotary knob in the Entry section, select Average.
8. Press Set.

When setup is completed, measurement restarts.
Also when the averaging count is changed with Storage Mode set to Average, measurement restarts on completion of the setup. If the values are not changed or changing is canceled, measurement is not restarted.

Refresh Interval: Set the interval for updating the average display.
- Every: Updates the display at every measurement.
- Once: Updates the display after measurement of the specified averaging count is completed.

Available storage modes are listed below.
- Normal: Updates and displays the measurement results at every measurement.
- Average: Averages and displays the measurement results at every measurement.

Changing measurement value unit (Unit)

This section explains how to change the IQ level measurement value unit.

Setting display unit

On the IQ Level screen, press F3 (Unit) to display the function labels listed below. Then select the unit to be used.

- F1 (mV): Shows the measurement value in mV.
- F2 (dBmV): Shows the measurement value in dBmV.
- F6 (return): Returns to the preceding function label display.

Saving and Reading Setup Parameters

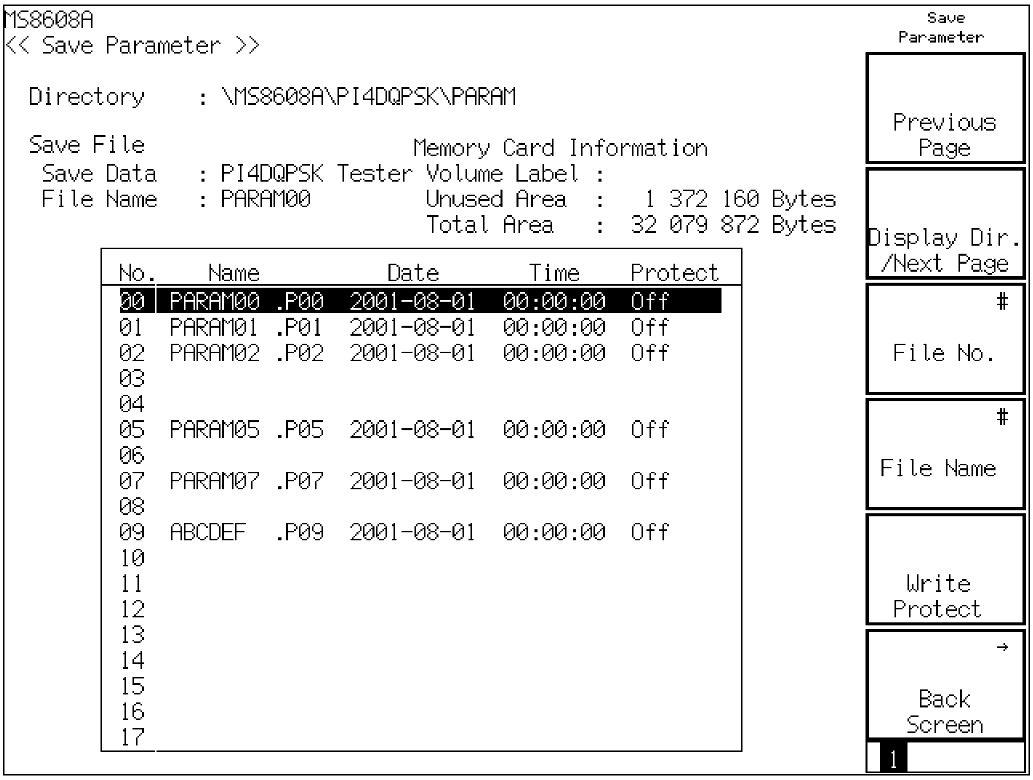
This section describes how to save and read parameter settings from the memory card. Before saving or reading parameter settings, insert the memory card in the memory card slot. The memory card can be inserted or removed while the unit power is ON. Do not remove the memory card while saving or reading.

One memory card can save a maximum of 100 parameter setup files. Save a file under one file number from 0 to 99. If necessary, a file may be assigned a file name consisting of letters and/or numerals and it may be write-protected.
A file name is in the MS-DOS format; that is, it may contain a maximum of eight characters, which are not case-sensitive.

Saving parameters (Save)

To save parameters, display the Save Parameter screen in the procedure below.

1. Insert a memory card in the memory card slot.
2. Press [Recall] while pressing [Shift].
3. Press [F2] (Display Dir.).



One memory card can save a maximum of 100 parameter setup files. Save a file under one file number from 0 to 99.

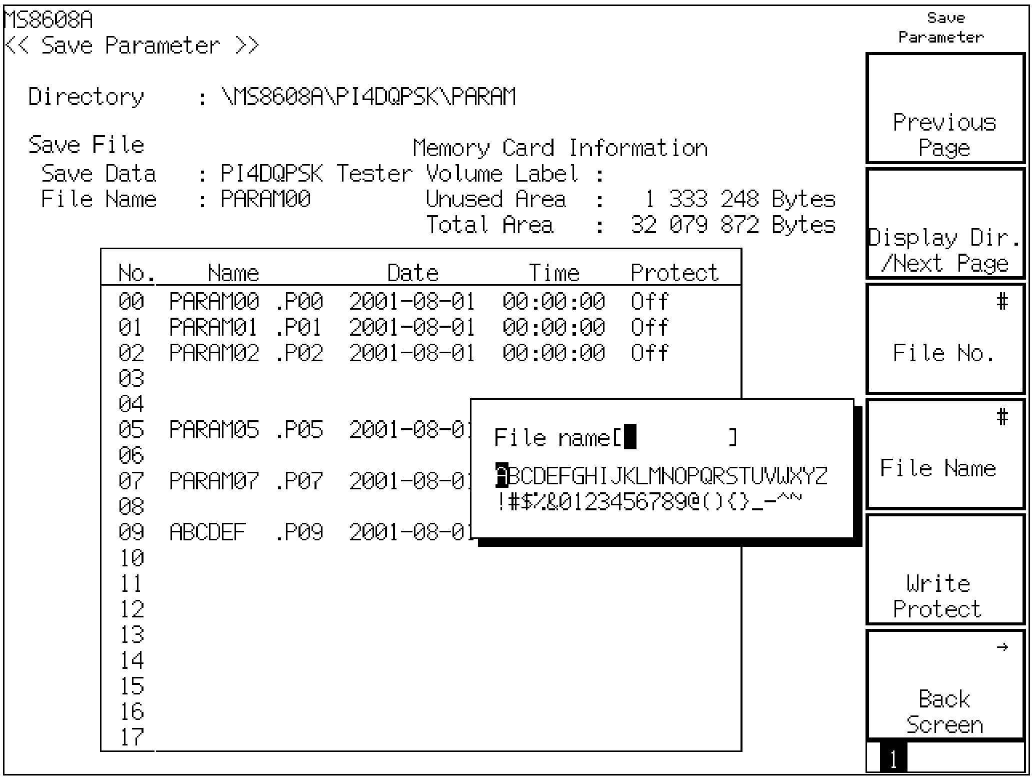
4. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor and select the file number. Or press [F3] (File No.) to open a setup window and enter the file number using the ten-key pad.
5. Press [Set] in the Entry section.
6. The confirmation window opens. Select Yes and press [Set].

Thus, the parameter settings are saved on the memory card.
When the file is saved under a new number, it is automatically assigned file name “PARAM**.P**” (where, “**” is a file number). When the file is saved under a file number already assigned to an existing file, the parameter settings are overwritten to the file and the file name remains unchanged.

Saving under a new name (File Name)

A file can be saved under a new name by pressing F4 (File Name) in Step 4 in "Saving Parameters (Save)."

This section describes how to enter a file name after displaying the file name input window by pressing F4 (File Name).



1. Using the rotary knob, move the cursor inside the list of characters and select the character to be entered.
2. Press Enter. The character selected appears in the entry area.
3. Repeat Steps 1 and 2 above to enter the file name. Characters A to F and 0 to 9 can also be entered from the ten-key pad. A file name may contain a maximum of eight characters. Available characters are only those given in the list of characters; other characters cannot be used.
4. After entering the file name, press Set.
5. A confirmation window opens. Select Yes and press Set.

Thus, the file is saved under the new name.

- Rotary knob: Moves the cursor inside the list of characters.
- ∧ or ∨: Moves the cursor inside the entry area.
- BS: Deletes the character preceding the cursor in the entry area.
- Enter: Overwrites the character pointed to the cursor in the list of characters onto the cursor position in the entry area.
- Set: Determines the character string in the entry area as the file name.

Write-protecting a file (Write Protect)

This section describes how to write-protect a file.

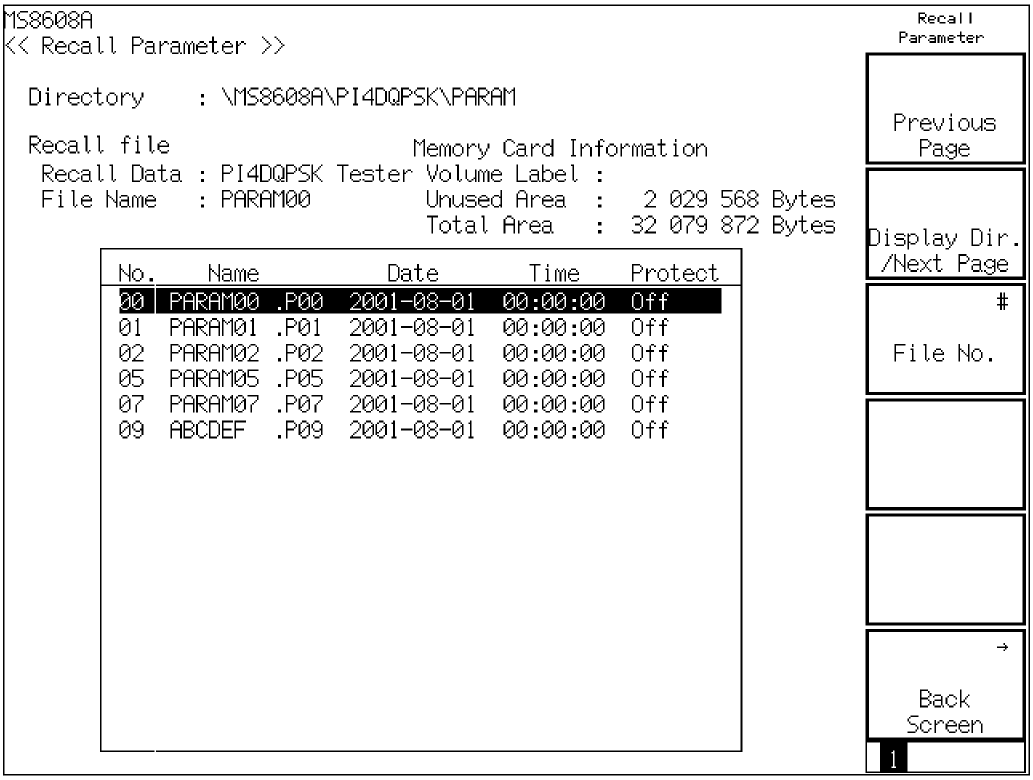
1. Using ∧ and ∨ or the rotary knob in the Entry section, move the cursor to the file to be write-protected.
2. Press F5 (Write Protect).

Each time F5 (Write Protect) is pressed write protection is alternately switched On and Off.

Reading parameters (Recall)

To read the saved parameters, display the Recall Parameter screen in the procedure given below.

1. Insert the memory card in the memory card slot.
2. Press [Recall].
3. Press [F2] (Display Dir.).



4. Using [∧] and [∨] or the rotary knob in the Entry section, move the cursor and select a file number or press [F3] (File No.) to open the setup window. Then enter a file number from the ten-key pad.
5. Press [Set] in the Entry section.
6. A confirmation window opens. Select Yes and press [Set].

When parameter reading is completed, the Setup Common Parameter screen appears.

Section 4 Performance Test

This section describes the measurement units, their connection and operation for the performance test conducted on measurements after installing MX860x05A in MS860x or MX268x05A in MS268x.

In this section, represents a panel key.

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About the Performance Test

The performance test described in this section should be carried out as part of preventive maintenance to check for performance deterioration during measurement with MX860x05A installed in MS860x or MX268x05A in MS268x.
Carry out the performance test on this unit when it is required for an acceptance inspection, periodic maintenance or a post-repair performance check.
Test items considered to be important should be checked periodically (once or twice a year) as preventive maintenance.
When using this unit for PDC, PHS or NADC measurement, the following test items should be included in performance tests carried out for acceptance inspection, periodic maintenance or post-repair performance.

- Modulation/frequency measurement
- Transmission power measurement accuracy
- Power measurement accuracy with carrier OFF
- Linearity
- Occupied frequency bandwidth measurement
- Adjacent channel leakage power measurement
- Spurious measurement
- IQ input modulation accuracy
- Power meter accuracy*

* For MS268x, this test is not performed.

If any items that do not satisfy requirements are uncovered by the performance test, contact Anritsu or its agency.

Equipment Required for the Performance Test <MS860x>

The measurement equipment required for the performance test is listed below.

Recommended unit name (model name)	Required performance	Test items
Synthesized signal generator (MG3633A)	• Frequency range: 100 kHz to 2700 MHz Resolution of 1 Hz available • Output level range: −20 to +10 dBm Resolution of 0.1dB available • SSB phase noise: −130 dBc/Hz or less (with offset 10 kHz) • Secondary harmonic wave: −30 dBc or less • External reference input: (10 MHz) available	Modulation/frequency measurement Transmission power measurement accuracy Linearity Adjacent channel leakage power measurement Spurious measurement Power meter accuracy
Digital modulation signal generator (MG3672A + MG0301C + MG0303B)	• Frequency range: 50 MHz to 2100 MHz Resolution 1 Hz available • Output level range Without modulation: −10 to +10 dBm With modulation: −20 to +4 dBm Resolution 0.1 dB available • External reference input: (10 MHz) available	Transmission rate accuracy Power measurement range with carrier OFF IQ input modulation accuracy
Calibration receiver (ML2530A)	• Frequency range: 100 kHz to 3 GHz Resolution 1 Hz available • Measurement power range: −140 to 20 dBm • Measurement accuracy: ±0.04 dB • External reference input: (10 MHz) available	Modulation/frequency measurement Linearity Power meter accuracy
Power meter (ML4803A) Power sensor (MA4601A)	• Main unit accuracy: ±0.02 dB • Frequency range: 100 kHz to 8.5 GHz (depending on power sensor used) • Frequency range: 10 MHz to 3 GHz • Measurement power range: −30 to +20 dBm • Input connector: N type	Transmission power measurement accuracy Linearity Power meter accuracy
Fixed attenuator (MP721A)	• Attenuation: 3 dB • VSWR: 1.2 or less	Power measurement accuracy
Programmable attenuator (MN72A)	• Frequency range: DC to 18 GHz • Attenuation accuracy: 0.9 dB • VSWR: 1.2 or less	Modulation/frequency measurement Transmission rate accuracy Transmission power measurement accuracy Linearity Power meter accuracy
Power Divider	• Frequency range: 50 MHz to 3 GHz	Modulation/frequency measurement
Power splitter	• Frequency range: 50 MHz to 3 GHz	Modulation/frequency measurement

Recommended unit name (model name)	Required performance	Test items
LPF switching unit	• Able to cut off 850 MHz secondary harmonic wave and filter through.	Spurious measurement
2G LPF	• Able to cut off harmonic wave of 2 GHz or more generated by signal generator.	Spurious measurement

The "Required performance" column shows a portion of the possible performance within the measurement range of the test items.

Performance Test <MS860x>

Before starting the performance test, warm up the devices to be tested and measurement units for 30 minutes or more, unless otherwise specified. Ensure that they are stabilized.

To achieve the highest measurement accuracy, measurement should be performed at room temperature (25 ±5°C), with little AC power voltage fluctuation. The environment should be free from noise, vibration, dust, humidity and other complications.

Modulation/frequency measurement <MS860x>

This section describes tests on the following items:

- Carrier frequency accuracy
- Residual EVM
- Origin offset accuracy
- Transmission rate accuracy

(1) Test specifications

- Frequency measurement accuracy: ± (Reference crystal oscillator accuracy+10 Hz)

  Input level (average power during burst):
  ≥−10 dBm (High Power input)
  ≥−30 dBm (Low Power input)
  ≥−40 dBm (Low Power input, with preamplifier ON*1)
- Residual EVM: <0.5% (rms) (PDC, NADC)
  <0.7% (rms) (PHS)

  Input level (average power during burst):
  ≥−10 dBm (High Power input)
  ≥−30 dBm (Low Power input)
  ≥−40 dBm (Low Power input, with preamplifier ON*1)
- Origin offset accuracy: ±0.5 dB

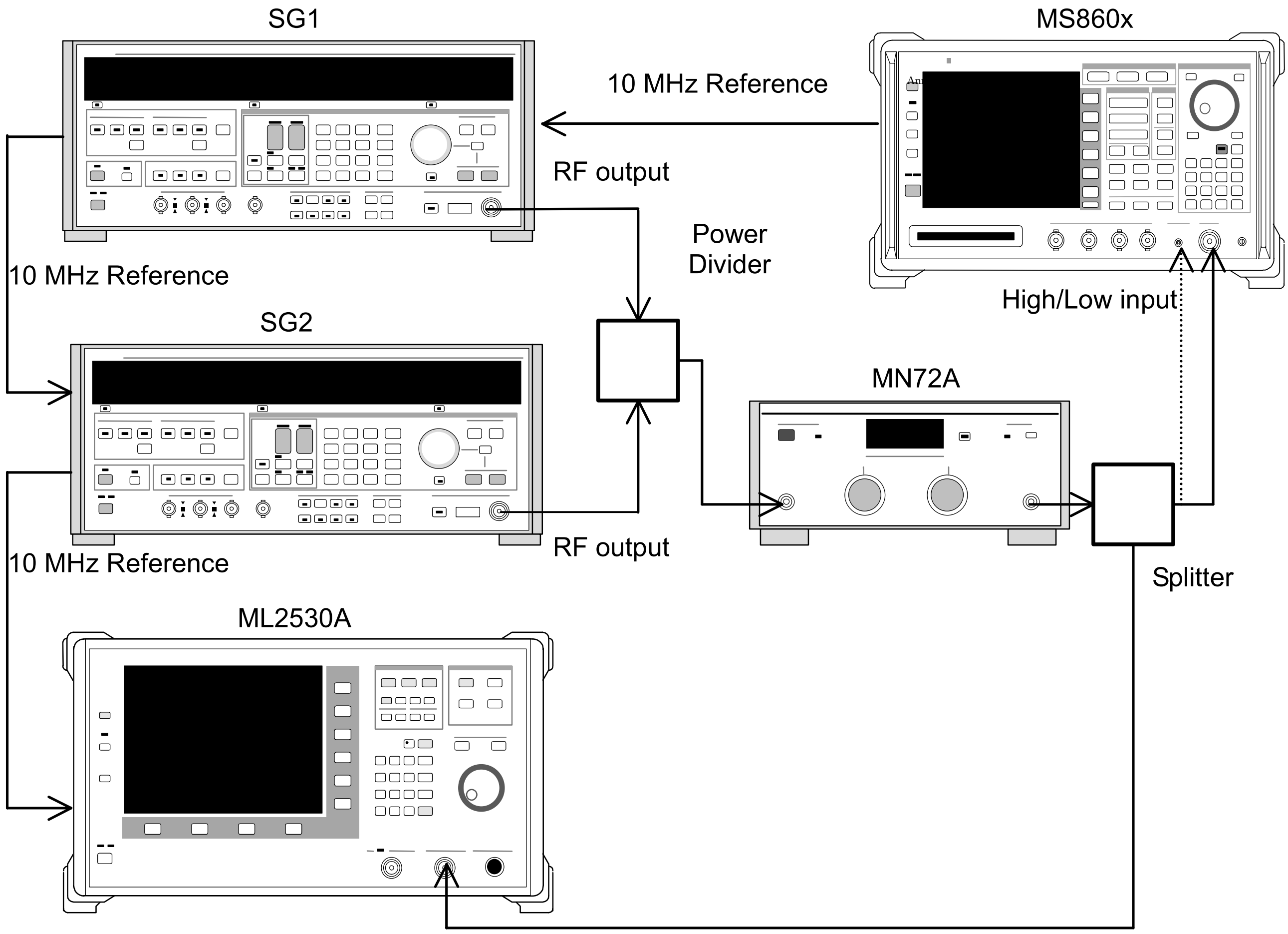
  Input level (average power during burst):
  ≥−10 dBm (High Power input)
  ≥−30 dBm (Low Power input)
  ≥−40 dBm (Low Power input, with preamplifier ON*1)
  for signal with origin offset −30 dBc

*1. The preamplifier can be turned on when main unit option 08 is installed.

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Synthesized signal generator (SG2): MG3633A
- Calibration receiver: ML2530A
- Programmable attenuator: MN72A
- Power divider
- Power splitter

(3) Setup



(4) Test procedures

1. Set the programmable attenuator (MN72A) to 0 dB.
2. Set SG1 to no-modulation and the frequency and level as follows:
   - Frequency: (Frequency given in the table below +2.625 kHz)
     2.625 kHz is 1/8 of PDC symbol rate.
     Equivalent to all-0 modulation on PDC.
   - Level: −10 dBm
3. Set SG2 to no-modulation and the frequency and level as follows:
   - Frequency: (Frequency given in the table of step 31)
   - Level: −40 dBm
4. Set this unit as follows:
   - Input Terminal: RF (High and Low for MS8608A)
   - Reference Level: −10 dBm
   - Frequency: (Frequency in the table of step 31)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
5. Press [ ] (More) to display the second function label page.
6. Press [F6] (Power Meter) to display the Power Meter screen.
7. Set SG1 and SG2 outputs to OFF and press [F5] (Zero Set).
8. Set the SG1 output to −10 dBm and execute [F4] (Adjust Range). Adjust the SG1 level so that the Power Meter indicates −10 dBm ±0.1 dB. (After changing the SG1 level, be sure to execute Adjust Range.) After level calibration, press [F6] (Back Screen).
9. Set programmable attenuator (MN72A) to 30 dB.
10. Set +2.625 kHz to the frequency given in the table below for the setting frequency for calibration receiver (ML2530A). Also set BW to 100 Hz and Relative mode. (The range is fixed to 2.)
11. Set the SG2 output to ON. After changing the ML2530A frequency to the value given in the table below, adjust the SG2 level so that the indicated value is −30 dB ±0.1 dB. Record the results (origin offset expected value). The value indicated by ML2530A becomes the origin offset expected value.
12. Set programmable attenuator (MN72A).
    - For Pre-Ampl ON: 30 dB
    - For MS8609A and MS8608A Low input: 20 dB
    - For MS8608A High input: 0 dB
13. Return the function label to the first page, and press [F2] (Modulation Analysis) to display the Modulation Analysis screen.

14. Execute F5 (Adjust Range).
15. Read the measurement results displayed on the screen and check that the origin offset satisfies the Standard.

    Origin offset accuracy [dB] = Measurement result − Origin offset expected value
16. Set the SG2 output to OFF.
17. Set Storage Mode to Average and the Average count to 10.
18. Read the measurement results displayed on the screen and check that the frequency error and residual vector error satisfy the Standard.
19. Change the frequency as shown in the table below and repeat Steps 1 to 18.
20. Set the programmable attenuator (MN72A) to 0 dB.
21. Set SG1 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency given in the table below +3.0375 kHz)
      3.0375 kHz is 1/8 of PDC symbol rate.
      Equivalent to all-0 modulation on NADC.
    - Level: −10 dBm
22. Set SG2 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency given in the table below)
    - Level: −40 dBm
23. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table of step 31)
    - Target System: NADC
    - Measuring Object: BASE
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
24. Repeat Steps 5 to 18 above.
25. Change the frequency as shown in the table below and repeat Steps 20 to 24.
26. Set programmable attenuator (MN72A) to 0 dB.
27. Set SG1 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency in the table below +24 kHz)
      24 kHz is 1/8 of PHS symbol rate.
      Equivalent to all-0 modulation on PHS.
    - Level: −10 dBm
28. Set SG2 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency in the table of step 31)
    - Level: −40 dBm

29. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
30. Repeat Steps 5 to 18 above.
31. Change the frequency as shown in the table below and repeat Steps 26 to 30.

Frequency	Level (input level to MS860x)		
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input	MS8608A High input
50 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
850 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
1800 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
2700 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB

Transmission rate accuracy <MS860x>

(1) Test specifications

Transmission rate accuracy: ±1ppm

Input level (average power during burst):

≥−10 dBm (High Power input)

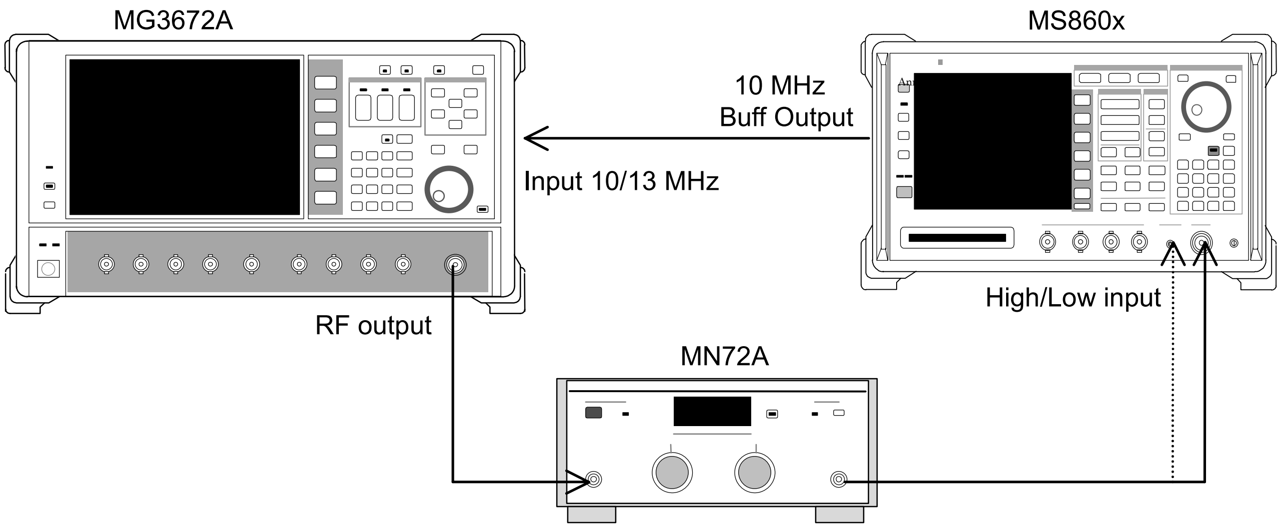
≥−30 dBm (Low Power input)

≥−40 dBm (Low Power input, with preamplifier ON*1)

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B
- Programmable attenuator: MN72A

(3) Setup



(4) Test procedures

1. Set programmable attenuator (MN72A) to 0 dB.
2. Set SG3 as follows:
   - Frequency: (Frequency given in the table of step 23)
   - Level: −10 dBm
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst:: OFF
   - Pattern: PN9
3. Set this unit as follows:
   - Input Terminal: RF (High and Low for MS8608A)
   - Reference Level: −10 dBm
   - Frequency: (Frequency given in the table of step 23)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
4. Press [ ] (More) to display the second function label page.
5. Press [F6] (Power Meter) to display the Power Meter screen.
6. Set SG3 outputs to OFF and execute [F5] (Zero Set).
7. Set the SG3 output to −10 dBm and execute [F4] (Adjust Range). Adjust the SG3 level so that the Power Meter indicates −10 dBm ±0.1 dB. (After changing the SG3 level, be sure to execute Adjust Range.) After level calibration, press [F6] (Back Screen).

8. Set programmable attenuator (MN72A) as follows:
   - For Pre-Ampl ON: 30 dB
   - For MS8609A and MS8608A Low input: 20 dB
   - For MS8608A High input: 0 dB
9. Return the function label to the first page, and press F2 (Modulation Analysis) to display the Modulation Analysis screen.
10. Execute F5 (Adjust Range).
11. Press F4 (Bit Rate Measure) to set it ON.
12. Read the measurement results displayed on the screen and check that the transmission rate error satisfies the Standard.
13. Change the frequency as shown in the table below and repeat Steps 1 to 12.
14. Set programmable attenuator (MN72A) to 0 dB.
15. Set SG3 as follows:
   - Frequency: (Frequency given in the table of step 23)
   - Level: –10 dBm
   - System: NADC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst:: OFF
   - Pattern: PN9
16. Set this unit as follows:
   - Input Terminal: RF (High and Low for MS8608A)
   - Reference Level: –10 dBm
   - Frequency: (Frequency given in the table of step 23)
   - Target System: NADC
   - Measuring Object: Base
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
17. Repeat Steps 4 to 12 above.
18. Change the frequency as shown in the table below and repeat Steps 14 to 17.
19. Set programmable attenuator (MN72A) to 0 dB.
20. Set SG3 as follows:
   - Frequency: (Frequency given in the table of step 23)
   - Level: –10 dBm
   - System: PHP
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst:: OFF
   - Pattern: PN9

21. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
22. Repeat Steps 4 to 12 above.
23. Change the frequency as shown in the table below and repeat Steps 19 to 22.

Frequency	Level (input level to MS860x)		
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input	MS8608A High input
50 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
850 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
1500 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB
2100 MHz	−40 dBm ±0.1 dB	−30 dBm ±0.1 dB	−10 dBm ±0.1 dB

Transmission power measurement accuracy <MS860x>

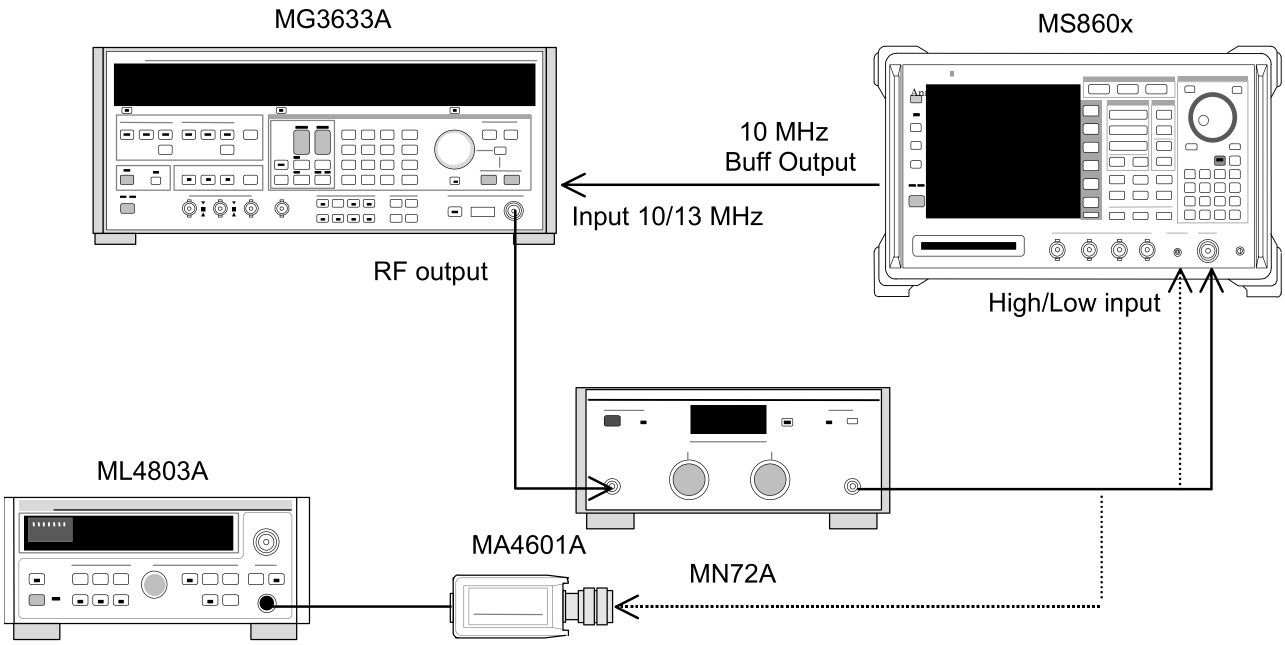
(1) Test specifications

±0.4 dB (after calibration using the built-in power meter)

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Power meter: ML4803A
- Power sensor: MA4601A
- Programmable attenuator: MN72A

(3) Setup



(4) Test procedures

1. Connect power sensor (MA4601A) to Cal Output for power meter (ML4803A) and execute Zero Adjust.
2. Set Sensor Input to ON and execute ADJ (Cal Adjust).
3. Connect SG1 (MN72A output) to power sensor (MA4601A).
4. Set the SG1 frequency and output level.
   Adjust the SG1 level so that power meter (ML4803A) indicates +10 dBm ±0.1 dB. Record the measurement results. Set the programmable attenuator (MN72A) to 20 dB and then measure and record the attenuation at each measurement frequency. Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS860x)		
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input	MS8608A High input
50 MHz	–10 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
850 MHz	–10 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
1500 MHz	–10 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
2100 MHz	–10 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB

5. Connect SG1 (MN72A output) to this unit.

6. Set this unit as follows:
   - Input Terminal: RF (High/Low Power Input)
   - Reference Level: (Level given in the table of step 4)
   - Frequency: (Frequency given in the table of step 4)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
7. Set programmable attenuator (MN72A).
   - Pre-Ampl ON: 20 dB
   - MS8609A and MS8608A Low input: 20 dB
   - MS8608A High input: 0 dB
8. Press F3 (RF Power) to display the RF Power screen.
9. Press F5 (Adjust Range).
10. Press (More) to display the second function label page.
11. Press F4 (Calibration) and execute F1 (Power Calibration).
12. Record the Tx Power value (dBm).
    - For MS8608A High input
      Measurement accuracy [dB] = Tx Power value − Power meter measurement value
    - For Pre-Ampl ON and MS860x Low input
      Measurement accuracy [dB] = Tx Power value − (Power meter measurement value − actual attenuation for MN72A ATT: 20 dB)
13. Change the frequency and repeat Steps 3 to 12 above.
14. Repeat Steps 1 to 13 above, changing Step 6 as follows:
    - Input Terminal: RF (High/Low Power Input)
    - Reference Level: (Level given in the table of step 4)
    - Frequency: (Frequency given in the table of step 4)
    - Target System: NADC
    - Measuring Object: Base
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0

15. Repeat Steps 1 to 13 above, changing Step 6 as follows:
    - Input Terminal: RF (High/Low Power Input)
    - Reference Level: (Level given in the table of step 4)
    - Frequency: (Frequency given in the table of step 4)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0

Transmission power measurement accuracy with carrier OFF <MS860x>

(1) Test specifications

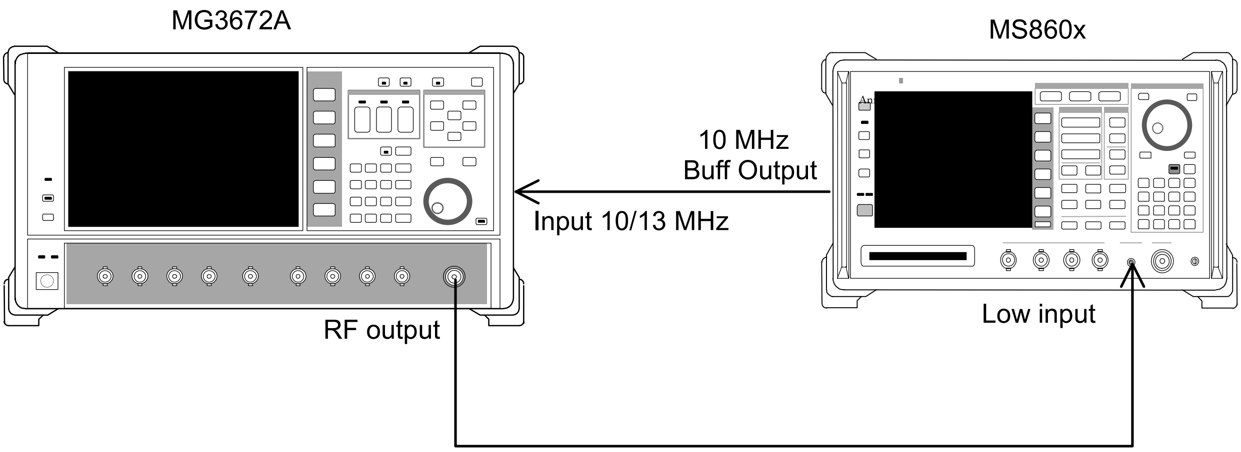
- Input level (average power during burst):
  ≥+10 dBm (High Power input)
  ≥−10 dBm (Low Power input)
  ≥−20 dBm (Low Power input, with preamplifier ON*1)
- Normal mode measurement range:
  ≥65 dB (compared with average power during burst) PDC, NADC
  ≥60 dB (compared with average power during burst) PHS
- Measurement range in wide-dynamic range mode:
  Average power during burst: 1W (High Power input)
  Compared with 10mW (Low Power input)
  ≥90 dB (Measurement limit is determined by average noise level: ≤−60 dBm (High input, 50 MHz to 2.1 GHz)) PDC, NADC
  ≥80 dB(Measurement limit is determined by average noise level: ≤−50 dBm (High input, 50 MHz to 2.1 GHz)) PDC, NADC

*1. The preamplifier can be turned on when main unit option 08 is installed.

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B

(3) Setup



(4) Test procedures

1. Set SG3 as follows:
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: ON
   - Pattern: UP TCH
   - Trigger: Int
2. Set the SG3 frequency. Set the SG3 output level to –10 dBm. Measure the input level to this unit using the Tx Power value on the RF Power screen (with Wide Dynamic Range set to OFF). Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS860x)	
	MS860x Pre-Ampl ON	MS860x Low input
50 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
850 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
1500 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
2100 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB

3. Set this unit as follows:
   - Input Terminal: RF (Low input only for MS8608A)
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: MS-TCH
   - Trigger: Free Run

4. Press F3 (RF Power) to display the RF Power screen.
5. Press F5 (Adjust Range).
6. Press (More) to display the second function label page.
7. Press F4 (Calibration) and execute F1 (Power Calibration).
8. Press Single and adjust the SG2 level so that the Tx Power value is −10 dBm ±0.1 dB or less. (Do not execute Adjust Range after changing the level.)

   (When Pre-Ampl is ON, calibrate so that the Tx Power value is −20 dBm ±0.1 dB. At this time, execute Adjust Range.)
9. Check that ON/OFF Ratio satisfies the Standard.
10. Return the function label to the first page. Press F4 (Wide Dynamic Range) and set it to ON (for both Low input and Pre-Ampl ON).
11. Adjust the SG2 level so that the input level to this unit indicated by Tx Power value on the RF Power screen is 0 dBm. Press F5 (Adjust Range).
12. Press (More) to display the second function label page.
13. Press F4 (Calibration) and execute F1 (Power Calibration).
14. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard (≤−81 dBm for Low Power input).
15. Change the frequency and repeat Steps 2 to 14 above.
16. Set SG3 as follows:
    - System: NADC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst: ON
    - Pattern: UP TCH
    - Trigger: Int
17. Set the SG3 frequency. Set the output level to −10 dBm. Measure the input level to this unit using the Tx Power value on the RF Power screen (with Wide Dynamic Range set to OFF). Measurement frequency and level combinations are given in the table above.
18. Set this unit as follows:
    - Input Terminal: RF (Low Power input only for MS8608A)
    - Reference Level: (Level given in the table of step 2)
    - Frequency: (Frequency given in the table of step 2)
    - Target System: NADC
    - Measuring Object: Mobile
    - Trigger: Free Run
19. Repeat Steps 4 to 13 above.

20. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard (≤–81 dBm for Low Power input)
21. Change the frequency and repeat Steps 16 to 20 above.
22. Set SG3 as follows:
    - System: PHP
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst: ON
    - Pattern: UP TCH
    - Trigger: Int
23. Set this unit as follows:
    - Input Terminal: RF (Low Power input only for MS8608A)
    - Reference Level: (Level given in the table of step 2)
    - Frequency: (Frequency given in the table of step 2)
    - Target System: PHS
    - Measuring Object: PS-TCH
    - Trigger: Free Run
24. Repeat Steps 4 to 13 above.
25. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard (≤–71 dBm for Low Power input).
26. Change the frequency and repeat Steps 22 to 25 above.

Linearity <MS860x>

(1) Test specifications

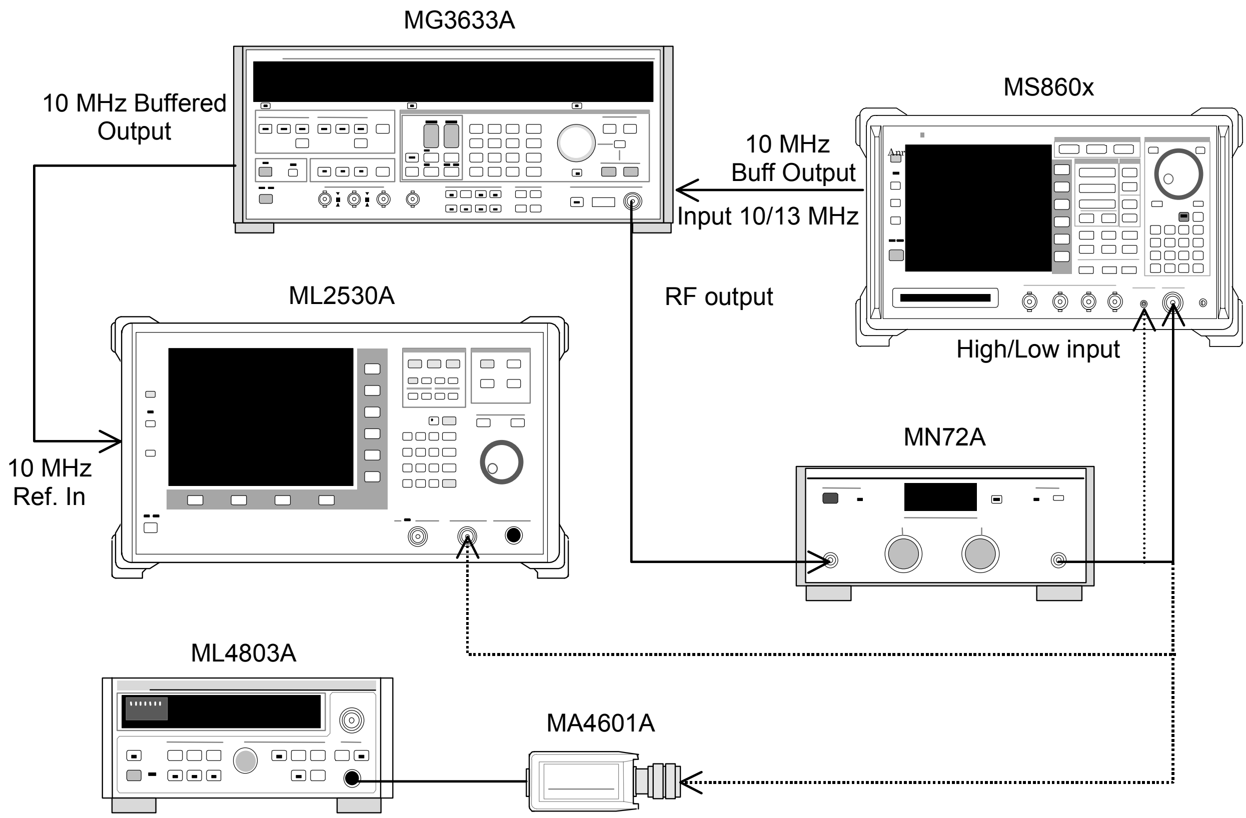
±0.2 dB (0 to –30 dB)

Without changing the reference level settings after range optimization

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Calibration receiver: ML2530A
- Programmable attenuator: MN72A
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Connect power sensor (MA4601A) to Cal Output for power meter (ML4803A). Execute Zero Adjust.
2. Set Sensor Input to ON and execute ADJ (Cal Adjust).
3. Connect SG1 (MN72A output) to power sensor (MA4601A).
4. Set the SG1 frequency and set programmable attenuator (MN72A) to 0 dB. Adjust the SG1 level so that the power meter (ML4803A) indicates +10 dBm ±0.1 dB. Record the set value (Set_Ref). Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS860x)		
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input	MS8608A High input
50 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
850 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
1500 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
2100 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB

5. Connect SG1 (MN72A output) to calibration receiver (ML2530A). Set BW to 100 Hz and the Relative mode (with the range fixed to 1).

6. Lower the SG1 level in 10 dB steps until it reaches –30 dBc (for Set_Ref). Record the measurement value at calibration receiver (ML2530A) at each step (ML2530A reading).
7. Set this unit as follows:
   - Input Terminal: RF (High/Low Power input)
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Sync Word: No
   - Trigger: Free Run
8. Set programmable attenuator (MN72A).
   - For Pre-Ampl ON: 30 dB
   - For MS8609A and MS8608A Low input: 20 dB
   - For MS8608A High input: 0 dB
9. Connect SG1 (MN72A output) to this unit and set the signal generator level to Set_Ref.
10. Press [F3] (RF Power) to display the RF Power screen.
11. Press [F5] (Adjust Range).
12. Press [ ] (More) to display the second function label page.
13. Press [F4] (Calibration) and execute [F1] (Power Calibration).
14. Record the Tx Power value (dBm) (Measure_Ref).
15. Lower the SG1 level in 10 dB steps until it reaches –30 dBc (for Set_Ref). Record the Tx Power value at each step.

    (Change the SG1 level in 10 dB steps; do not change the programmable attenuator (MN72A) settings.)
16. Check that the linearity error (below) satisfies the Standard.
    Linearity error [dB] = Tx Power value – (Measure_Ref-ML2530A reading)
17. Change the frequency and repeat Steps 3 to 16 above.
18. Repeat Steps 1 to 17 above, changing Step 7 as follows:
   - Input Terminal: RF (High/Low Power input)
   - Reference Level: (Level given in the table of step 4)
   - Frequency: (Frequency given in the table of step 4)
   - Target System: NADC
   - Measuring Object: Base
   - Sync Word: No
   - Trigger: Free Run

19. Repeat Steps 1 to 17 above, changing Step 7 as follows:
    - Input Terminal: RF (High/Low Power Input)
    - Reference Level: (Level given in the table of step 4)
    - Frequency: (Frequency given in the table of step 4)
    - Target System: PHS
    - Measuring Object: Continuous
    - Sync Word: No
    - Trigger: Free Run

Occupied frequency bandwidth measurement <MS860x>

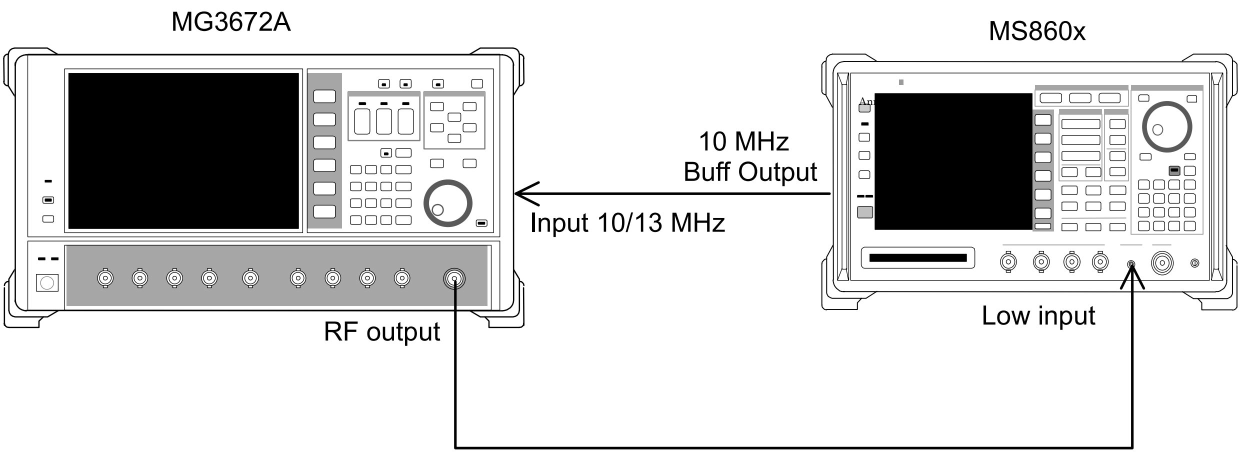
(1) Test specifications

- This test is a functional test and therefore has no test specifications.

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B

(3) Setup



(4) Test procedures

1. Set SG3 as follows:
    - System: PDC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9
2. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Use the built-in power meter to measure the input level to this unit. Measurement frequency and level combinations are given in the table below.

3. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency in the table of step 21)
    - Target System: PDC
    - Measuring Object: BS-CH
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
4. Press F4 (Occupied Bandwidth) and display the Occupied Bandwidth screen.
5. Execute F5 (Adjust Range).
6. Press F1 (Measure Method) and set the measurement method to FFT.
7. Set Storage Mode to Average and Average Count to 10.
8. Check that the occupied frequency bandwidth measurement value is 26.5 ±2 kHz.
9. Change the frequency and repeat Steps 2 to 8 above.
10. Set SG3 as follows:
    - System: NADC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9
11. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Use the built-in power meter to measure the input level to this unit. Measurement frequency and level combinations are given in the table of step 21.
12. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table of step 21)
    - Target System: NADC
    - Measuring Object: Base
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
13. Repeat Steps 4 to 7 above.
14. Check that the occupied frequency bandwidth measurement value is 27.7 ±2 kHz.
15. Change the frequency and repeat Steps 11 to 14 above.

16. Set SG3 as follows:
    - System: PHP
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9
17. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Use the built-in power meter to measure the input level to this unit. Measurement frequency and level combinations are given in the table below.
18. Set this unit as follows:
    - Input Terminal: RF (High and Low for MS8608A)
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
19. Repeat Steps 4 to 7 above.
20. Check that the occupied frequency bandwidth measurement value is 245.0 ±10 kHz.
21. Change the frequency and repeat Steps 17 to 20 above.

Frequency	**Level (SG3 set value)**		
	MS860x Pre-Ampl ON	**MS8609A and MS8608A Low input**	**MS8608A High input**
50 MHz	−30 dBm	−20 dBm	0 dBm
850 MHz	−30 dBm	−20 dBm	0 dBm
1500 MHz	−30 dBm	−20 dBm	0 dBm
2100 MHz	−30 dBm	−20 dBm	0 dBm

Adjacent channel leakage power measurement <MS860x>

(1) Test specifications

- CW signal input for High Speed method

  PDC

  50 kHz detuning: ≥60 dB

  100 kHz detuning: ≥65 dB

  NADC

  30 kHz detuning: ≥30 dB

  60 kHz detuning: ≥60 dB

  90 kHz detuning: ≥65 dB

  PHS

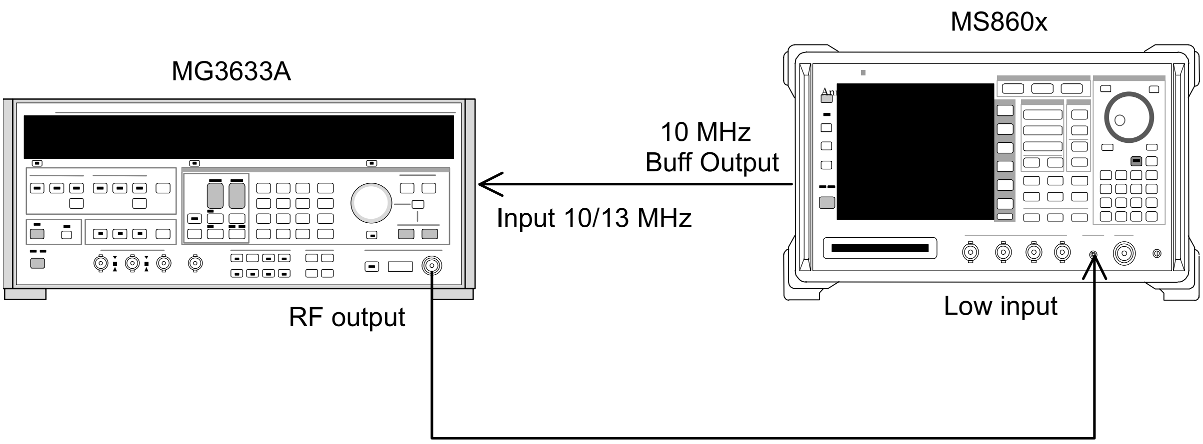
  600 kHz detuning: ≥60 dB

  900 kHz detuning: ≥60 dB

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A

(3) Setup



(4) Test procedures

1. Set SG1 to no-modulation and set the frequency and output level. Use the built-in power meter to measure the input level to this unit. Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS860x)	
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input
50 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
850 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
1500 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB
2100 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB

2. Set this unit as follows:
   - Input Terminal: RF (Low input only for MS8608A)
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Trigger: Free Run
3. Press [ ] (More) to display the second function label page.
4. Press [F6] (Power Meter) to display the Power Meter screen.
5. Set SG1 output to OFF and execute [F5] (Zero Set).
6. Set the SG1 output to the level given in the table above and execute [F4] (Adjust Range). Adjust the SG1 level so that the Power Meter indicates the level given in the table above. (After changing the SG1 level, be sure to execute Adjust Range.)
7. After level calibration, press [F6] (Back Screen).
8. Return the function label to the first page, and press [F5] (Adjacent Channel Power) to display the Adjacent Channel Power screen.
9. Press [F1] (Measure Method) and set the measurement method to High Speed.
10. Press [F3] (Unit) and then [F5] (dB) to change the unit to dB.
11. Press [F6] (Return) and then [F5] (Adjust Range).
12. Press [F4] (Calibration) and then [F1] (Power Calibration).
13. Check that the Mean Power measurement results satisfy the Standard.
14. Change the frequency and repeat Steps 1 to 13 above.

15. Repeat Steps 1 to 14 above, changing Step 2 as follows:
    - Input Terminal: RF (Low input only for MS8608A)
    - Reference Level: (Level given in the table of step 1)
    - Frequency: (Frequency given in the table of step 1)
    - Target System: NADC
    - Measuring Object: Base
    - Trigger: Free Run
16. Repeat Steps 1 to 14 above, changing Step 2 as follows:
    - Input Terminal: RF (Low input only for MS8608A)
    - Reference Level: (Level given in the table of step 1)
    - Frequency: (Frequency given in the table of step 1)
    - Target System: PHS
    - Measuring Object: Continuous
    - Trigger: Free Run

Spurious measurement <MS860x>

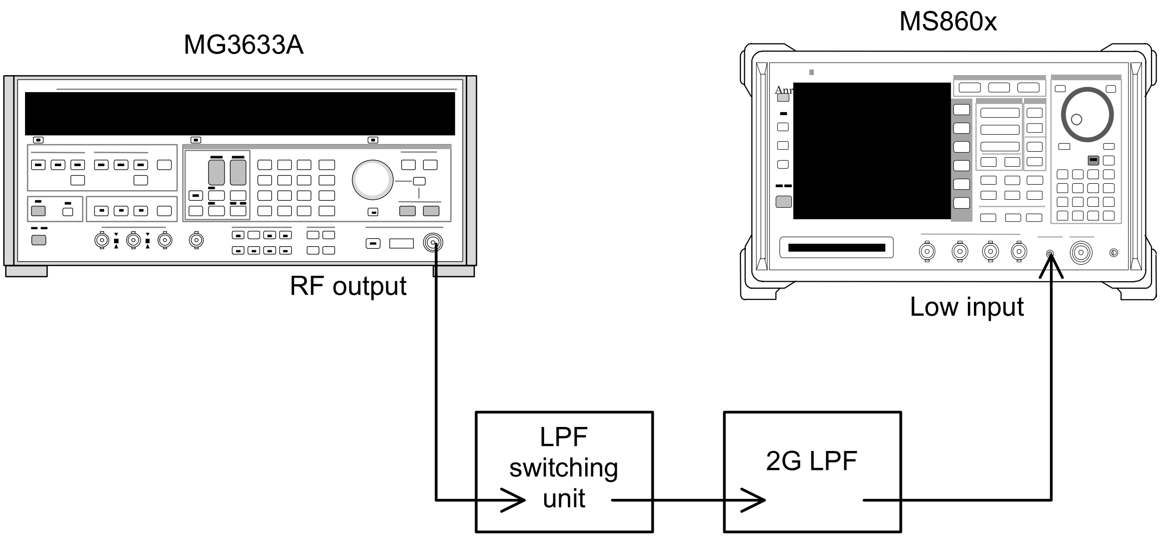
(1) Test specifications

This test is a functional test and therefore has no test specifications.

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- LPF switching unit (Able to cut off 850 MHz secondary harmonic waves and filter through)
- 2G LPF

(3) Setup



(4) Test procedures

1. Set the SG1 frequency and output level. Use the built-in power meter to measure the input level to this unit. Measurement frequency and level combinations are given in the table below.

Frequency	Level (power meter reading)	
	MS860x Pre-Ampl ON	MS8609A and MS8608A Low input
850 MHz	–10 dBm ±0.1 dB	0 dBm ±0.1 dB
1850 MHz	–10 dBm ±0.1 dB	0 dBm ±0.1 dB

2. Set this unit as follows:
   - Input Terminal: RF (Low input only for MS8608A)
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Modulation: PHS
   - Measuring Object: Continuous
   - Trigger: Free Run
3. Press [ ] (More) to display the second function label page.
4. Press [F6] (Power Meter) to display the Power Meter screen.
5. Set SG1 output to OFF and press [F5] (Zero Set).
6. Set the SG1 output to the level given in the table above and execute [F4] (Adjust Range). Adjust the signal generator (SG1) level so that the Power Meter indicates the level given in the table above. (After changing the SG1 level, be sure to execute Adjust Range.)
7. After level calibration, press [F6] (Back Screen).

8. Set the LPF switching unit as follows:
   a) When Carrier Frequency is 850 MHz
      - Set LPF to 1.1 GHz.
   b) When Carrier Frequency is 1850 MHz
      - Set LPF to Filter Pass (No Filter).
9. Return the function label to the first page, and press F6 (Spurious Emission) to display the Spurious Emission screen.
10. Press F1 (Spurious Mode) and set F3 (Sweep). After setting, press F6 (Return).
11. Press [ ] (More) to display the second function label page.
12. Press F2 (Setup Search/Sweep Table) and set the frequencies given in the table of step 25.
    a) When Carrier Frequency is 850 MHz
       - Set Table 1.0.
    b) When Carrier Frequency is 1850 MHz
       - Set Table 2.0.

    After setting the table, press F6 (Return).
13. Press [ ] (More) to display the second function label page.
    Press F5 (Setup Spectrum Analyzer).
    Press F4 (Preselector) and set Normal mode.
14. Return the function label to the first page.

    (Steps 13 and 14 are available only when option 03 is installed.)
15. Execute F5 (Adjust Range).
16. Press F4 (Calibration) and execute F1 (Power Calibration).
17. Check that the measurement value is ≥ 60 dB.
18. When option 03 is installed, continue to the steps below.
19. Press [ ] (More) to display the second function label page.
    Press F3 (Setup Search/Sweep Table) and then press [ ] (More) to display the second function label page.
20. Press F2 to clear the frequency table.
21. Set the frequency table as shown below.
    a) When Carrier Frequency is 850 MHz
       - Set as shown in Table 1.1.
    b) When Carrier Frequency is 1850 MHz
       - Set as shown in Table 2.1.
22. Press [ ] (More) to display the second function label page.
    Press F5 (Setup Spectrum Analyzer).
    Press F4 (Preselector) to set Spurious mode.

23. Return the function label to the first page.
24. In the same way, repeat Steps 15 to 17.
25. Change the frequency and repeat Steps 1 to 24 above.

Table 1.0

	Start frequency	Stop frequency	RBW
f1	2 MHz	50 MHz	300 kHz
f2	50 MHz	500 MHz	300 kHz
f3	500 MHz	800 MHz	300 kHz
f4	900 MHz	1650 MHz	300 kHz
f5	1750 MHz	2500 MHz	300 kHz
f6	2600 MHz	3200 MHz	300 kHz
f7	3200 MHz	7800 MHz	300 kHz

Table 1.1

	Start frequency	Stop frequency	RBW
f1	1600 MHz	7800 MHz	300 kHz

Table 2.0

	Start frequency	Stop frequency	RBW
f1	1 MHz	50 MHz	300 kHz
f2	50 MHz	500 MHz	300 kHz
f3	500 MHz	1800 MHz	300 kHz
f4	1900 MHz	3200 MHz	300 kHz
f7	3200 MHz	7800 MHz	300 kHz

Table 2.1

	Start frequency	Stop frequency	RBW
f1	1600 MHz	1800 MHz	300 kHz
f2	1900 MHz	7800 MHz	300 kHz

IQ input modulation accuracy <MS860x>

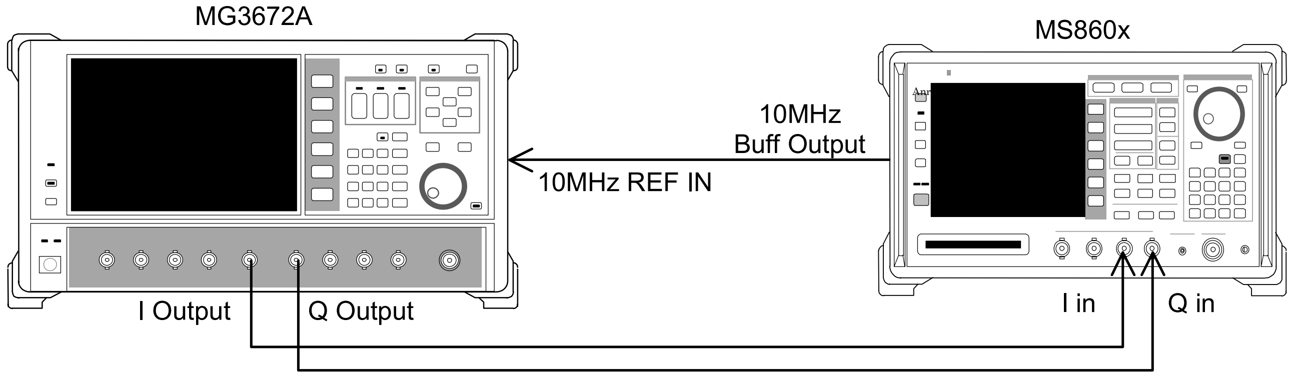
(1) Test specifications

- Residual EVM
  < 0.5% (rms) (DC coupling) PDC, NADC typical value
  < 0.7% (rms) (DC coupling) PHS typical value

(2) Measurement units for test

- Digital signal generator: MG3672A with MG0301C and MG0303B

(3) Setup



(4) Test procedures

1. Set MG3672A as follows:
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
2. Set this unit as follows:
   - Input Terminal: IQ-DC
   - Impedance: 50 Ω
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word Pattern: No
   - Trigger: Free Run
   - Symbol Timing: 0.00symbol
3. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
4. Check that the residual EVM value (Residual EVM) satisfies the Standard.

5. Set MG3672A as follows:
   - System: NADC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
6. Set this unit as follows:
   - Input Terminal: IQ-DC
   - Impedance: 50 Ω
   - Target System: NADC
   - Measuring Object: Base
   - Filter: Root-Nyquist
   - Sync Word Pattern: No
   - Trigger: Free Run
   - Symbol Timing: 0.00symbol
7. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
8. Check that the residual EVM value (Residual EVM) satisfies the Standard.
9. Set MG3672A as follows:
   - System: PHP
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
10. Set this unit as follows:
    - Input Terminal: IQ-DC
    - Impedance: 50 W
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word Pattern: No
    - Trigger: Free Run
    - Symbol Timing: 0.00symbol
11. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
12. Check that the residual EVM value (Residual EVM) satisfies the Standard.

Power meter accuracy <MS860x>

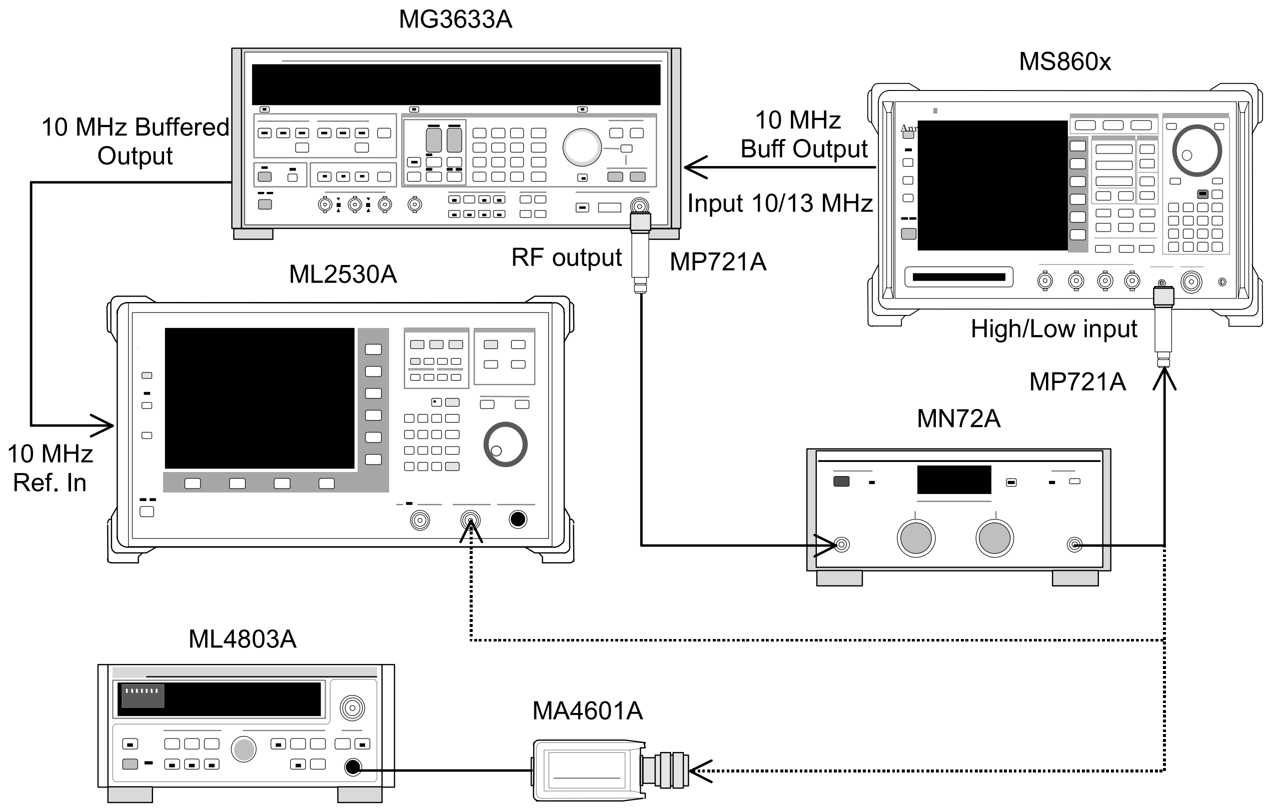
(1) Test specifications

- Measurement level accuracy
  ±10% (after zero-point calibration)

(2) Measurement units for test

- Signal generator (SG1): MG3633A
- Calibration receiver: ML2530A
- Power meter: ML4803A
- Power sensor: MA4601A
- Programmable attenuator: MN72A
- 3 dB ATT ×2: MP721A

(3) Setup



(4) Test procedures

1. Connect power sensor (MA4601A) to Cal Output for power meter (ML4803A) and execute Zero Adjust.
2. Set Sensor Input to ON and execute ADJ (Cal Adjust).
3. Connect SG1 (MN72A output) to power sensor (MA4601A) with MP721A.
4. Set the SG1 frequency.
   Measurement frequencies: 50 MHz, 2000 MHz, 3000 MHz
5. Adjust the SG1 level so that the power meter (ML4803A) indicates +10 dBm ±0.1 dB at the set frequency. Record the SG1 set value (Set_Ref) and the power meter reading (Read_Ref).
6. Connect the SG1 (MN72A output) to calibration receiver (ML2530A) (MP721A included). Set the SG1 level to the Set_Ref value above.
7. Set calibration receiver (ML2530A) to Relative mode (with range fixed to 1). Lower the programmable attenuator (MN72A) in steps of 10 dB until it is –30 dB. Record the measurement value of ML2530A at each step (ATT_n). After recording, reset the MN72A to 0 dB.
8. Press [ ] (More) on this unit to display the second function label page.
9. Press [F6] (Power Meter) to display the Power Meter screen.
10. With no signals input to this unit, execute [F5] (Zero Set).
11. Connect SG1 (MN72A output) to this unit with MP721A.
12. Set the frequency of this unit to the value set in Step 4 above.
13. Lower the programmable attenuator (MN72A) in steps of 10 dB until it is –30 dB. At each attenuation step calculate the measurement accuracy from the measurement value of this unit (tester measurement value) and the Power meter reading (Read_Ref) – ML2530A measurement value (ATT_n) (see the formula below). When changing the programmable attenuator settings, execute [F4] (Adjust Range) at each step.

$$Measurement\ accuracy[\%] = \left(\frac{10^{(Tester\ measurement\ value/10)}}{10^{(Read\_Ref + ATT\_n*)/10}} - 1 \right) \times 100$$

* ATT_n is a minus value.

14. Change the frequency and repeat Steps 4 to 13 above.

Equipment Required for the Performance Test <MS268x>

The measurement equipment required for the performance test is listed below.

Recommended unit name (model name)	Required performance	Test items
Synthesized signal generator (MG3633A)	• Frequency range: 100 kHz to 2700 MHz Resolution of 1 Hz available • Output level range: −20 to +10 dBm Resolution of 0.1dB available • SSB phase noise: −130 dBc/Hz or less (with offset 10 kHz) • Secondary harmonic wave: −30 dBc or less • External reference input: (10 MHz) available	Modulation/frequency measurement Transmission power measurement accuracy Linearity Adjacent channel leakage power measurement Spurious measurement
Digital modulation signal generator (MG3672A + MG0301C + MG0303B)	• Frequency range: 50 MHz to 2100 MHz Resolution 1 Hz available • Output level range Without modulation: −10 to +10 dBm With modulation: −20 to +4 dBm Resolution 0.1 dB available • External reference input: (10 MHz) available	Transmission rate accuracy Power measurement range with carrier OFF IQ input modulation accuracy
Calibration receiver (ML2530A)	• Frequency range: 100 kHz to 3 GHz Resolution 1 Hz available • Measurement power range: −140 to 20 dBm • Measurement accuracy: ±0.04 dB • External reference input: (10 MHz) available	Modulation/frequency measurement Linearity
Power meter (ML4803A) Power sensor (MA4601A)	• Main unit accuracy: ±0.02 dB • Frequency range: 100 kHz to 8.5 GHz (depending on power sensor used) • Frequency range: 10 MHz to 3 GHz • Measurement power range: −30 to +20 dBm • Input connector: N type	Modulation/frequency measurement Transmission rate accuracy Transmission power measurement accuracy Power measurement range with carrier OFF Linearity Adjacent channel leakage power measurement Spurious measurement
Programmable attenuator (MN72A)	• Frequency range: DC to 18 GHz • Attenuation accuracy: 0.9 dB • VSWR: 1.2 or less	Modulation/frequency measurement Transmission rate accuracy Transmission power measurement accuracy Linearity
Power divider	• Frequency range: 50 MHz to 3 GHz	Modulation/frequency measurement
Power splitter	• Frequency range: 50 MHz to 3 GHz	Modulation/frequency measurement

Recommended unit name (model name)	Required performance	Test items
LPF switching unit	• Able to cut off 850 MHz secondary harmonic wave and filter through.	Spurious measurement
2G LPF	• Able to cut off harmonic wave of 2 GHz or more generated by signal generator.	Spurious measurement

The "Required performance" column shows a portion of the possible performance within the measurement range of the test items.

Performance Test <MS268x>

Before starting the performance test, warm up the devices to be tested and measurement units for 30 minutes or more, unless otherwise specified. Ensure that they are stabilized.
To achieve the highest measurement accuracy, measurement should be performed at room temperature (25 ±5°C), with little AC power voltage fluctuation. The environment should be free from noise, vibration, dust, humidity and other complications.

Modulation/frequency measurement <MS268x>

This section describes tests on the following items:

- Carrier frequency accuracy
- Residual EVM
- Origin offset accuracy
- Transmission rate accuracy

(1) Test specifications

<MS2681A/MS2683A>

- Frequency measurement accuracy: ± (Reference crystal oscillator accuracy+10 Hz)
  Input level (average power during burst):
  ≥–30 dBm (with preamplifier OFF)
  ≥–40 dBm (with preamplifier ON*1)
- Residual EVM: <0.5% (rms) (PDC, NADC)
  <0.7% (rms) (PHS)
  Input level (average power during burst):
  ≥–30 dBm (with preamplifier OFF)
  ≥–40 dBm (with preamplifier ON*1)
- Origin offset accuracy: ±0.5 dB
  Input level (average power during burst):
  ≥–30 dBm (with preamplifier OFF)
  ≥–40 dBm (with preamplifier ON*1)
  for signal with origin offset –30 dBc

*1. The preamplifier can be turned on when main unit option 08 is installed.

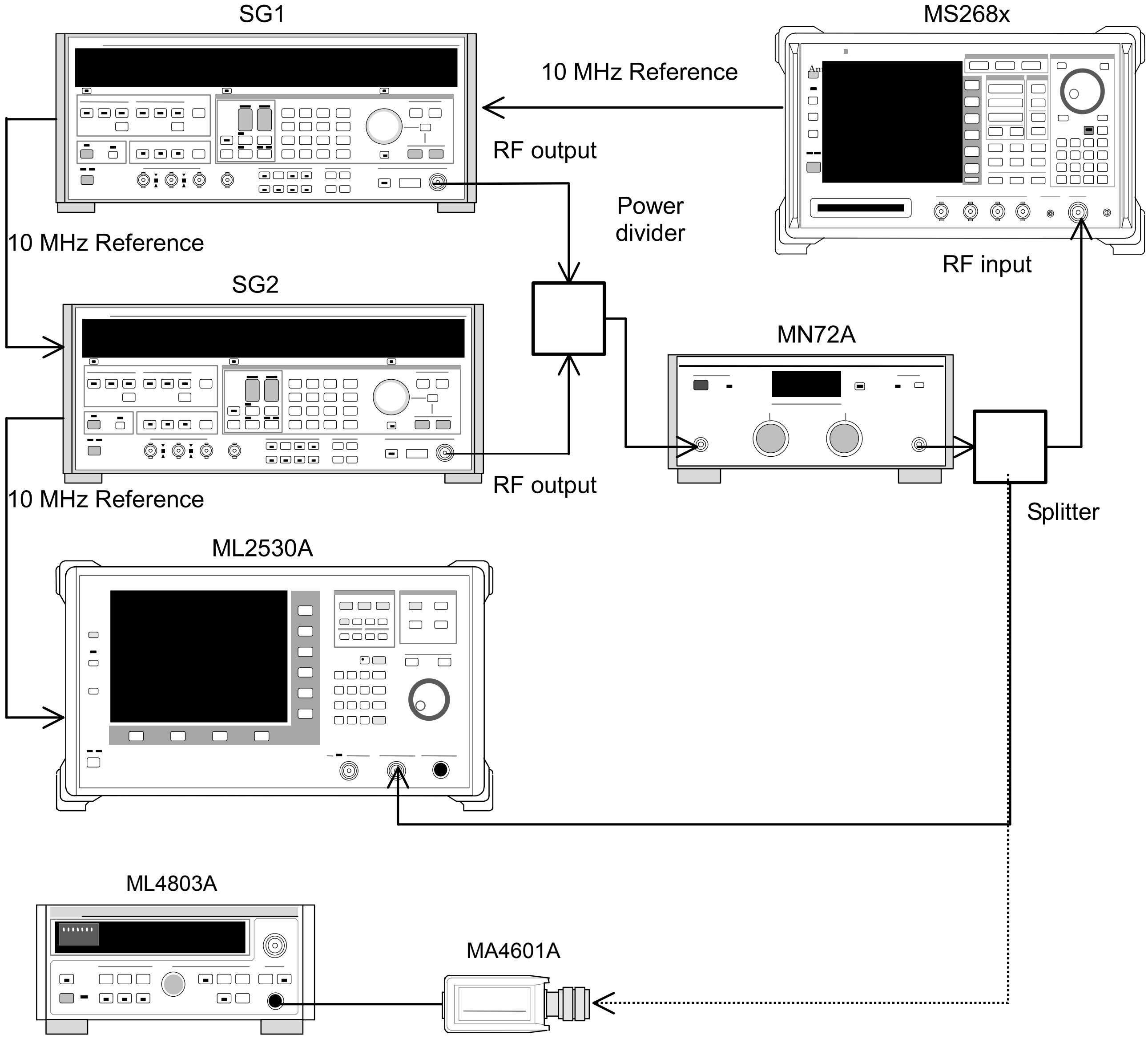
<MS2687A/B>

- Frequency measurement accuracy: ± (Reference crystal oscillator accuracy+10 Hz)
  Input level (average power during burst):
  ≥–30 dBm
- Residual EVM: <0.5% (rms) (PDC, NADC)
  <0.7% (rms) (PHS)
  Input level (average power during burst):
  ≥–30 dBm
- Origin offset accuracy: ±0.5 dB
  Input level (average power during burst):
  ≥–30 dBm
  for signal with origin offset –30 dBc

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Synthesized signal generator (SG2): MG3633A
- Calibration receiver: ML2530A
- Programmable attenuator: MN72A
- Power divider
- Power splitter
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set the programmable attenuator (MN72A) to 0 dB.
2. Set SG1 to no-modulation and the frequency and level as follows:
   - Frequency: (Frequency given in the table of step 30 +2.625 kHz)
     2.625 kHz is 1/8 of PDC symbol rate.
     Equivalent to all-0 modulation on PDC.
   - Level: −10 dBm
3. Set SG2 to no-modulation and the frequency and level as follows:
   - Frequency: (Frequency given in the table of step 30)
   - Level: −40 dBm

4. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: −10 dBm
   - Frequency: (Frequency in the table of step 30)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
5. Connect the splitter output to the power sensor (MA4601A) and switch SG1 output to ON.
6. Adjust the SG1 level so that the power meter (ML4803A) indicates a value of −10 dBm ±0.1 dB.
7. Connect the splitter output to RF input of the spectrum analyzer.
8. Set programmable attenuator (MN72A) to 30 dB.
9. Set +2.625 kHz to the frequency given in the table below for the setting frequency for calibration receiver (ML2530A). Also set BW to 100 Hz and Relative mode. (The range is fixed to 2.)
10. Set the SG2 output to ON. After changing the ML2530A frequency to the value given in the table below, adjust the SG2 level so that the indicated value is –30 dB ±0.1 dB. Record the results (origin offset expected value). The value indicated by ML2530A becomes the origin offset expected value.
11. Set programmable attenuator (MN72A).
    - For Pre-Ampl ON: 30 dB
    - For Pre-Ampl OFF: 20 dB
12. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
13. Execute F5 (Adjust Range).
14. Read the measurement results displayed on the screen and check that the origin offset satisfies the Standard.

    Origin offset accuracy [dB] = Measurement result − Origin offset expected value
15. Set the SG2 output to OFF.
16. Set Storage Mode to Average and the Average count to 10.
17. Read the measurement results displayed on the screen and check that the frequency error and residual vector error satisfy the Standard.
18. Change the frequency as shown in the table below and repeat Steps 1 to 17.

19. Set the programmable attenuator (MN72A) to 0 dB.
20. Set SG1 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency given in the table of step 30 +3.0375 kHz)
      3.0375 kHz is 1/8 of PDC symbol rate.
      Equivalent to all-0 modulation on NADC.
    - Level: −10 dBm
21. Set SG2 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency given in the table of step 30)
    - Level: −40 dBm
22. Set this unit as follows:
    - Input Terminal: RF
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table of step 30)
    - Target System: NADC
    - Measuring Object: BASE
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
23. Repeat Steps 5 to 17 above.
24. Change the frequency as shown in the table below and repeat Steps 19 to 23.
25. Set programmable attenuator (MN72A) to 0 dB.
26. Set SG1 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency in the table of step 30 +24 kHz)
      24 kHz is 1/8 of PHS symbol rate.
      Equivalent to all-0 modulation on PHS.
    - Level: −10 dBm
27. Set SG2 to no-modulation and the frequency and level as follows:
    - Frequency: (Frequency in the table of step 30)
    - Level: −40 dBm

28. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: –10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
29. Repeat Steps 5 to 17 above.
30. Change the frequency as shown in the table below and repeat Steps 25 to 29.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
850 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
1800 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
2700 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB

Transmission rate accuracy <MS268x>

(1) Test specifications

<MS2681A/MS2683A>

Transmission rate accuracy: ±1 ppm

Input level (average power during burst):

≥–30 dBm (with preamplifier OFF)

≥–40 dBm (with preamplifier ON*1)

*1. The preamplifier can be turned on when main unit option 08 is installed.

<MS2687A/B>

Transmission rate accuracy: ±1 ppm

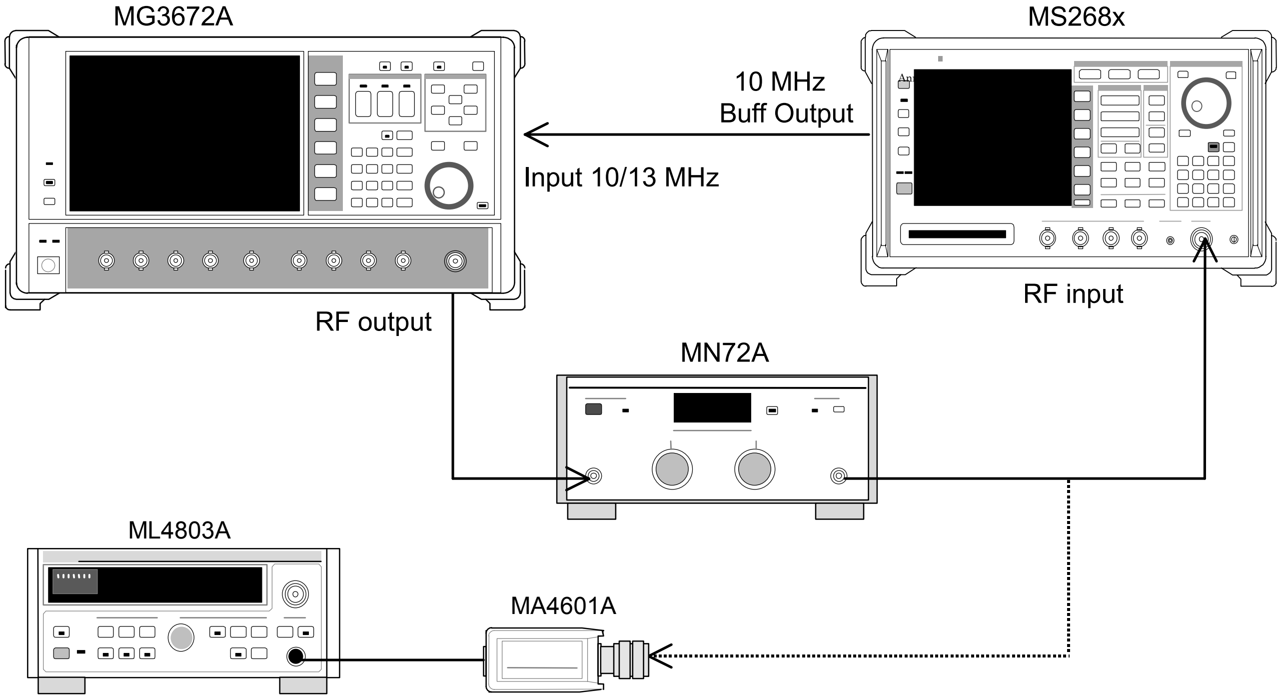
Input level (average power during burst):

≥–30 dBm

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B
- Programmable attenuator: MN72A
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set programmable attenuator (MN72A) to 0 dB.
2. Set SG3 as follows:
   - Frequency: (Frequency given in the table of step 22)
   - Level: −10 dBm
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9

3. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table of step 22)
    - Target System: PDC
    - Measuring Object: BS-CH
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
4. Connect the programmable attenuator output to the power sensor (MA4601A) and switch SG3 output to ON.
5. Adjust the SG3 level so that the power meter (ML4803A) indicates a value of −10 dBm ±0.1 dB.
6. Connect the programmable attenuator output to RF input of the spectrum analyzer.
7. Set programmable attenuator (MN72A) as follows:
    - For Pre-Ampl ON: 30 dB
    - For Pre-Ampl OFF: 20 dB
8. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
9. Execute F5 (Adjust Range).
10. Press F4 (Bit Rate Measure) to set it ON.
11. Read the measurement results displayed on the screen and check that the transmission rate error satisfies the Standard.
12. Change the frequency as shown in the table below and repeat Steps 1 to 11.
13. Set programmable attenuator (MN72A) to 0 dB.
14. Set SG3 as follows:
    - Frequency: (Frequency given in the table of step 22)
    - Level: −10 dBm
    - System: NADC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9

15. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: –10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: NADC
    - Measuring Object: Base
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
16. Repeat Steps 4 to 11 above.
17. Change the frequency as shown in the table below and repeat Steps 13 to 16.
18. Set programmable attenuator (MN72A) to 0 dB.
19. Set SG3 as follows:
    - Frequency: (Frequency given in the table below)
    - Level: –10 dBm
    - System: PHP
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst: OFF
    - Pattern: PN9
20. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: –10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
21. Repeat Steps 4 to 11 above.
22. Change the frequency as shown in the table below and repeat Steps 18 to 21.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
850 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
1500 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB
2100 MHz	–40 dBm ±0.1 dB	–30 dBm ±0.1 dB	–30 dBm ±0.1 dB

Transmission power measurement accuracy <MS268x>

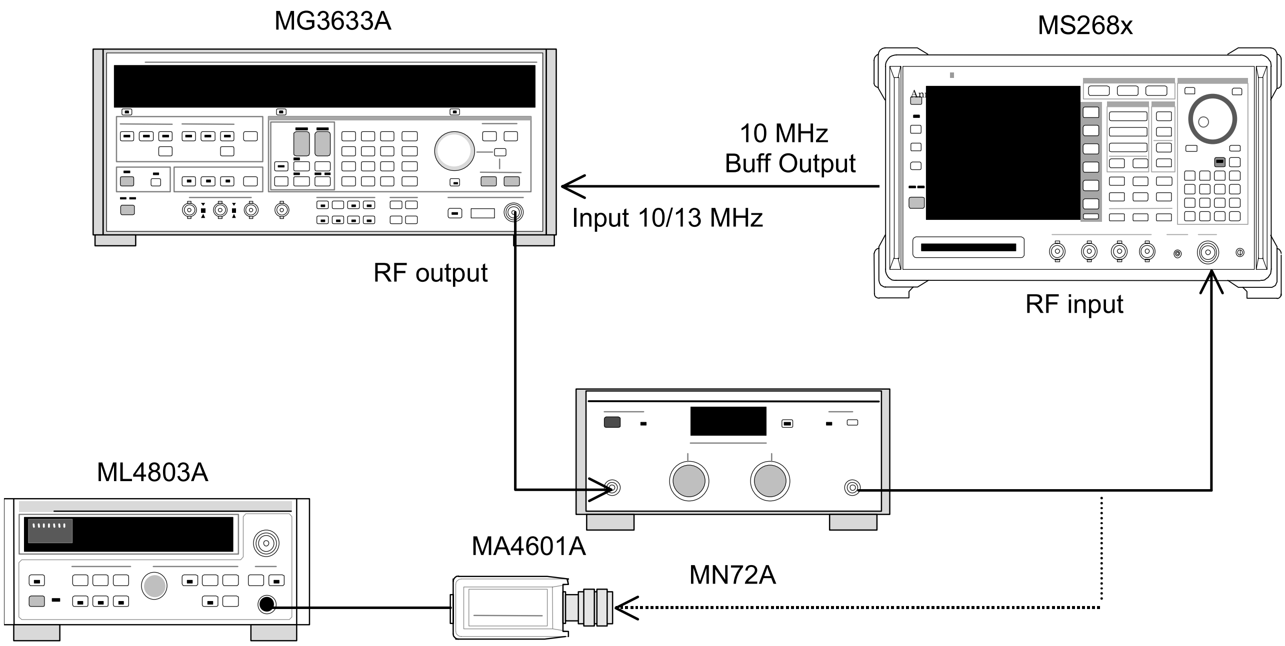
(1) Test specifications

This test is a functional test and therefore has no test specifications.

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Power meter: ML4803A
- Power sensor: MA4601A
- Programmable attenuator: MN72A

(3) Setup



(4) Test procedures

1. Connect power sensor (MA4601A) to Cal Output for power meter (ML4803A) and execute Zero Cal.
2. Connect SG1 (MN72A output) to power sensor (MA4601A).

3. Set the SG1 frequency and output level.
   Adjust the SG1 level so that the power meter (ML4803A) indicates +10 dBm ±0.1 dB. Record the measurement results. Set the programmable attenuator (MN72A) to 20 dB and then measure and record the attenuation at each measurement frequency. Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB	+10 dBm ±0.1 dB
850 MHz	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB	+10 dBm ±0.1 dB
1500 MHz	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB	+10 dBm ±0.1 dB
2100 MHz	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB	+10 dBm ±0.1 dB

4. Connect SG1 (MN72A output) to this unit.
5. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
6. Set programmable attenuator (MN72A).
   - Pre-Ampl ON: 20 dB
   - Pre-Ampl OFF: 20 dB
7. Press F3 (RF Power) to display the RF Power screen.
8. Press F5 (Adjust Range).
9. Record the Tx Power value (dBm).
   Measurement accuracy [dB] = Tx Power value − (Power meter measurement value − actual attenuation for MN72A ATT: 20 dB)
10. Change the frequency and repeat Steps 3 to 9 above.

11. Repeat Steps 1 to 10 above, changing Step 5 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 3)
    - Frequency: (Frequency given in the table of step 3)
    - Target System: NADC
    - Measuring Object: Base
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
12. Repeat Steps 1 to 10 above, changing Step 5 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 3)
    - Frequency: (Frequency given in the table of step 3)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0

Transmission power measurement accuracy with carrier OFF <MS268x>

(1) Test specifications

<MS2681A/MS2683A>

- Input level (average power during burst):
  ≥−10 dBm (with preamplifier OFF)
  ≥−20 dBm (with preamplifier ON*1)
- Normal mode measurement range:
  ≥65 dB (compared with average power during burst) PDC, NADC
  ≥60 dB (compared with average power during burst) PHS
- Measurement range in wide-dynamic range mode:
  Average power during burst: Compared with 10mW
  ≥90 dB (Measurement limit is determined by average noise level: ≤−80 dBm (High input, 50 MHz to 2.1 GHz)) PDC, NADC
  ≥80 dB(Measurement limit is determined by average noise level: ≤−70 dBm (High input, 50 MHz to 2.1 GHz)) PHS

*1. The preamplifier can be turned on when main unit option 08 is installed.

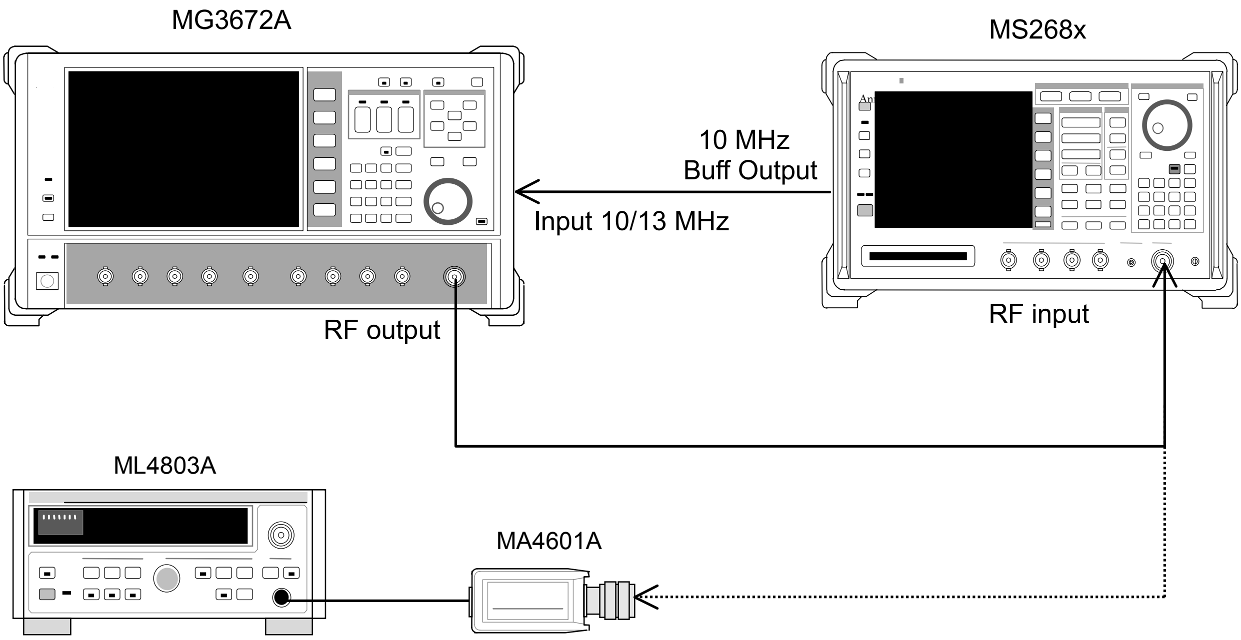
<MS2687A/B>

- Input level (average power during burst):
  ≥−10 dBm
- Normal mode measurement range:
  ≥65 dB (compared with average power during burst) PDC, NADC
  ≥60 dB (compared with average power during burst) PHS
- Measurement range in wide-dynamic range mode:
  Average power during burst: Compared with 10mW
  ≥90 dB (Measurement limit is determined by average noise level: ≤−80 dBm (High input, 50 MHz to 2.1 GHz)) PDC, NADC
  ≥80 dB(Measurement limit is determined by average noise level: ≤−70 dBm (High input, 50 MHz to 2.1 GHz)) PHS

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set SG3 as follows:
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: ON
   - Pattern: UP TCH
   - Trigger: Int
2. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Measure the input level to this unit using the Tx Power value on the RF Power screen (with Wide Dynamic Range set to OFF). Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
850 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
1500 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
2100 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB

3. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: (Level given in the table of step 2)
   - Frequency: (Frequency given in the table of step 2)
   - Target System: PDC
   - Measuring Object: MS-TCH
   - Trigger: Free Run
4. Press F3 (RF Power) to display the RF Power screen.
5. Press F5 (Adjust Range).
6. Press Single and adjust the SG3 level so that the Tx Power value is −10 dBm ±0.1 dB or less. (Do not execute Adjust Range after changing the level.)

   (When Pre-Ampl is ON, calibrate so that the Tx Power value is −20 dBm ±0.1 dB. At this time, execute Adjust Range.)
7. Check that ON/OFF Ratio satisfies the specification.
8. Press F4 (Wide Dynamic Range) to set it to ON.
   (At both Low input and Pre-Ampl ON)
9. Adjust the SG3 level so that the input level to this unit indicated by Tx Power value on the RF Power screen is 0 dBm. Press F5 (Adjust Range).
10. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard (≤−81 dBm for Low Power input).
11. Change the frequency and repeat Steps 2 to 10 above.
12. Set SG3 as follows:
    - System: NADC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst: ON
    - Pattern: UP TCH
    - Trigger: Int
13. Set the SG3 frequency. Set the output level to −10 dBm. Measure the input level to this unit using the Tx Power value on the RF Power screen (with Wide Dynamic Range set to OFF). Measurement frequency and level combinations are given in the table above.
14. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 2)
    - Frequency: (Frequency given in the table of step 2)
    - Target System: NADC
    - Measuring Object: Mobile
    - Trigger: Free Run
15. Repeat Steps 4 to 9 above.

16. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard.
17. Change the frequency and repeat Steps 12 to 16 above.
18. Set SG3 as follows:
    - System: PHP
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst: ON
    - Pattern: UP TCH
    - Trigger: Int
19. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 2)
    - Frequency: (Frequency given in the table of step 2)
    - Target System: PHS
    - Measuring Object: PS-TCH
    - Trigger: Free Run
20. Repeat Steps 4 to 9 above.
21. Measure the Carrier OFF Power and check that the OFF Power absolute value does not exceed the average noise level for the Standard (≤−71 dBm for Low Power input).
22. Change the frequency and repeat Steps 18 to 21 above.

Linearity <MS268x>

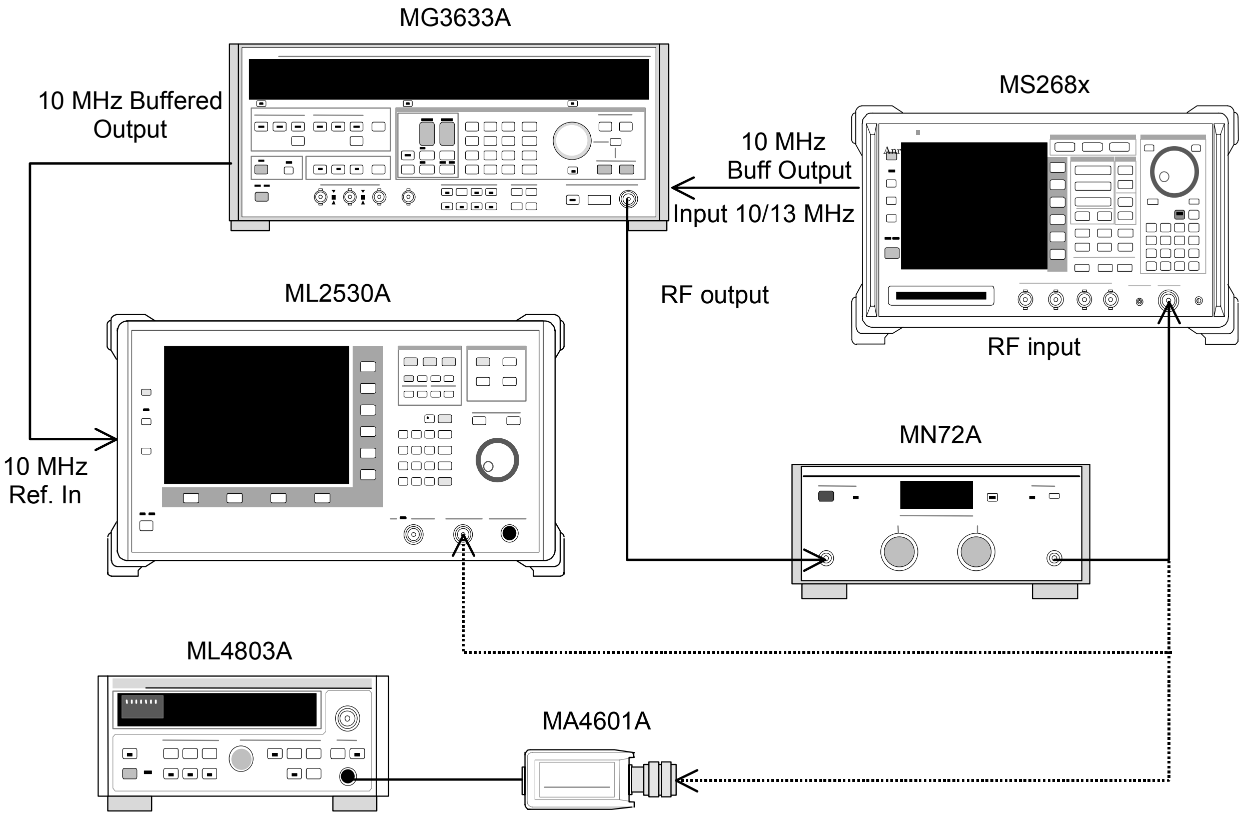
(1) Test specifications

±0.2 dB (0 to –30 dB)
Without changing the reference level settings after range optimization

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Calibration receiver: ML2530A
- Programmable attenuator: MN72A
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Connect power sensor (MA4601A) to Cal Output for power meter (ML4803A). Execute Zero Cal.
2. Connect SG1 (MN72A output) to power sensor (MA4601A).

3. Set the SG1 frequency and set programmable attenuator (MN72A) to 0 dB. Adjust the SG1 level so that the power meter (ML4803A) indicates +10 dBm ±0.1 dB. Record the set value (Set_Ref). Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
850 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
1500 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB
2100 MHz	–20 dBm ±0.1 dB	–10 dBm ±0.1 dB	+10 dBm ±0.1 dB

4. Connect SG1 (MN72A output) to calibration receiver (ML2530A). Set BW to 100 Hz and the Relative mode (with the range fixed to 1).
5. Lower the SG1 level in 10 dB steps until it reaches –30 dBc (for Set_Ref). Record the measurement value at calibration receiver (ML2530A) at each step (ML2530A reading).
6. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Sync Word: No
   - Trigger: Free Run
7. Set programmable attenuator (MN72A).
   - For Pre-Ampl ON: 30 dB
   - For Pre-Ampl OFF: 20 dB
8. Connect SG1 (MN72A output) to the MS268x spectrum analyzer and set the signal generator level to Set_Ref.
9. Press F3 (RF Power) to display the RF Power screen.
10. Press F5 (Adjust Range).
11. Record the Tx Power value (dBm) (Measure_Ref).
12. Lower the SG1 level in 10 dB steps until it reaches –30 dBc (for Set_Ref). Record the Tx Power value at each step.

    (Change the SG1 level in 10 dB steps; do not change the programmable attenuator (MN72A) settings.)
13. Check that the linearity error (below) satisfies the Standard.
    Linearity error [dB] = Tx Power value – (Measure_Ref-ML2530A reading)
14. Change the frequency and repeat Steps 2 to 13 above.

15. Repeat Steps 1 to 14 above, changing Step 6 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 3)
    - Frequency: (Frequency given in the table of step 3)
    - Target System: NADC
    - Measuring Object: Base
    - Sync Word: No
    - Trigger: Free Run
16. Repeat Steps 1 to 14 above, changing Step 6 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 3)
    - Frequency: (Frequency given in the table of step 3)
    - Target System: PHS
    - Measuring Object: Continuous
    - Sync Word: No
    - Trigger: Free Run

Occupied frequency bandwidth measurement <MS268x>

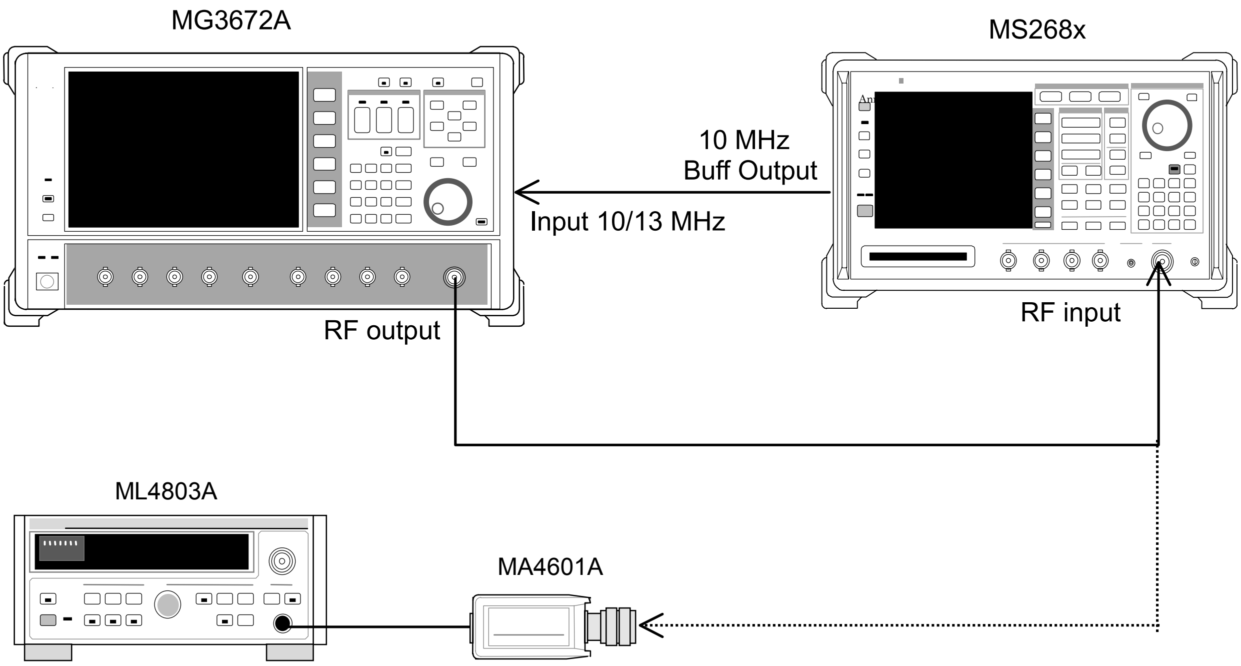
(1) Test specifications

This test is a functional test and therefore has no test specifications.

(2) Measurement units for test

- Digital signal generator (SG3): MG3672A with MG0301C and MG0303B
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set SG3 as follows:
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst:: OFF
   - Pattern: PN9
2. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Use the power meter (ML4803A) to measure the input level to the MS268x spectrum analyzer. Measurement frequency and level combinations are given in the table of step 21.

3. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: −10 dBm
   - Frequency: (Frequency in the table of step 21)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word: No
   - Trigger: Free Run
   - Symbol Timing: 0
4. Press F4 (Occupied Bandwidth) and display the Occupied Bandwidth screen.
5. Execute F5 (Adjust Range).
6. Press F1 (Measure Method) and set the measurement method to FFT.
7. Set Storage Mode to Average and Average Count to 10.
8. Check that the occupied frequency bandwidth measurement value is 26.5 ±2 kHz.
9. Change the frequency and repeat Steps 2 to 8 above.
10. Set SG3 as follows:
    - System: NADC
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9
11. Set the SG3 frequency. Set the SG3 output level to −10 dBm. Use the power meter (ML4803A) to measure the input level to this unit. Measurement frequency and level combinations are given in the table of step 21.
12. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: −10 dBm
    - Frequency: (Frequency given in the table of step 21)
    - Target System: NADC
    - Measuring Object: Base
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
13. Repeat Steps 4 to 7 above.
14. Check that the occupied frequency bandwidth measurement value is 27.7 ±2 kHz.
15. Change the frequency and repeat Steps 11 to 14 above.

16. Set SG3 as follows:
    - System: PHP
    - Filter: RNYQ
    - Phase Encode: Normal
    - Burst:: OFF
    - Pattern: PN9
17. Set the SG3 frequency. Set the SG3 output level to –10 dBm. Use the power meter (ML4803A) to measure the input level to this unit. Measurement frequency and level combinations are given in the table below.
18. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: RF
    - Reference Level: –10 dBm
    - Frequency: (Frequency given in the table below)
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word: No
    - Trigger: Free Run
    - Symbol Timing: 0
19. Repeat Steps 4 to 7 above.
20. Check that the occupied frequency bandwidth measurement value is 245.0 ±10 kHz.
21. Change the frequency and repeat Steps 17 to 20 above.

Frequency	Level (SG3 set value)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	–30 dBm	–20 dBm	–20 dBm
850 MHz	–30 dBm	–20 dBm	–20 dBm
1500 MHz	–30 dBm	–20 dBm	–20 dBm
2100 MHz	–30 dBm	–20 dBm	–20 dBm

Adjacent channel leakage power measurement <MS268x>

(1) Test specifications

- CW signal input for High Speed method
  PDC
  - 50 kHz detuning: ≥60 dB
  - 100 kHz detuning: ≥65 dB

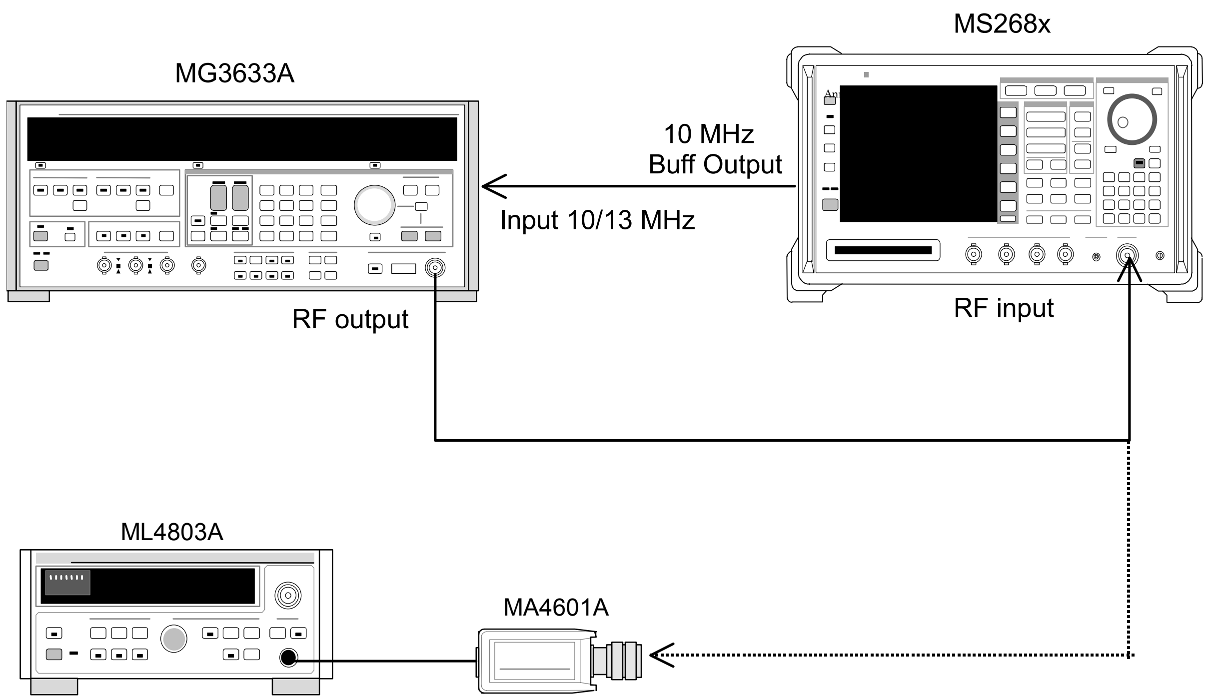
  NADC
  - 30 kHz detuning: ≥30 dB
  - 60 kHz detuning: ≥60 dB
  - 90 kHz detuning: ≥65 dB

  PHS
  - 600 kHz detuning: ≥60 dB
  - 900 kHz detuning: ≥60 dB

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set SG1 to no-modulation and set the frequency and output level. Use the power meter (ML4803A) to measure the input level to the MS268x spectrum analyzer. Measurement frequency and level combinations are given in the table below.

Frequency	Level (input level to MS268x)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
50 MHz	−20 dBm ±0.1 dB	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB
850 MHz	−20 dBm ±0.1 dB	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB
1500 MHz	−20 dBm ±0.1 dB	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB
2100 MHz	−20 dBm ±0.1 dB	−10 dBm ±0.1 dB	−10 dBm ±0.1 dB

2. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Target System: PDC
   - Measuring Object: BS-CH
   - Trigger: Free Run
3. Connect the SG1 output to the power sensor (MA4601A) and switch SG1 output to ON.
4. Adjust the SG1 level so that the power meter (ML4803A) indicates a value of table above.
5. Connect the SG1 output to RF input of the MS268x spectrum analyzer.
6. Press F5 (Adjacent Channel Power) to display the Adjacent Channel Power screen.
7. Press F1 (Measure Method) and set the measurement method to High Speed.
8. Press F3 (Unit) and then F5 (dB) to change the unit to dB.
9. Press F6 (Return) and then F5 (Adjust Range).
10. Check that the Mean Power measurement results satisfy the Standard.
11. Change the frequency and repeat Steps 1 to 10 above.

12. Repeat Steps 1 to 10 above, changing Step 2 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 1)
    - Frequency: (Frequency given in the table of step 1)
    - Target System: NADC
    - Measuring Object: Base
    - Trigger: Free Run
13. Repeat Steps 1 to 10 above, changing Step 2 as follows:
    - Input Terminal: RF
    - Reference Level: (Level given in the table of step 1)
    - Frequency: (Frequency given in the table of step 1)
    - Target System: PHS
    - Measuring Object: Continuous
    - Trigger: Free Run

Spurious measurement <MS268x>

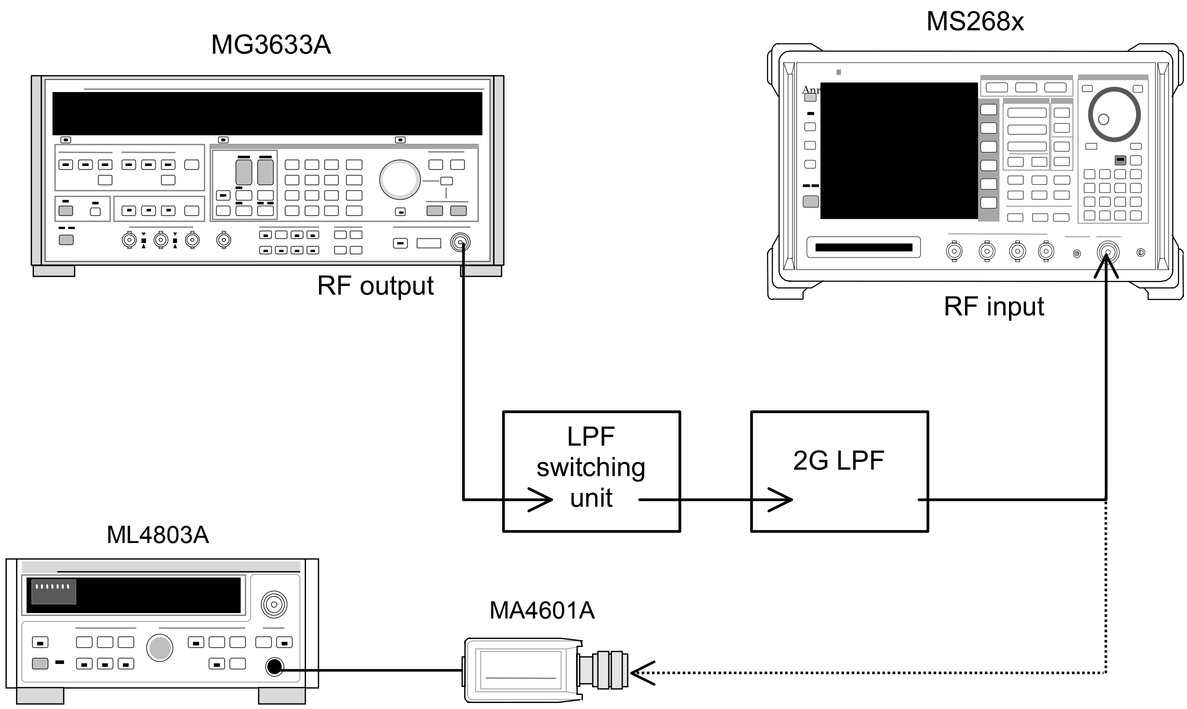
(1) Test specifications

- This test is a functional test and therefore has no test specifications.

(2) Measurement units for test

- Synthesized signal generator (SG1): MG3633A
- LPF switching unit (Able to cut off 850 MHz secondary harmonic waves and filter through)
- 2G LPF
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



(4) Test procedures

1. Set the SG1 frequency and output level. Use the power meter (ML4803A) to measure the input level to the MS268x spectrum analyzer. Measurement frequency and level combinations are given in the table below.

Frequency	Level (power meter reading)		
	MS2681A/3A Pre-Ampl ON	MS2681A/3A Pre-Ampl OFF	MS2687A/B
850 MHz	–10 dBm ±0.1 dB	0 dBm ±0.1 dB	0 dBm ±0.1 dB
1850 MHz	–10 dBm ±0.1 dB	0 dBm ±0.1 dB	0 dBm ±0.1 dB

2. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: RF
   - Reference Level: (Level given in the table above)
   - Frequency: (Frequency given in the table above)
   - Modulation: PHS
   - Measuring Object: Continuous
   - Trigger: Free Run
3. Connect the 2G LPF output to the power sensor (MA4601A) and switch SG1 output to ON.
4. Adjust the SG1 Level so that the power meter (ML4803A) indicates a value of table above.

5. Connect the 2G LPF output to RF input of the MS268x spectrum analyzer.
6. Set the LPF switching unit as follows:
   a) When Carrier Frequency is 850 MHz
      - Set LPF to 1.1 GHz.
   b) When Carrier Frequency is 1850 MHz
      - Set LPF to Filter Pass (No Filter).
7. Press [F6] (Spurious Emission) to display the Spurious Emission screen.
8. Press [F1] (Spurious Mode) and set [F3] (Sweep). After setting, press [F6] (Return).
9. Press [ ] (More) to display the second function label page.
10. Press [F2] (Setup Search/Sweep Table) and set the frequencies given in the table of step 22.
    a) When Carrier Frequency is 850 MHz
       - Set Table 1.0.
    b) When Carrier Frequency is 1850 MHz
       - Set Table 2.0.

    After setting the table, press [F6] (Return).
11. Press [ ] (More) to display the second function label page.
    Press [F5] (Setup Spectrum Analyzer).
    Press [F4] (Preselector) and set Normal mode.
12. Return the function label to the first page.

    (Steps 11 and 12 are available only when option 03 is installed.)
13. Execute [F5] (Adjust Range).
14. Check that the measurement value is ≥ 60 dB.
15. When option 03 is installed, continue to the steps below.
16. Press [ ] (More) to display the second function label page.
    Press [F3] (Setup Search/Sweep Table) and then press [ ] (More) to display the second function label page.
17. Press [F2] to clear the frequency table.
18. Set the frequency table as shown below.
    c) When Carrier Frequency is 850 MHz
       - Set as shown in Table 1.1.
    d) When Carrier Frequency is 1850 MHz
       - Set as shown in Table 2.1.
19. Press [ ] (More) to display the second function label page.
    Press [F5] (Setup Spectrum Analyzer).
    Press [F4] (Preselector) to set Spurious mode.

20. Return the function label to the first page.
21. In the same way, repeat Steps 13 and 14.
22. Change the frequency and repeat Steps 1 to 21 above.

Table 1.0

	Start frequency	Stop frequency	RBW
f1	2 MHz	50 MHz	300 kHz
f2	50 MHz	500 MHz	300 kHz
f3	500 MHz	800 MHz	300 kHz
f4	900 MHz	1650 MHz	300 kHz
f5	1750 MHz	2500 MHz	300 kHz
f6	2600 MHz	3200 MHz	300 kHz
f7	3200 MHz	7800 MHz	300 kHz

Table 1.1

	Start frequency	Stop frequency	RBW
f1	1600 MHz	7800 MHz	300 kHz

Table 2.0

	Start frequency	Stop frequency	RBW
f1	1 MHz	50 MHz	300 kHz
f2	50 MHz	500 MHz	300 kHz
f3	500 MHz	1800 MHz	300 kHz
f4	1900 MHz	3200 MHz	300 kHz
f7	3200 MHz	7800 MHz	300 kHz

Table 2.1

	Start frequency	Stop frequency	RBW
f1	1600 MHz	1800 MHz	300 kHz
f2	1900 MHz	7800 MHz	300 kHz

IQ input modulation accuracy <MS268x>

(1) Test specifications

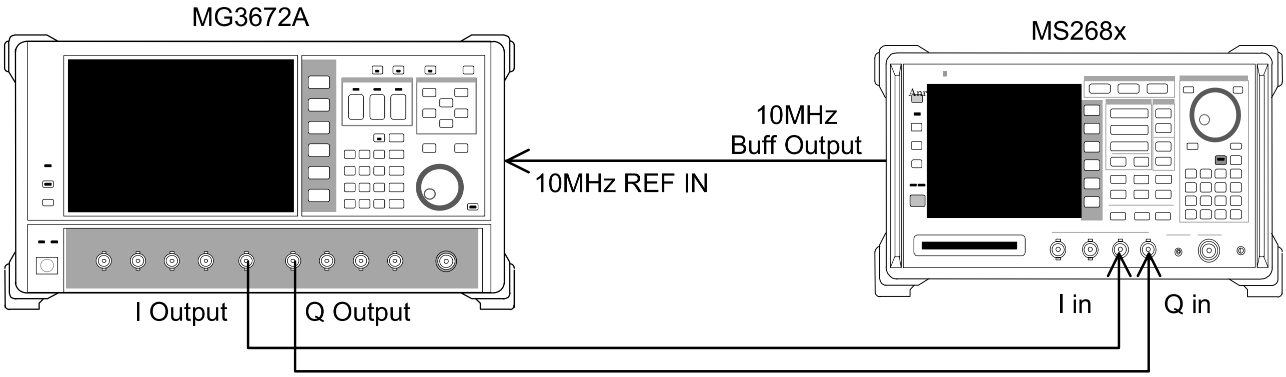
- Residual EVM
  < 0.5% (rms) (DC coupling) PDC, NADC typical value
  < 0.7% (rms) (DC coupling) PHS typical value

(Available only when Option MS2681A/3A-17 or -18, or MS2687A/B-18 is installed)

(2) Measurement units for test

- Digital signal generator: MG3672A with MG0301C and MG0303B

(3) Setup



(4) Test procedures

1. Set MG3672A as follows:
   - System: PDC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
2. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: IQ-DC
   - Impedance: 50 Ω
   - Target System: PDC
   - Measuring Object: BS-CH
   - Filter: Root-Nyquist
   - Sync Word Pattern: No
   - Trigger: Free Run
   - Symbol Timing: 0.00symbol
3. Press F2 (Modulation Analysis) to display the Modulation Analysis screen.
4. Check that the residual EVM value (Residual EVM) satisfies the specification.

5. Set MG3672A as follows:
   - System: NADC
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
6. Set the MS268x spectrum analyzer as follows:
   - Input Terminal: IQ-DC
   - Impedance: 50 W
   - Target System: NADC
   - Measuring Object: Base
   - Filter: Root-Nyquist
   - Sync Word Pattern: No
   - Trigger: Free Run
   - Symbol Timing: 0.00symbol
7. Press [F2] (Modulation Analysis) to display the Modulation Analysis screen.
8. Check that the residual EVM value (Residual EVM) satisfies the Specification.
9. Set MG3672A as follows:
   - System: PHP
   - Filter: RNYQ
   - Phase Encode: Normal
   - Burst: OFF
   - Pattern: PN9
   - Trigger: Int
10. Set the MS268x spectrum analyzer as follows:
    - Input Terminal: IQ-DC
    - Impedance: 50 Ω
    - Target System: PHS
    - Measuring Object: Continuous
    - Filter: Root-Nyquist
    - Sync Word Pattern: No
    - Trigger: Free Run
    - Symbol Timing: 0.00symbol
11. Press [F2] (Modulation Analysis) to display the Modulation Analysis screen.
12. Check that the residual EVM value (Residual EVM) satisfies the Specification.

Sample Entry Forms for Performance Test Results <MS860x>

This section contains sample forms for the performance test results from the MS860x Digital Mobile Radio Transmitter Tester.
Copy these forms and enter the performance test results.

Test location	____________	Report No.	____________
	____________	Date	____________
	____________	Tested by	____________

Unit names: MS860x Digital Mobile Radio Transmitter Tester
MX860x05A π/4 DQPSK measurement software

Serial No.	____________	Ambient temperature	____________ °C
Power frequency	____________ Hz	Relative humidity	____________ %

Remarks: ____

____

____

Modulation/frequency measurement <MS860x>

Frequency/modulation measurement accuracy (High Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Residual EVM	Minimum value	0% (rms)			
	Measurement value	______ % (rms)	______ % (rms)	______ % (rms)	______ % (rms)
	Maximum value	0.44% (rms) PDC, NADC 0.62% (rms) PHS			
	Measurement uncertainty	0.06% (rms) PDC, NADC 0.08% (rms) PHS			
Carrier frequency accuracy	Minimum value	−9.9 Hz			
	Measurement value	______ Hz	______ Hz	______ Hz	______ Hz
	Maximum value	+9.9 Hz			
	Measurement uncertainty	±0.1 Hz			

Frequency/modulation measurement accuracy (Low Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Residual EVM	Minimum value	0% (rms)			
	Measurement value	______% (rms)	______% (rms)	______% (rms)	______% (rms)
	Maximum value	0.44% (rms) PDC, NADC 0.62% (rms) PHS			
	Measurement uncertainty	0.06% (rms) PDC, NADC 0.08% (rms)PHS			
Carrier frequency accuracy	Minimum value	–9.9 Hz			
	Measurement value	______Hz	______Hz	______Hz	______Hz
	Maximum value	+9.9 Hz			
	Measurement uncertainty	±0.1 Hz			

Frequency/modulation measurement accuracy (Low Power input and Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Residual EVM	Minimum value	0% (rms)			
	Measurement value	______% (rms)	______% (rms)	______% (rms)	______% (rms)
	Maximum value	0.44% (rms) PDC, NADC 0.62% (rms) PHS			
	Measurement uncertainty	0.06% (rms) PDC, NADC 0.08% (rms) PHS			
Carrier frequency accuracy	Minimum value	–9.9 Hz			
	Measurement value	______Hz	______Hz	______Hz	______Hz
	Maximum value	+9.9 Hz			
	Measurement uncertainty	±0.1 Hz			

Origin offset expected value

	50 MHz	850 MHz	1500 MHz	2100 MHz
Expected value	______dB	______dB	______dB	______dB

Origin offset (High Power input)

	50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement result	______dB	______dB	______dB	______dB
Upper limit	+0.46 dB			
Origin offset accuracy*	______dB	______dB	______dB	______dB
Lower limit	–0.46 dB			
Measurement uncertainty	±0.04 dB			

Origin offset (Low Power input)

	50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement result	______dB	______dB	______dB	______dB
Upper limit	+0.46 dB			
Origin offset accuracy*	______dB	______dB	______dB	______dB
Lower limit	–0.46 dB			
Measurement uncertainty	±0.04 dB			

Origin offset (Low Power input and Pre-Ampl ON)

	50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement result	______dB	______dB	______dB	______dB
Upper limit	+0.46 dB			
Origin offset accuracy*	______dB	______dB	______dB	______dB
Lower limit	–0.46 dB			
Measurement uncertainty	±0.04 dB			

* Origin offset accuracy [dB] = Measurement result – Origin offset expected value

Transmission rate accuracy (High Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Transmission rate accuracy	Minimum value	0 ppm			
	Measurement value	______ppm	______ppm	______ppm	______ppm
	Maximum value	0.9 ppm			
	Measurement uncertainty	0.1 ppm			

Transmission rate accuracy (Low Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Transmission rate accuracy	Minimum value	0 ppm			
	Measurement value	______ppm	______ppm	______ppm	______ppm
	Maximum value	0.9 ppm			
	Measurement uncertainty	0.1 ppm			

Transmission rate accuracy (Low Power input and Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Transmission rate accuracy	Minimum value	0 ppm			
	Measurement value	______ppm	______ppm	______ppm	______ppm
	Maximum value	0.9 ppm			
	Measurement uncertainty	0.1 ppm			

Transmission power measurement accuracy <MS860x>

Power meter reading

		50 MHz	850 MHz	1500 MHz	2100 MHz
Power meter reading	Upper limit	+10.1 dBm			
	Reading	______ dBm	______ dBm	______ dBm	______ dBm
	Lower limit	+9.9 dBm			

Actual attenuation of programmable attenuator (attenuation from +10 dBm)

ATT set value	50 MHz	850 MHz	1500 MHz	2100 MHz
20	______ dB	______ dB	______ dB	______ dB

Transmission power measurement accuracy (High Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement accuracy	Minimum value	+0.23 dB			
	Measurement value	______ dB	______ dB	______ dB	______ dB
	Maximum value	–0.23 dB			
	Measurement uncertainty	±0.17 dB			

Measurement accuracy [dB] = Tx Power value – Power meter reading

Transmission power measurement accuracy (Low Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement accuracy	Minimum value	+0.23 dB			
	Measurement value	______ dB	______ dB	______ dB	______ dB
	Maximum value	–0.23 dB			
	Measurement uncertainty	±0.17 dB			

Measurement accuracy [dB] = Tx Power value – (Power meter reading – Actual attenuation for MN72A ATT: 20 dB)

Transmission power measurement accuracy (Low Power input and Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement accuracy	Minimum value	+0.23 dB			
	Measurement value	______ dB	______ dB	______ dB	______ dB
	Maximum value	–0.23 dB			
	Measurement uncertainty	±0.17 dB			

Measurement accuracy［dB］ = Tx Power value – (Power meter reading – Actual attenuation for MN72A ATT: 20 dB)

Transmission power measurement accuracy with carrier OFF <MS860x>

Transmission power measurement accuracy (Low Power input)

		50 MHz	850 MHz	1500 MHz	2100 MHz
ON/OFF Ratio (WDR_OFF)	Upper limit	-----			
	Measurement value	_______ dBm	_______ dBm	_______ dBm	_______ dBm
	Lower limit	65 dB (PDC, NADC) 60 dB (PHS)			
	Measurement uncertainty	2 dB			
OFF Power (WDR ON)	Upper limit	−82 dBm (PDC, NADC) −72 dBm (PHS)			
	Measurement value	_______ dB	_______ dB	_______ dB	_______ dB
	Lower limit	-----			
	Measurement uncertainty	2 dB			

Transmission power measurement accuracy (Low Power input and Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
ON/OFF Ratio (WDR_OFF)	Upper limit	-----			
	Measurement value	_______ dBm	_______ dBm	_______ dBm	_______ dBm
	Lower limit	65 dB (PDC, NADC) 60 dB (PHS)			
	Measurement uncertainty	2 dB			
OFF Power (WDR ON)	Upper limit	−82 dBm (PDC, NADC) −72 dBm (PHS)			
	Measurement value	_______ dB	_______ dB	_______ dB	_______ dB
	Lower limit	-----			
	Measurement uncertainty	2 dB			

Measurement accuracy = Tx Power value – power meter reading

Linearity <MS860x>

SG1 set value for +10 dBm calibration at each frequency

		50 MHz	850 MHz	1500 MHz	2100 MHz
SG1 set value	Set_Ref	_______ dBm	_______ dBm	_______ dBm	_______ dBm

Linearity accuracy (High Power input)

Frequency (MHz)	SG level (dBm)	Calibration receiver reading (dB)	Tester measurement value (dBm)	Linearity calculation value (dB)**	Effective range (dB)
50	+10	-----	_______ dBm*		
	0	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–10	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
850	+10	-----	_______ dBm*		
	0	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–10	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
1500	+10	-----	_______ dBm*		
	0	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–10	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
2100	+10	-----	_______ dBm*		
	0	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–10	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
Measurement uncertainty		±0.04 dB			

Linearity accuracy (Low Power input)

Frequency (MHz)	SG level (dBm)	Calibration receiver reading (dB)	Tester measurement value (dBm)	Linearity calculation value (dB)**	Effective range (dB)
50	–10	-----	_______ dBm*		
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–30	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–40	_______ dB	_______ dBm	_______ dB	±0.16 dB
850	–10	-----	_______ dBm*		
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–30	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–40	_______ dB	_______ dBm	_______ dB	±0.16 dB
1500	–10	-----	_______ dBm*		
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–30	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–40	_______ dB	_______ dBm	_______ dB	±0.16 dB
2100	–10	-----	_______ dBm*		
	–20	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–30	_______ dB	_______ dBm	_______ dB	±0.16 dB
	–40	_______ dB	_______ dBm	_______ dB	±0.16 dB
Measurement uncertainty		±0.04 dB			

Linearity accuracy (Low Power input and Pre-Ampl ON)

Frequency (MHz)	SG level (dBm)	Calibration receiver reading (dB)	Tester measurement value (dBm)	Linearity calculation value (dB)**	Effective range (dB)
50	–20	-----	______ dBm*		
	–30	______ dB	______ dBm	______ dB	±0.16 dB
	–40	______ dB	______ dBm	______ dB	±0.16 dB
	–50	______ dB	______ dBm	______ dB	±0.16 dB
850	–20	-----	______ dBm*		
	–30	______ dB	______ dBm	______ dB	±0.16 dB
	–40	______ dB	______ dBm	______ dB	±0.16 dB
	–50	______ dB	______ dBm	______ dB	±0.16 dB
1500	–20	-----	______ dBm*		
	–30	______ dB	______ dBm	______ dB	±0.16 dB
	–40	______ dB	______ dBm	______ dB	±0.16 dB
	–50	______ dB	______ dBm	______ dB	±0.16 dB
2100	–20	-----	______ dBm*		
	–30	______ dB	______ dBm	______ dB	±0.16 dB
	–40	______ dB	______ dBm	______ dB	±0.16 dB
	–50	______ dB	______ dBm	______ dB	±0.16 dB
Measurement uncertainty		±0.04 dB			

* Measure_Ref

** Linearity calculation

Linearity calculation value (dB) = Tester measurement value (dBm) – {Measure_Ref (dBm) – Calibration receiver measurement value (dB)}

Adjacent channel leakage power measurement <MS860x>

Measurement range (Low Power input)

	Detuning frequency	50 MHz	850 MHz	1500 MHz	2100 MHz	Measurement uncertainty	Effective lower limit
PDC	50 k	_____ dB	_____ dB	_____ dB	_____ dB	1 dB	61 dB
PDC	100 k	_____ dB	_____ dB	_____ dB	_____ dB		66 dB
NADC	30 k	_____ dB	_____ dB	_____ dB	_____ dB		31 dB
NADC	60 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB
NADC	90 k	_____ dB	_____ dB	_____ dB	_____ dB		66 dB
PHS	600 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB
PHS	900 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB

Measurement range (Low Power input, Pre-Ampl ON)

	Detuning frequency	50 MHz	850 MHz	1500 MHz	2100 MHz	Measurement uncertainty	Effective lower limit
PDC	50 k	_____ dB	_____ dB	_____ dB	_____ dB	1 dB	61 dB
PDC	100 k	_____ dB	_____ dB	_____ dB	_____ dB		66 dB
NADC	30 k	_____ dB	_____ dB	_____ dB	_____ dB		31 dB
NADC	60 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB
NADC	90 k	_____ dB	_____ dB	_____ dB	_____ dB		66 dB
PHS	600 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB
PHS	900 k	_____ dB	_____ dB	_____ dB	_____ dB		61 dB

Power meter accuracy <MS860x>

Power meter reading (Set_Ref)

		50 MHz	2000 MHz	3000 MHz
SG set value (Set_Ref)	-----	______ dBm	______ dBm	______ dBm
Power meter reading (Read_Ref)	Upper limit	+10.1 dBm		
	Reading	______ dBm	______ dBm	______ dBm
	Lower limit	+9.9 dBm		

ML2530A measurement value (ATT_n)*
with programmable attenuator varied

ATT set value	ATT_n	50 MHz	2000 MHz	3000 MHz
10 dB	ATT_10	______ dB	______ dB	______ dB
20 dB	ATT_20	______ dB	______ dB	______ dB
30 dB	ATT_30	______ dB	______ dB	______ dB

Measurement accuracy (Low Power input)

Frequency (MHz)	Input level (dBm)	SG&ATT Set level	Tester measurement value (dBm)	Measurement accuracy (%)**	Effective range (dB)
50	+10	Set_Ref	______ dBm	______ dB	±5.8%
	0	Set_Ref+ATT:10 dB	______ dBm	______ dB	±5.8%
	–10	Set_Ref+ATT:20 dB	______ dBm	______ dB	±5.8%
	–20	Set_Ref+ATT:30 dB	______ dBm	______ dB	±5.8%
2000	+10	Set_Ref	______ dBm	______ dB	±5.8%
	0	Set_Ref+ATT:10 dB	______ dBm	______ dB	±5.8%
	–10	Set_Ref+ATT:20 dB	______ dBm	______ dB	±5.8%
	–20	Set_Ref+ATT:30 dB	______ dBm	______ dB	±5.8%
3000	+10	Set_Ref	______ dBm	______ dB	±5.8%
	0	Set_Ref+ATT:10 dB	______ dBm	______ dB	±5.8%
	–10	Set_Ref+ATT:20 dB	______ dBm	______ dB	±5.8%
	–20	Set_Ref+ATT:30 dB	______ dBm	______ dB	±5.8%
Measurement uncertainty			±4.2%		

* ATT_n is a minus value.

** Measurement accuracy calculation

$$Measurement\ accuracy[\%] = \left(\frac{10^{(Tester\ measurement\ value/10)}}{10^{(Read\_Ref + ATT\_n)/10}} - 1 \right) \times 100$$

Sample Entry Forms for Performance Test Results <MS268x>

This section contains sample forms for the performance test results from the MS268x spectrum analyzer.
Copy these forms and enter the performance test results.

Test location	________________	Report No.	________________
	________________	Date	________________
	________________	Tested by	________________

Unit names: MS268x Spectrum Analyzer ____________
MX268x05A π/4 DQPSK measurement software ____________

Serial No.	________________	Ambient temperature	____________ °C
Power frequency	____________ Hz	Relative humidity	____________ %

Remarks:

Modulation/frequency measurement <MS268x>

Frequency/modulation measurement accuracy (Pre-Ampl OFF)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Residual EVM	Minimum value	0% (rms)			
	Measurement value	______% (rms)	______% (rms)	______% (rms)	______% (rms)
	Maximum value	0.44% (rms) PDC, NADC 0.62% (rms) PHS			
	Measurement uncertainty	0.06% (rms) PDC, NADC 0.08% (rms)PHS			
Carrier frequency accuracy	Minimum value	−9.9 Hz			
	Measurement value	______Hz	______Hz	______Hz	______Hz
	Maximum value	+9.9 Hz			
	Measurement uncertainty	±0.1 Hz			

Frequency/modulation measurement accuracy (Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Residual EVM	Minimum value	0% (rms)			
	Measurement value	______ % (rms)	______ % (rms)	______ % (rms)	______ % (rms)
	Maximum value	0.44% (rms) PDC, NADC 0.62% (rms) PHS			
	Measurement uncertainty	0.06% (rms) PDC, NADC 0.08% (rms) PHS			
Carrier frequency accuracy	Minimum value	−9.9 Hz			
	Measurement value	______ Hz	______ Hz	______ Hz	______ Hz
	Maximum value	+9.9 Hz			
	Measurement uncertainty	±0.1 Hz			

Origin offset expected value

	50 MHz	850 MHz	1500 MHz	2100 MHz
Expected value	______ dB	______ dB	______ dB	______ dB

Origin offset (Pre-Ampl OFF)

	50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement result	______ dB	______ dB	______ dB	______ dB
Upper limit	+0.46 dB			
Origin offset accuracy*	______ dB	______ dB	______ dB	______ dB
Lower limit	−0.46 dB			
Measurement uncertainty	±0.04 dB			

* Origin offset accuracy [dB] = Measurement result − Origin offset expected value

Origin offset (Pre-Ampl ON)

	50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement result	______ dB	______ dB	______ dB	______ dB
Upper limit	+0.46 dB			
Origin offset accuracy*	______ dB	______ dB	______ dB	______ dB
Lower limit	−0.46 dB			
Measurement uncertainty	±0.04 dB			

* Origin offset accuracy [dB] = Measurement result − Origin offset expected value

Transmission rate accuracy (Pre-Ampl OFF)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Transmission rate accuracy	Minimum value	0 ppm			
	Measurement value	_______ppm	_______ppm	_______ppm	_______ppm
	Maximum value	0.9 ppm			
	Measurement uncertainty	0.1 ppm			

Transmission rate accuracy (Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Transmission rate accuracy	Minimum value	0 ppm			
	Measurement value	_______ppm	_______ppm	_______ppm	_______ppm
	Maximum value	0.9 ppm			
	Measurement uncertainty	0.1 ppm			

Transmission power measurement accuracy <MS268x>

Power meter reading

		50 MHz	850 MHz	1500 MHz	2100 MHz
Power meter reading	Upper limit	+10.1 dBm			
	Reading	_____ dBm	_____ dBm	_____ dBm	_____ dBm
	Lower limit	+9.9 dBm			

Actual attenuation of programmable attenuator (attenuation from +10 dBm)

ATT set value	50 MHz	850 MHz	1500 MHz	2100 MHz
20	_____ dB	_____ dB	_____ dB	_____ dB

Transmission power measurement accuracy (Pre-Ampl OFF)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement accuracy	Minimum value	+0.23 dB			
	Measurement value	_____ dB	_____ dB	_____ dB	_____ dB
	Maximum value	–0.23 dB			
	Measurement uncertainty	±0.17 dB			

Measurement accuracy [dB] = Tx Power value – (Power meter reading – Actual attenuation for MN72A ATT: 20 dB)

Transmission power measurement accuracy (Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
Measurement accuracy	Minimum value	+0.23 dB			
	Measurement value	_____ dB	_____ dB	_____ dB	_____ dB
	Maximum value	–0.23 dB			
	Measurement uncertainty	±0.17 dB			

Measurement accuracy［dB］ = Tx Power value – (Power meter reading – Actual attenuation for MN72A ATT: 20 dB)

Transmission power measurement accuracy with carrier OFF <MS268x>

Transmission power measurement accuracy (Pre-Ampl OFF)

		50 MHz	850 MHz	1500 MHz	2100 MHz
ON/OFF Ratio (WDR_OFF)	Upper limit	-----			
	Measurement value	______ dBm	______ DBm	______ dBm	______ dBm
	Lower limit	65 dB (PDC, NADC) 60 dB (PHS)			
	Measurement uncertainty	2 dB			
OFF Power (WDR ON)	Upper limit	–82 dBm (PDC, NADC) –72 dBm (PHS)			
	Measurement value	______ dB	______ DB	______ dB	______ dB
	Lower limit	-----			
	Measurement uncertainty	2 dB			

Transmission power measurement accuracy (Pre-Ampl ON)

		50 MHz	850 MHz	1500 MHz	2100 MHz
ON/OFF Ratio (WDR_OFF)	Upper limit	-----			
	Measurement value	______ dBm	______ dBm	______ dBm	______ dBm
	Lower limit	65 dB (PDC, NADC) 60 dB (PHS)			
	Measurement uncertainty	2 dB			
OFF Power (WDR ON)	Upper limit	–82 dBm (PDC, NADC) –72 dBm (PHS)			
	Measurement value	______ dB	______ dB	______ dB	______ dB
	Lower limit	-----			
	Measurement uncertainty	2 dB			

Measurement accuracy = Tx Power value – power meter reading

Linearity <MS268x>

SG1 set value for +10 dBm calibration at each frequency

		50 MHz	850 MHz	1500 MHz	2100 MHz
SG1 set value	Set_Ref	dBm	dBm	dBm	dBm

Linearity accuracy (Pre-Ampl OFF)

Frequency (MHz)	SG level (dBm)	Calibration receiver reading (dB)	Tester measurement value (dBm)	Linearity calculation value (dB)**	Effective range (dB)
50	–10	-----	dBm*		
	–20	dB	dBm	dB	±0.16 dB
	–30	dB	dBm	dB	±0.16 dB
	–40	dB	dBm	dB	±0.16 dB
850	–10	-----	dBm*		
	–20	dB	dBm	dB	±0.16 dB
	–30	dB	dBm	dB	±0.16 dB
	–40	dB	dBm	dB	±0.16 dB
1500	–10	-----	dBm*		
	–20	dB	dBm	dB	±0.16 dB
	–30	dB	dBm	dB	±0.16 dB
	–40	dB	dBm	dB	±0.16 dB
2100	–10	-----	dBm*		
	–20	dB	dBm	dB	±0.16 dB
	–30	dB	dBm	dB	±0.16 dB
	–40	dB	dBm	dB	±0.16 dB
Measurement uncertainty		±0.04 dB			

* Measure_Ref

** Linearity calculation

Linearity calculation value (dB) = Spectrum analyzer measurement value (dBm) – {Measure_Ref (dBm) – Calibration receiver measurement value (dB)}

Linearity accuracy (Pre-Ampl ON)

Frequency (MHz)	SG level (dBm)	Calibration receiver reading (dB)	Tester measurement value (dBm)	Linearity calculation value (dB)**	Effective range (dB)
50	–20	-----	_______dBm*		
	–30	_______dB	_______dBm	_______dB	±0.16 dB
	–40	_______dB	_______dBm	_______dB	±0.16 dB
	–50	_______dB	_______dBm	_______dB	±0.16 dB
850	–20	-----	_______dBm*		
	–30	_______dB	_______dBm	_______dB	±0.16 dB
	–40	_______dB	_______dBm	_______dB	±0.16 dB
	–50	_______dB	_______dBm	_______dB	±0.16 dB
1500	–20	-----	_______dBm*		
	–30	_______dB	_______dBm	_______dB	±0.16 dB
	–40	_______dB	_______dBm	_______dB	±0.16 dB
	–50	_______dB	_______dBm	_______dB	±0.16 dB
2100	–20	-----	_______dBm*		
	–30	_______dB	_______dBm	_______dB	±0.16 dB
	–40	_______dB	_______dBm	_______dB	±0.16 dB
	–50	_______dB	_______dBm	_______dB	±0.16 dB
Measurement uncertainty		±0.04 dB			

* Measure_Ref

** Linearity calculation
Linearity calculation value (dB) = Spectrum analyzer measurement value (dBm) – {Measure_Ref (dBm) – Calibration receiver measurement value (dB)}

Adjacent channel leakage power measurement <MS268x>

Measurement range (Pre-Ampl OFF)

	Detuning frequency	50 MHz	850 MHz	1500 MHz	2100 MHz	Measurement uncertainty	Effective lower limit
PDC	50 k	____ dB	____ dB	____ DB	____ dB	1 dB	61 dB
PDC	100 k	____ dB	____ dB	____ DB	____ dB		66 dB
NADC	30 k	____ dB	____ dB	____ DB	____ dB		31 dB
NADC	60 k	____ dB	____ dB	____ DB	____ dB		61 dB
NADC	90 k	____ dB	____ dB	____ DB	____ dB		66 dB
PHS	600 k	____ dB	____ dB	____ DB	____ dB		61 dB
PHS	900 k	____ dB	____ dB	____ DB	____ dB		61 dB

Measurement range (Pre-Ampl ON)

	Detuning frequency	50 MHz	850 MHz	1500 MHz	2100 MHz	Measurement uncertainty	Effective lower limit
PDC	50 k	____ dB	____ dB	____ dB	____ dB	1 dB	61 dB
PDC	100 k	____ dB	____ dB	____ dB	____ dB		66 dB
NADC	30 k	____ dB	____ dB	____ dB	____ dB		31 dB
NADC	60 k	____ dB	____ dB	____ dB	____ dB		61 dB
NADC	90 k	____ dB	____ dB	____ dB	____ dB		66 dB
PHS	600 k	____ dB	____ dB	____ dB	____ dB		61 dB
PHS	900 k	____ dB	____ dB	____ dB	____ dB		61 dB

MX860805A/MX860905A/
MX268105A/MX268305A/MX268705A
π/4 DQPSK Measurement Software
(For MS8608A/MS8609A/
MS2681A/MS2683A/MS2687A/B)
Operation Manual
(Remote Control)

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Section 1 General

This section outlines the remote control and gives examples of system upgrades.

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General

The MS8608A/MS8609A, when combined with an external controller (host computer, personal computer, etc.), can automate your measurement system. For this purpose, the MS8608A/MS8609A 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.

Remote control functions

The remote control functions of the MS8608A/MS8609A 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.

Interface port selection functions

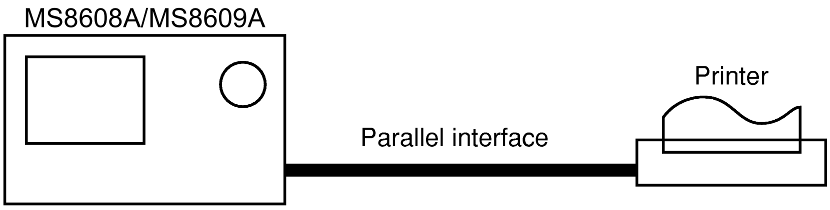
The MS8608A/MS8609A Spectrum Analyzer function has the standard RS-232C interface, GPIB interface bus and parallel (Centronics) interface. It can also have Ethernet interface as an option. Use the panel to select the interface port to be used to connect external devices as shown below.

Port for the external controller:	:Select RS-232C, GPIB or Ethernet (Option).
Port for the printer:	:Parallel interface.

Examples of system upgrades using RS-232C and GPIB

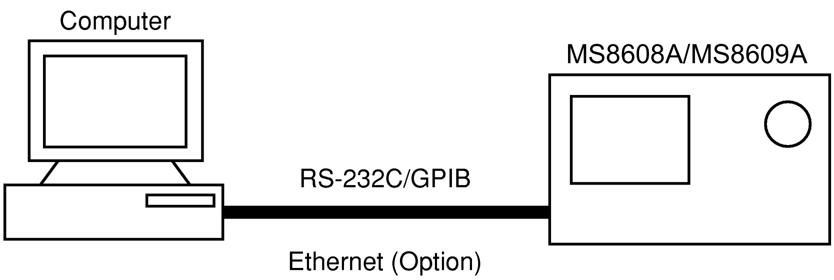
(1) Stand-alone type 1

Waveforms measured with MS8608A/MS8609A are output to the printer.



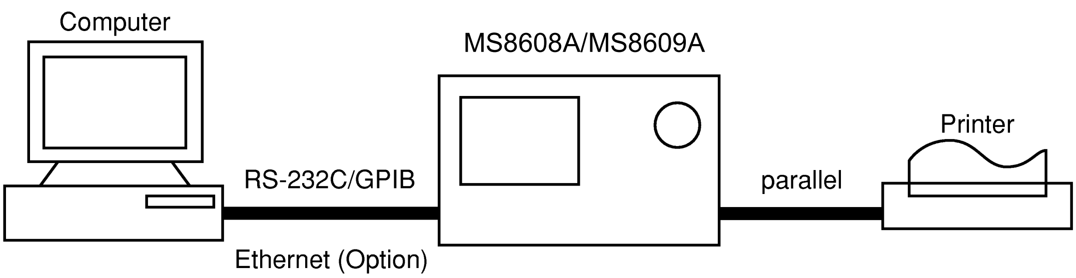
(2) Control by the host computer (1)

The spectrum analyzer is controlled automatically or remotely from the computer.



(3) Control by the host computer (2)

The waveforms measured by controlling spectrum analyzer automatically or remotely are output to the printer.



Specifications of RS-232C

The table below lists the specifications of the RS-232C provided as standard in 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 number (NON)
Start bit	1 bit
Stop bit (bits)	1 or 2 bits
Connector	D-sub 9-pin, male

Specifications of GPIB

The table below lists the specifications of the GPIB provided for 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	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.

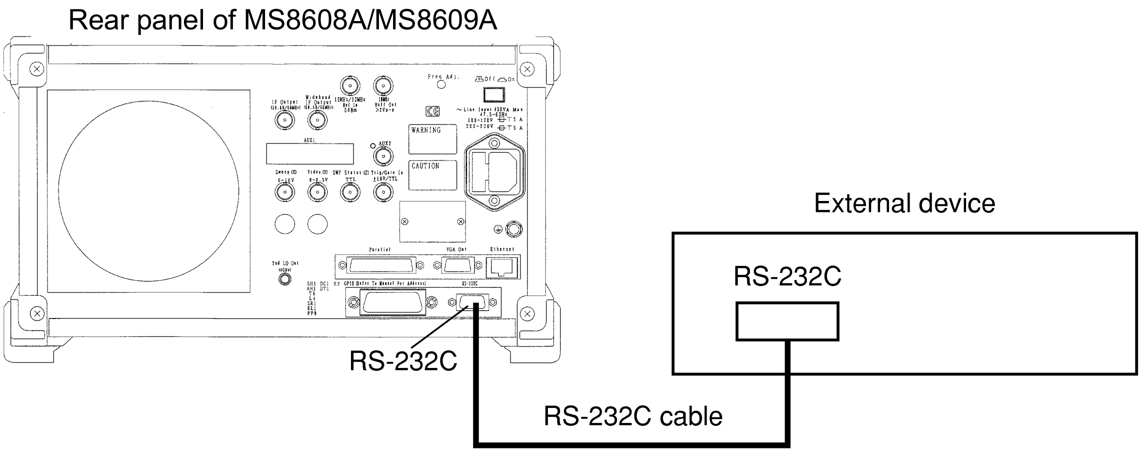
Section 2 Connecting Device

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 spectrum analyzer function.

Connecting an External Device with an RS-232C Cable..... 2-3
Connection Diagram of RS-232C Interface Signals 2-4
Connecting a Device with a GPIB Cable 2-5
Setting the GPIB Address 2-6

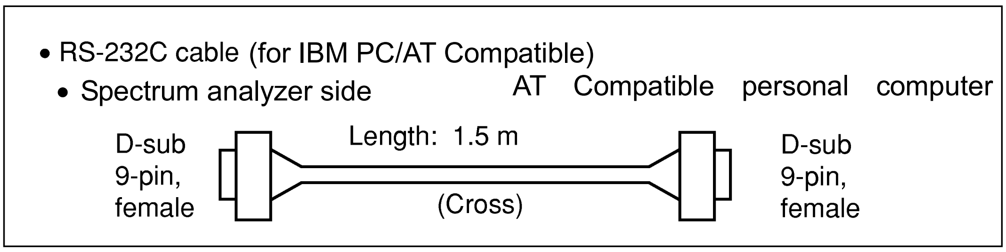
Connecting an External Device with an RS-232C Cable

Connect the RS-232C connector (D-sub 9-pin, male) on the rear panel of spectrum analyzer to the RS-232C connector of the external device with an RS-232C cable.



Note:

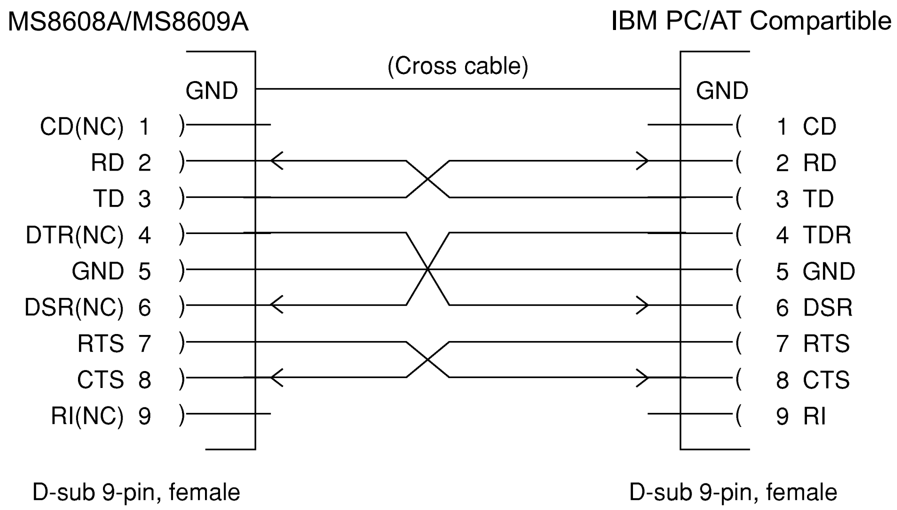
RS-232C connectors with 9 pins and 25 pins are available. When purchasing the RS-232C cable, check the number of pins on the RS-232C connector of the external device. Also, the following RS-232C cable is provided as peripheral parts of the spectrum analyzer.



Connection Diagram of RS-232C Interface Signals

The diagram below shows the RS-232C interface signal connections between the spectrum analyzer and devices such as a personal computer.

- Connection with IBM PC/AT Compatible personal computer



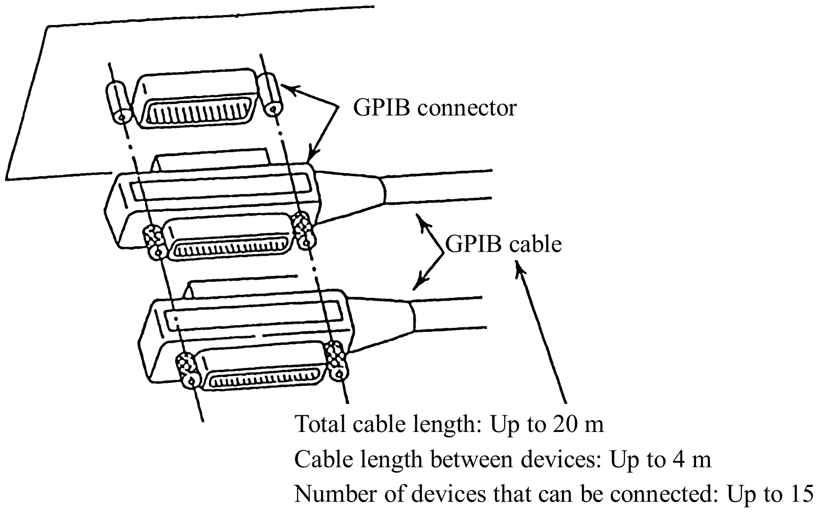
Connecting a Device with a GPIB Cable

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:



Setting GPIB Address

Set the GPIB address of this equipment as follows.

Config → Interface → (move cursor) My Address 1 → Set

Use the 10-key pad to enter the GPIB address of this equipment, next push Set key to confirm address.

The initial value is 1.

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 MS8608A/MS8609A via the RS-232C GPIB or Ethernet system.

General Description 3-3

Program Message Format 3-3

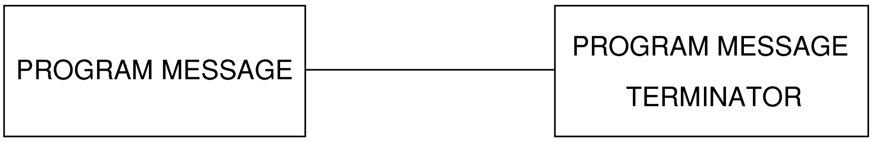
Response Message Format...................................... 3-8

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.

Program Message Format

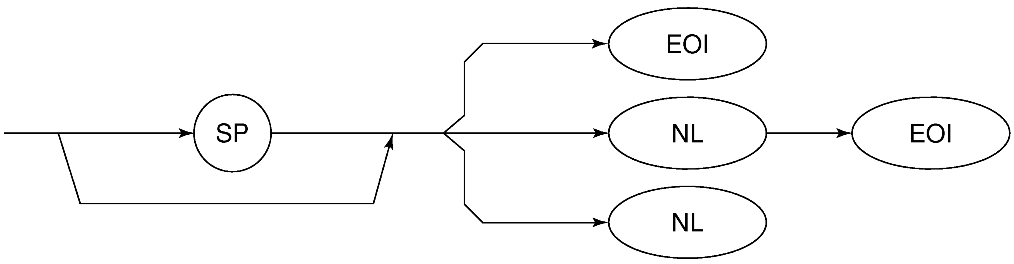
To transfer a program message from the controller program to this instrument using the WRITE statement, the program message formats are defined as follows.




```
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.

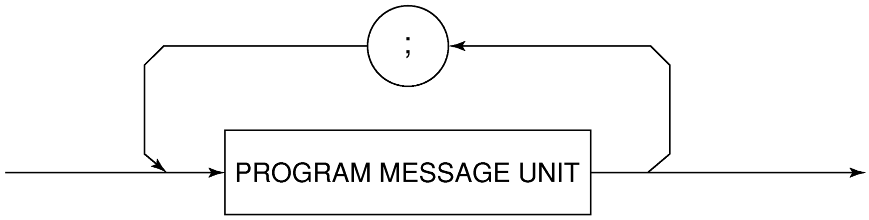
(1) PROGRAM MESSAGE TERMINATOR



NL: Called New line or LF (Line Feed)

Carriage Return (CR) is ignored and is not processed as a terminator.

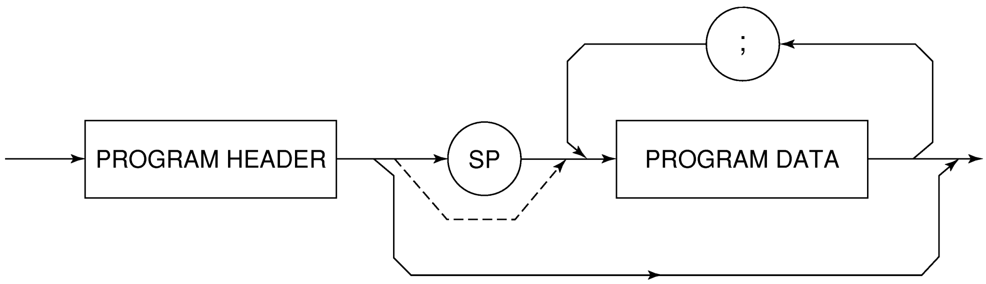
(2) PROGRAM MESSAGE



Multiple program message units can be output sequentially by separating them with a semicolon.

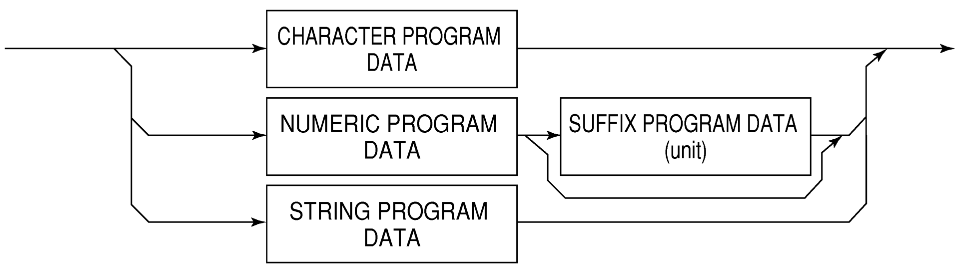
<Example> `WRITE #1;"CF 1GHZ;SP 5ØØKHZ"`

(3) PROGRAM MESSAGE UNIT



- The program header of an IEEE488.2 common command always begins with an asterisk.
- For numeric program data, the SP 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

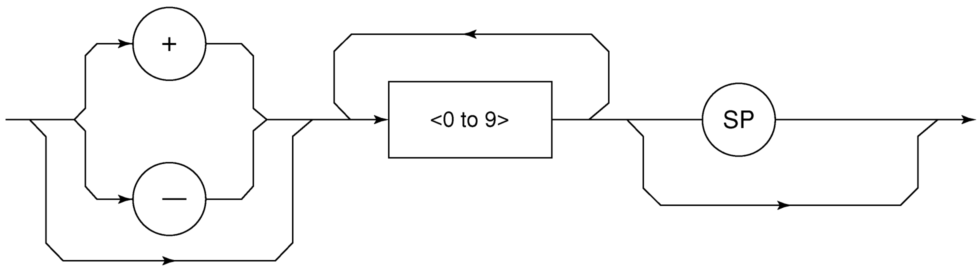
Character program data is specific character string data consisting of the uppercase alphabetic characters from A to Z, lowercase alphabetic characters from a to z, numbers 0 to 9, and underline (_).

<Example> `WRITE #1;"ST AUTO"` .... Sets Sweep Time to AUTO.

(6) NUMERIC PROGRAM DATA

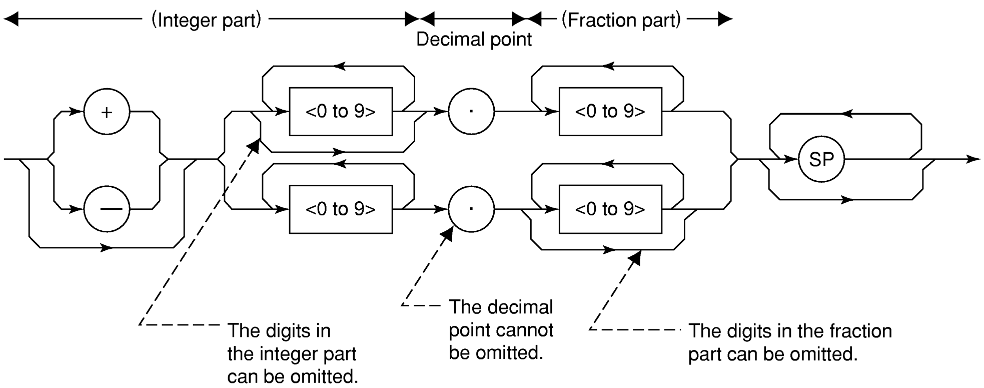
Numeric program data has two types of formats: integer format (NR1) and fixed-point format (NR2).

< 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 can be placed before the decimal point → +.05, –.05
- A number can end with a decimal point → 12.

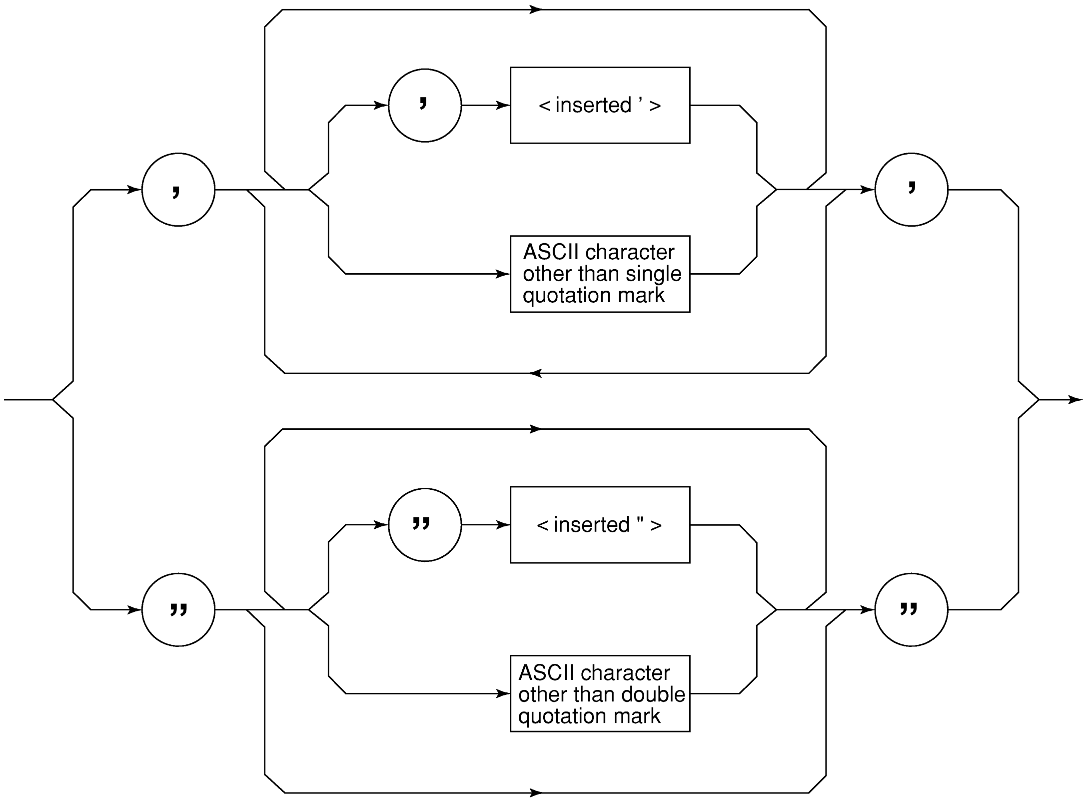
(7) SUFFIX PROGRAM DATA (unit)

The table below lists the suffixes used for MS8608A/MS8609A.

Table of Suffix Codes

Classification	Unit	Suffix Code
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	MV
	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’MS8608A’”`

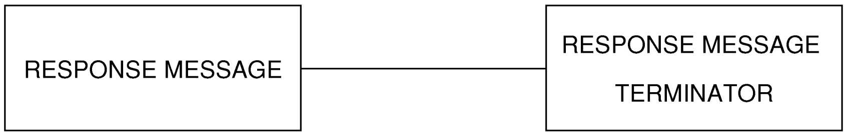
- A single quotation mark used within a character string must be repeated as shown in the double quotation marks.

  `WRITE #1;”TITLE’MS8608A’’NOISE MEAS’’’”`

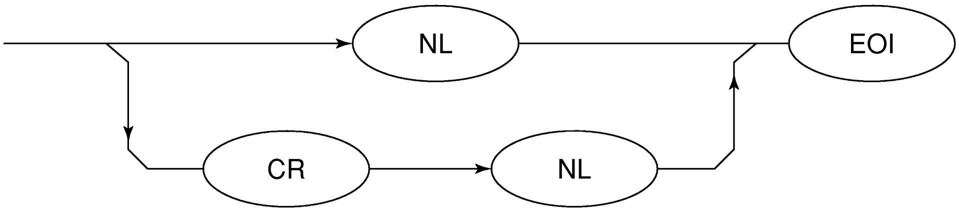
MS8608A ‘NOISE MEAS’ is set as the title.

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.

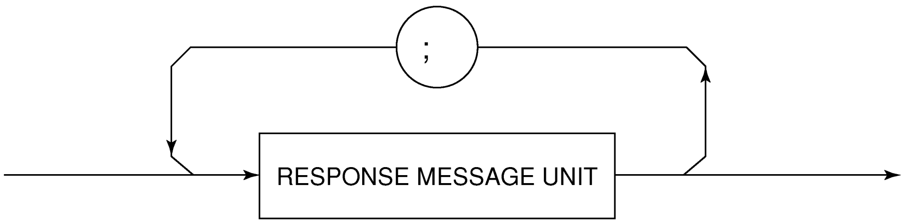


(1) RESPONSE MESSAGE TERMINATOR



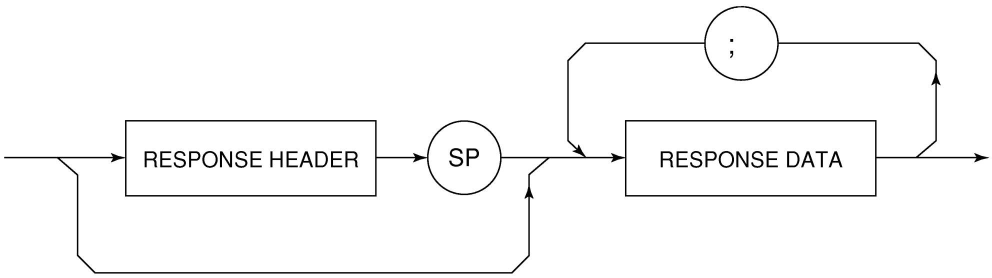
The response message terminator to be used depends on the TRM command specification.

(2) RESPONSE MESSAGE

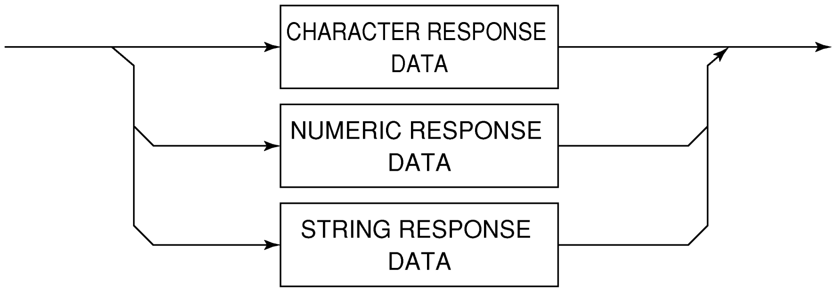


When a query is sent by the WRITE statement with one or more program queries, the response message also consists of one or more response message units.

(3) Usual RESPONSE MESSAGE UNIT



(4) RESPONSE DATA

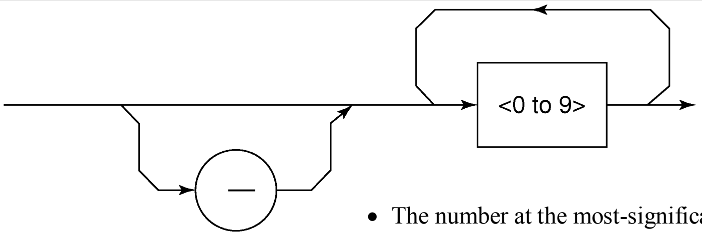


(5) CHARACTER RESPONSE DATA

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) >

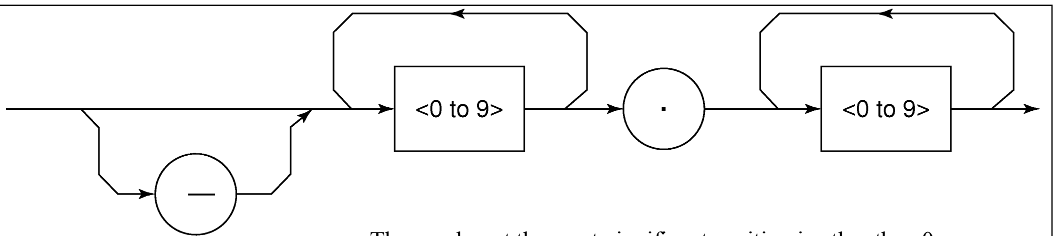


< Example >

```
123
−1234
```

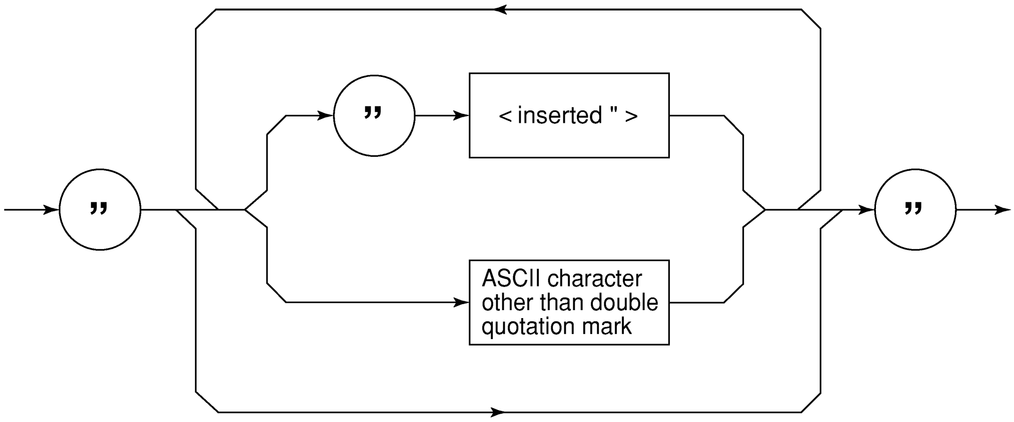
- The number at the most-significant position is other than 0.
- A + sign need not be placed before a positive number.

<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



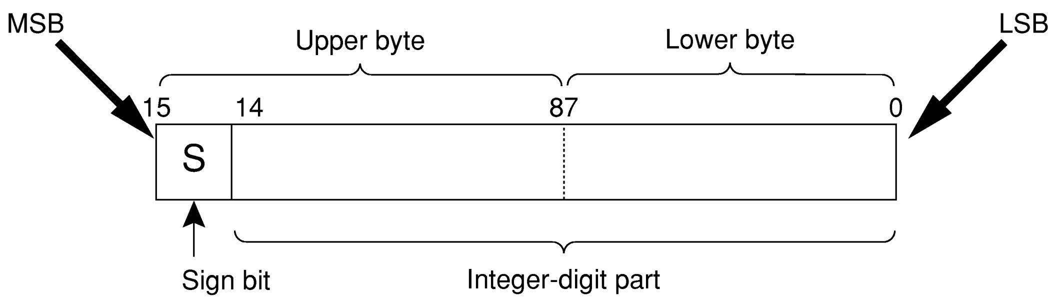
String response data is transmitted as an ASCII character enclosed with double quotation marks.

(8) Response message for input of waveform data using binary data

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
1000000000000001	−32767	32769
1000000000000010	−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(MBS) is used.
Integer-digit part: Bits 0 to 14 are used.
So, 16 bits(two bytes) are used.

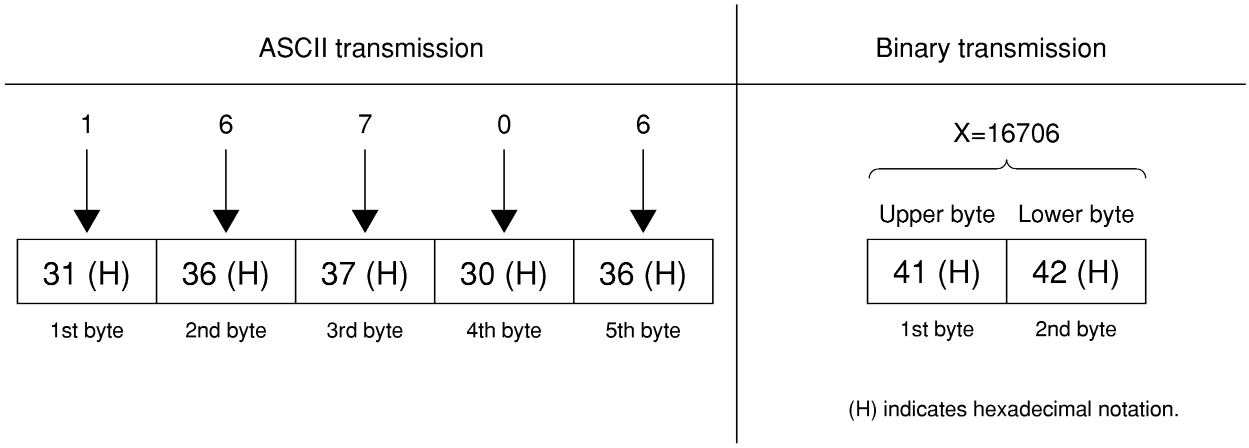


Internal Representation of 2-byte Bynary Data

† 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.

For an example, to transmit an integer of 16706, the ASCII format is compared with the Binary format, below.

The ASCII format requires 5 bytes. Whereas, the Binary format requires only 2 bytes, and does not need the data format transformation. So, The Binary format is used for a high-speed transmission.



$$16706\ (D) = 4 \times 16^3 + 1 \times 16^2 + 4 \times 16^1 + 2 \times 16^0$$

Binary notation

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Upper byte								Lower byte							
X=16706	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0

1st byte → 2nd byte (Transmission order)

bit	7	6	5	4	3	2	1	0	
1st byte	0	1	0	0	0	0	0	1	(Upper byte)= 41 (H)
2nd byte	0	1	0	0	0	0	1	0	(Lower byte)= 42 (H)

The waveform binary data has a number of bytes for

(Number of points to be specified) × 2 bytes + termination code.

Where, termination code is specified by the TRM command, and is LF (0D (H): 1 byte) or CR+LF (0A0D (H): 2 bytes).

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.

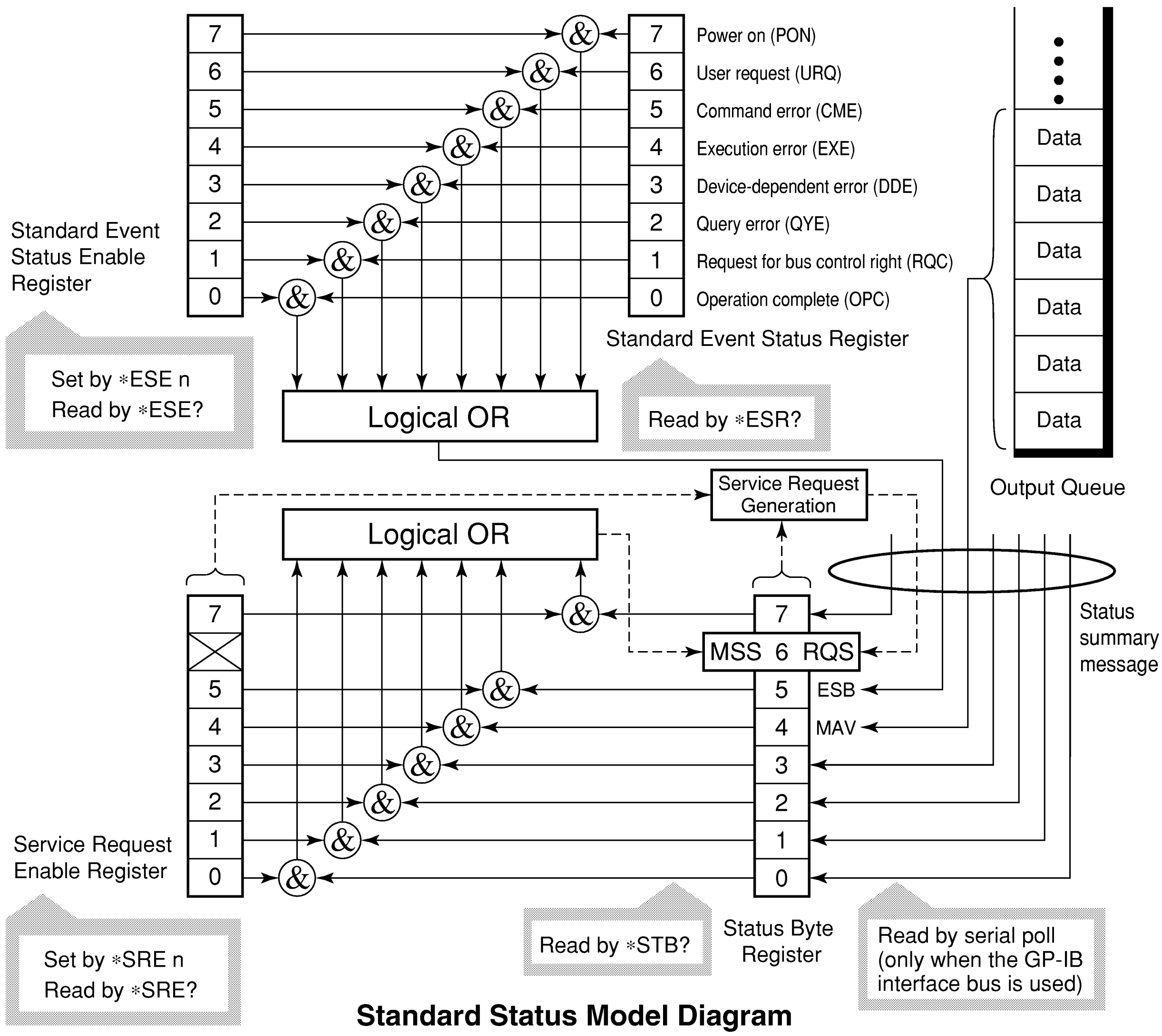
These functions are used to control a device from an external controller using the GPIB interface bus. Most of these functions can also be used to control a device from an external controller using the RS-232C or Ethernet interface.

IEEE488.2 Standard Status Model 4-3
Status Byte (STB) Register.. 4-5
ESB and MAV summary messages.......................... 4-5
Device-dependant summary messages.................... 4-6
Reading and clearing the STB register 4-7
Service Request (SRQ) Enabling Operation 4-8
Standard Event Status Register 4-9
Bit definition of Standard Event Status Register....... 4-9
Reading, writing, and clearing the Standard Event Status Register.. 4-10
Reading, writing, and clearing the Standard Event Status Enable Register................................. 4-10
Extended Event Status Register.. 4-11
Bit definition of END Event Status Register.............. 4-12
Reading, writing, and clearing the Extended Event Status Register... 4-13
Reading, writing, and clearing the Extended Status Enable Register.. 4-13
Techniques for Synchronizing MS8608A/MS8609A with a Controller.. 4-14
Wait for a response after the ∗OPC? query is sent... 4-14
Wait for a service request after ∗OPC is sent (only when the GPIB interface bus is used).. 4-15

The Status Byte (STB) sent to the controller is based on the IEEE488.2 standard. The bits comprising the STB are called status summary messages because they represent a summary of the current data in registers and queues.

IEEE488.2 Standard Status Model

The diagram below shows the standard model for the status structures stipulated in the IEEE488.2 standard.



Standard Status Model Diagram

In the status model, IEEE488.2 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 corresponding bit becomes 0. When the result 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 bit 5 (DIO6) 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 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 IEEE488.2 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.

Status Byte (STB) Register

The STB register consists of the STB and RQS (or MSS) messages of the device.

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.

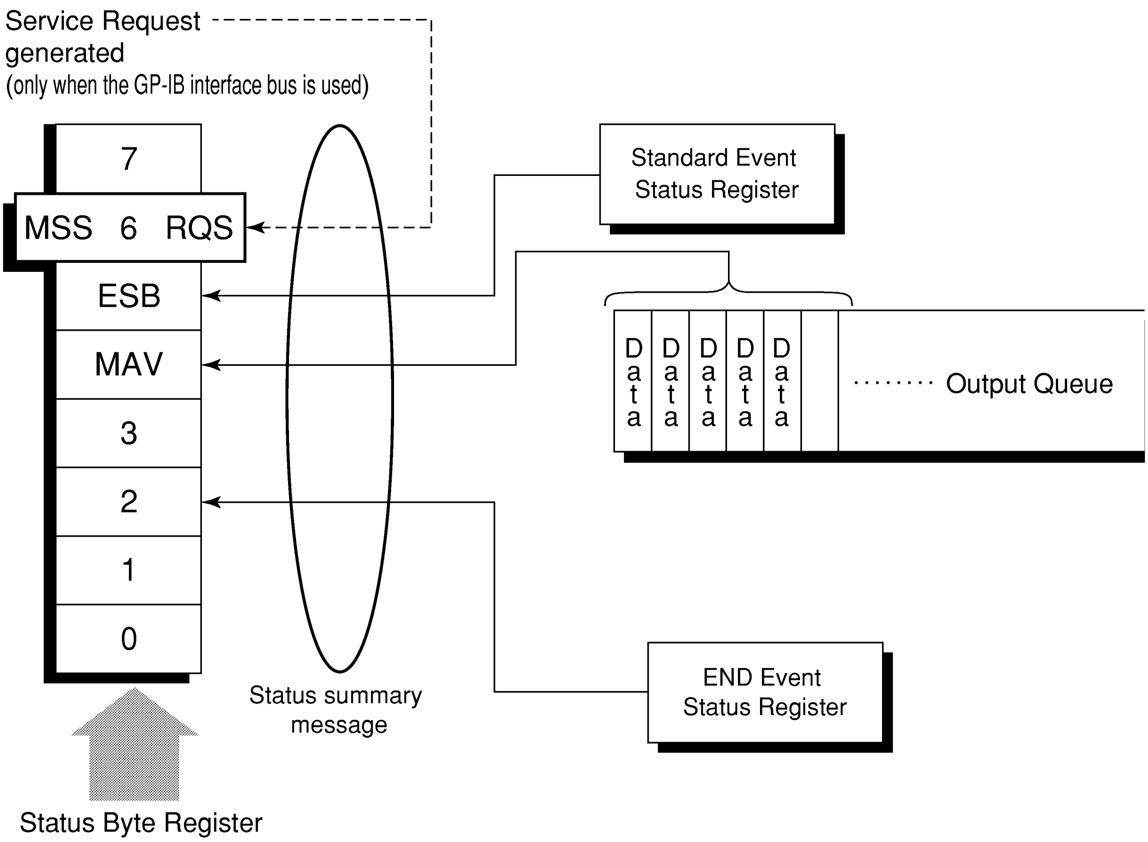
This bit becomes 0 when the ESR register is read by the ∗ESR? query or when it is cleared by the ∗CLS command.

(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.

Device-dependant summary messages

As shown in the diagram below, the spectrum analyzer does not use bit 0, 1, 3, and 7, and it uses bit 2 as the summary bit of the Event Status Register.



Reading and clearing the STB register

The STB register can be read using serial polling or the *STB? common query. The IEEE488.2 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 IEEE488.2 serial polling allows the device to return a 7-bit status byte and an RQS message bit which conforms to IEEE488.2. 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 Status)

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 IEEE488.2. 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

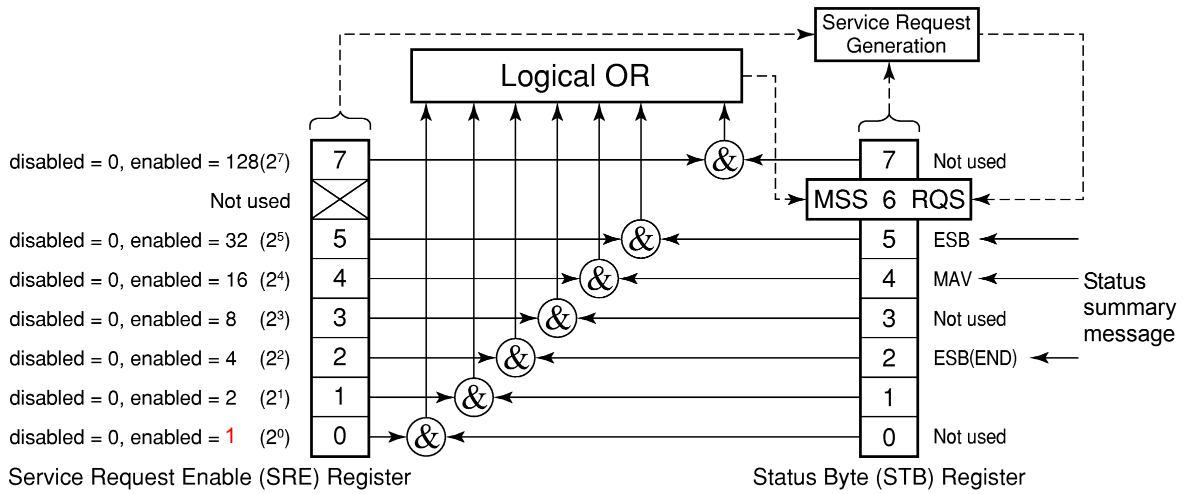
The *CLS common command clears all status data structures as well as the summary messages corresponding to them.

The *CLS command does not affect the settings in the Enable Register.

Service Request (SRQ) Enabling Operation

Bit 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.

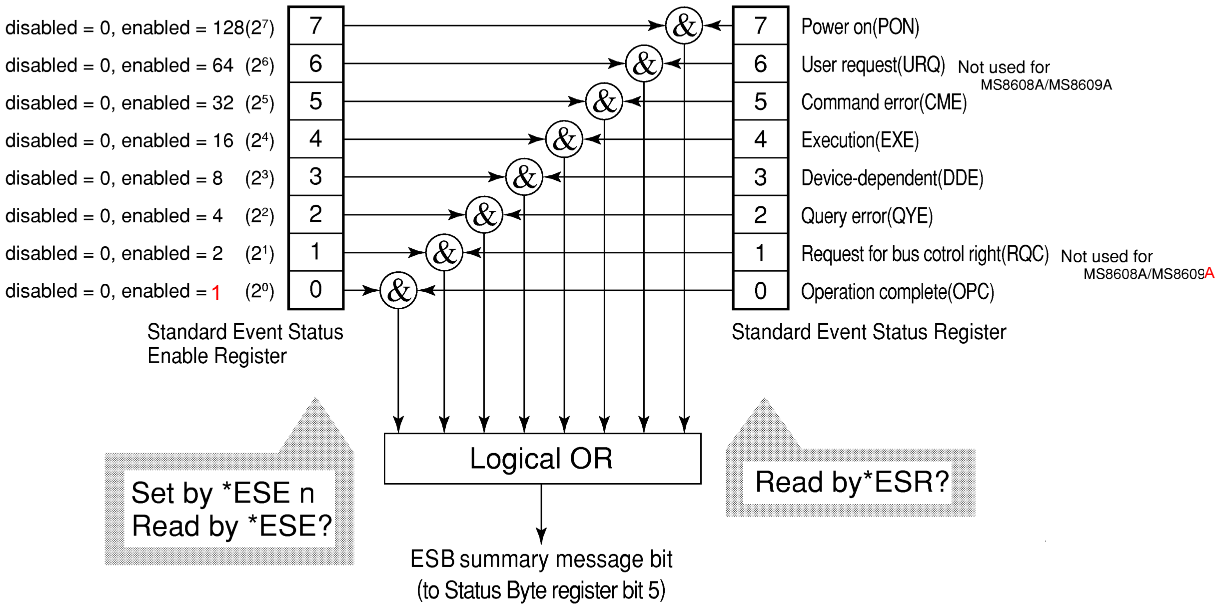
(2) Updating the SRE register

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.

Standard Event Status Register

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	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	Not used
0	Operation complete (OPC-Operation Complete)	This bit becomes 1 when this instrument has processed the ∗OPC command.

Reading, writing, and clearing the Standard Event Status Register

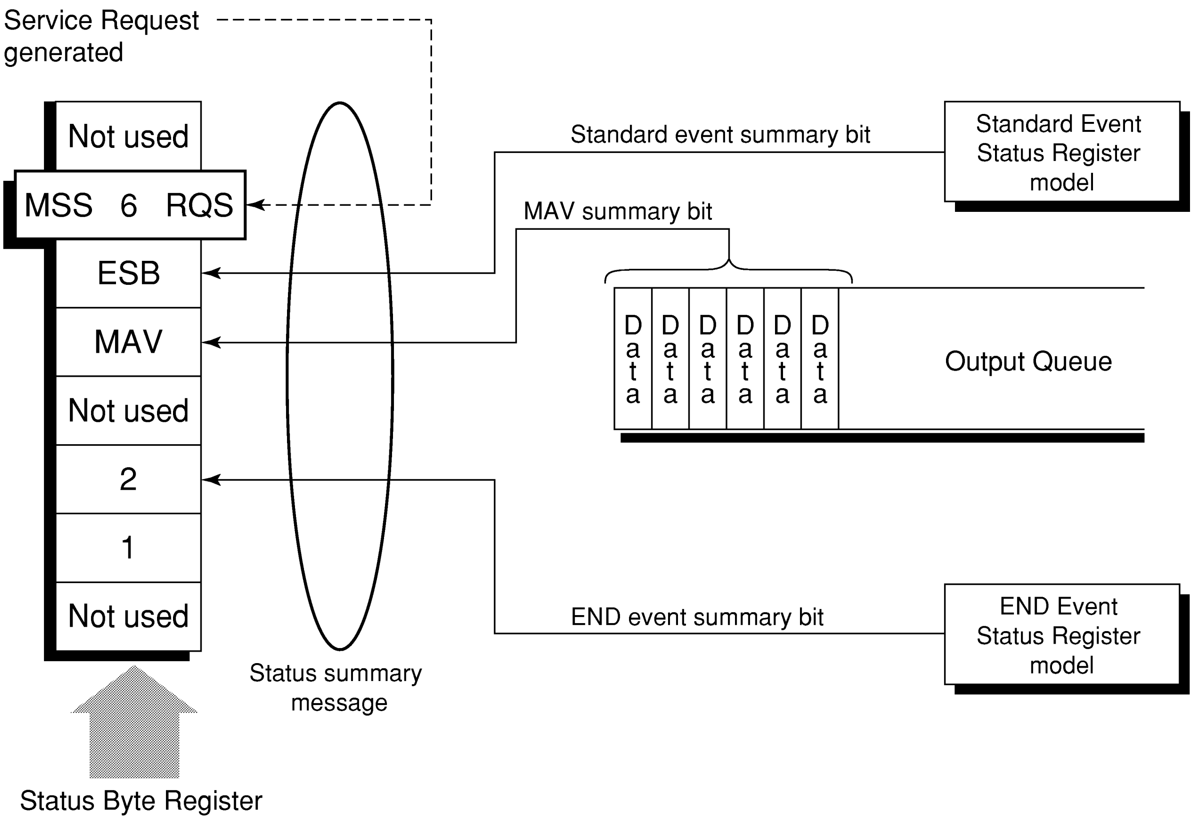
Reading	The register is read using the ∗ESR? common query. The register is cleared after being read. The response message is integer-format data with the binary weight added to the event bit and the sum converted to decimal.
Writing	With the exception of clearing, data cannot be written to the register 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

Reading, writing, and clearing the Standard Event Status Enable Register

Reading	The register is read using the ∗ESE? common query. 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 IEEE488.2 is changed [2] An ∗RST common command is received [3] A ∗CLS common command is received

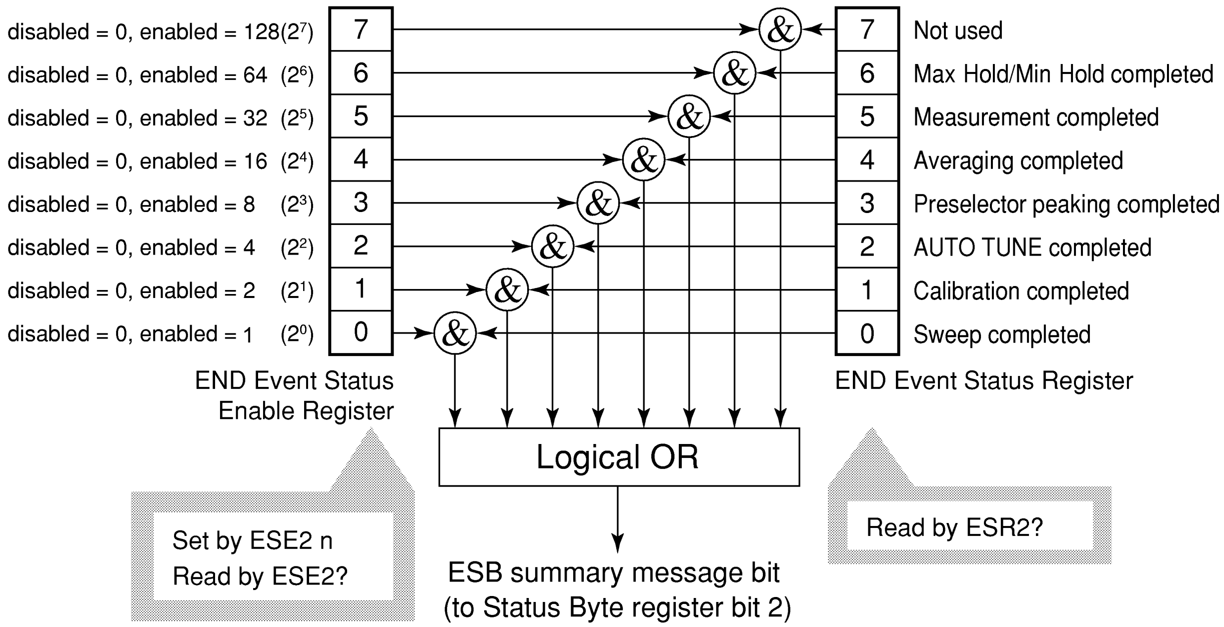
Extended Event Status Register

For 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.



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.

Reading, writing, and clearing the Extended Event Status Register

Reading	The ESR2? 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

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 IEEE488.2 is changed [2] An *RST common command is received [3] A *CLS common command is received

Techniques for Synchronizing MS8608A/MS8609A with a Controller

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 MS8608A/MS8609A and the controller.

If the controller controls and synchronizes with one or more devices, after all the commands specified for MS8608A/MS8609A have been processed, the next commands must be sent to other devices.

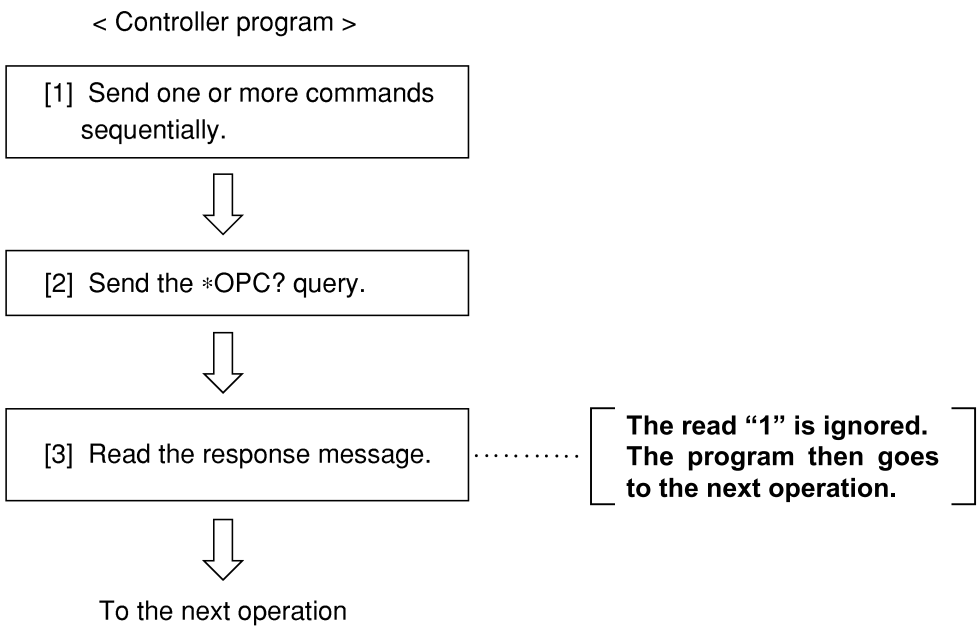
There are two ways of synchronizing MS8608A/MS8609A with the controller:

[1] Wait for a response after the ∗OPC? query is sent.

[2] Wait for SRQ after ∗OPC is sent.

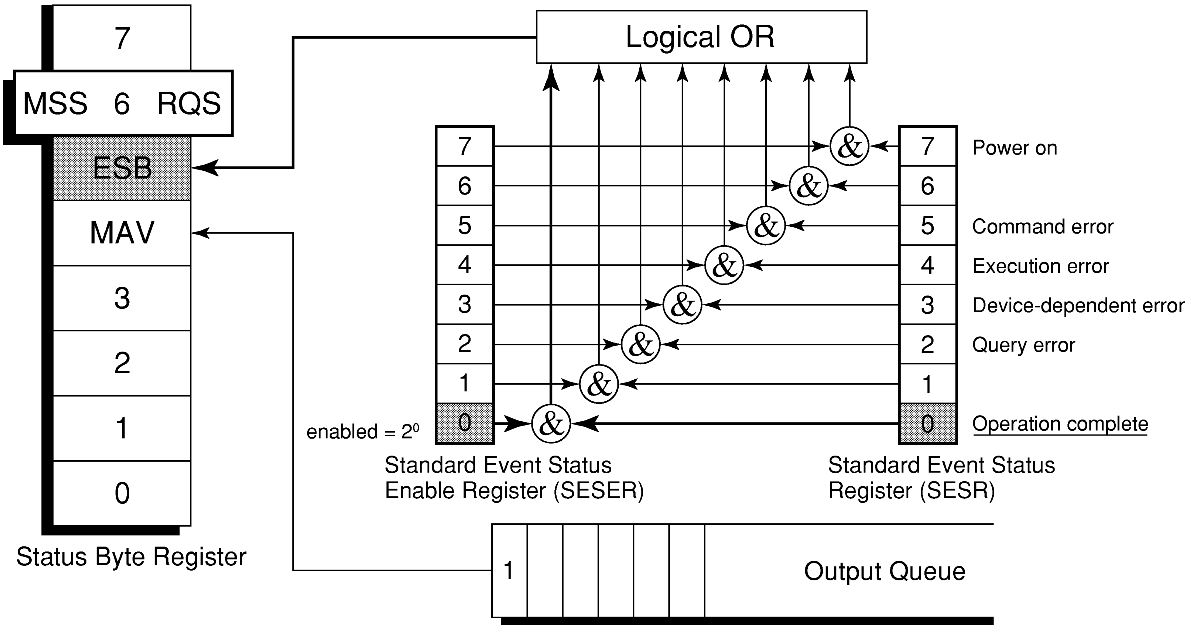
Wait for a response after the ∗OPC? query is sent

MS8608A/MS8609A outputs “1” as the response message when executing the ∗OPC? query command. The controller is synchronized with MS8608A/MS8609A by waiting for the response message to be entered.



Wait for a service request after ∗OPC is sent (only when the GPIB interface bus is used)

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

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.

Bus Initialization Using the IFC Statement 5-4
Initialization for Message Exchange by DCL and
SDC Bus Commands 5-5
Device Initialization Using the ∗RST Command 5-7
Device Initialization Using the INI/IP Command 5-8
Device Status at Power-on 5-8

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 GPIB are initialized using the SDC and DCL GPIB 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 MS8608A/MS8609A from the controller, the level 3 device initialization function of can be used, and the level 1, 2 initialization function cannot be used. When using the GPIB (Standard) interface bus to control the 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 which is set when the power is turned on.

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 which are initialized, and indicates the functions which 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	Remort/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.).

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 can be used when the GPIB interface is used to control the spectrum analyzer function 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 message from 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

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) to a specific initial state.

Note:

The ∗RST command does not affect the following.

[1] IEEE488.2 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.

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 spectrum analyzer device-dependent messages that initialize a device at level 3.

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 the Standard Event Status Enable Registers are cleared. Events can be recorded after the registers have been cleared.

Section 6 Command List

This section notes the device messages used on MX860x05A/MX268x05A by function in the Table of Contents below. For details on each command, refer to Section 7 “Command Details”.

How to Read the Device Message List 6-3
- Commands Commonly Used on All Measurement Screens 6-4
- Setup Common Parameter 6-7
- Modulation Analysis 6-13
- RF Power 6-16
- Occupied Bandwidth 6-19
- Spurious close to the Carrier..................................... 6-20
- Spurious Emission 6-22
- Power Meter... 6-27
- IQ Level 6-28

How to Read the Device Message List

The following pages show a list of commands (device messages) for each item on the π /4 DQPSK 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 judgment	PASS (Passable)/FAIL (Outside the specified range)	None
s	Binary judgment	ON/OFF	None
u	Unit specification	DB, DBM, DM, DBMV, DBUV, DBUVE, V, MV, UV, W, MW, UW, NW	None

Commands Commonly Used on All Measurement Screens

This section lists the commands used on all the measurement screens. For more information on external control commands commonly used in all the measurement modes for the MS860x/MS268x, refer to the separate MS860x/MS268x operation manual.

Function	Item	Program Message	Query Message	Response Message	Remarks
Measurement mode switching					
Spectrum Analyzer		PNLMD SPECT	PNLMD?	SPECT	
Tx Tester		PNLMD SYSTEM		SYSTEM	
Config		PNLMD CONFIG		CONFIG	
Measurement system switching					
System-1(F1)		SYS 1	SYS?	1	
System-2(F2)		SYS 2		2	
System-3(F3)		SYS 3		3	
Output data format					
Binary Code		BIN ON	BIN?	ON	
		BIN 1			
ASCII character string		BIN OFF		OFF	
		BIN 0			
Initialization					
Preset		PRE	---	---	
		INI			
		IP			
Measurement screen switching					
Setup Common Parameter		DSPL SETCOM	DSPL?	SETCOM	
Modulation Analysis		DSPL MODANAL		MODANAL	
RF Power		DSPL RFPWR		RFPWR	
Setup Template (RF Power)		DSPL SETTEMP_RFPWR		SETTEMP_RFPWR	
Occupied Bandwidth	Spectrum	DSPL OBW,SPECT		OBW,SPECT	
	FFT	DSPL OBW,FFT		OBW,FFT	
Adjacent Channel Power	Spectrum (All)	DSPL ADJ,SPECT1		ADJ,SPECT1	
	Spectrum (Separate)	DSPL ADJ,SPECT2		ADJ,SPECT1	
	High Speed	DSPL ADJ,HIGH		ADJ,HIGH	
Spurious Emission	Spot	DSPL SPURIOUS,SPOT		SPURIOUS,SPOT	

Function	Item	Program Message	Query Message	Response Message	Remarks
Spurious Emission	Search	DSPL SPURIOUS,SEARCH	DSPL?	SPURIOUS,SEARCH	
	Sweep	DSPL SPURIOUS,SWEEP		SPURIOUS,SWEEP	
Setup Spot Table (Spurious Emission)		DSPL SETTBL_SPU,SPOT		SETTBL_SPU,SPOT	
Setup Search/Sweep Table (Spurious Emission)		DSPL SETTBL_SPU,SWEEP		SETTBL_SPU,SWEEP	
IQ Level		DSPL IQLVL		IQLVL	*1)
Power Meter		DSPL PWRMTR		PWRMTR	*2)
Back Screen		BS	---	---	
Start Measurement					
Sweep/ Measure	Single, No Sync	SNGLS	---	---	
		S2			
	Single, Sync	SWP			
		TS			
	Continuous, No Sync	CONTS			
		S1			
Sweep /Measure status	Status of result	---	MSTAT?	0	Normal
				1	RF Level Limit
				2	Level Over
				3	Level Under
				4	Signal Abnormal
				5	No Synchronization
				6	Trigger Timeout
				9	No Measure
	During Measurement/sweep	---	SWP?	SWP 1	
	Measurement/ Sweep End			SWP 0	

*1) For MS268x, this Command is available when Option-17 or –18 I/Q Input is installed.

*2) Valid only for MS860x

Function	Item		Program Message	Query Message	Response Message	Remarks
Switch Screen and Measure Start	Setup Common Parameter		MEAS SETCOM	MEAS?	SETCOM	
	Modulation Analysis		MEAS MODANAL		MODANAL	
	RF Power		MEAS RFPWR		RFPWR	
	Setup Template (RF Power)		MEAS SETTEMP_RFPWR		SETTEMP_RFPWR	
	Occupied Band width	Spectrum	MEAS OBW,SPECT		OBW,SPECT	
		FFT	MEAS OBW,FFT		OBW,FFT	
	Adjacent Channel Power	Spectrum (ALL)	MEAS ADJ,SPECT1		ADJ,SPECT1	
		Spectrum (Separate)	MEAS ADJ,SPECT2		ADJ,SPECT2	
		High Speed	MEAS ADJ,HIGH		ADJ,HIGH	
	Spurious Emission	Spot	MEAS SPURIOUS,SPOT		SPURIOUS,SPOT	
		Search	MEAS SPURIOUS,SEARCH		SPURIOUS,SEARCH	
		Sweep	MEAS SPURIOUS,SWEEP		SPURIOUS,SWEEP	
	Setup Spot Table (Spurious Emission)		MEAS SETTBL_SPU,SPOT		SETTBL_SPU,SPOT	
	Setup Search/Sweep Table (Spurious Emission)		MEAS SETTBL_SPU,SWEEP		SETTBL_SPU,SWEEP	
	IQ Level		MEAS IQLVL		IQLVL	*1)
	Power Meter		MEAS PWRMTR		PWRMTR	*2)
RF Input connector switching						
RF Input	High		RFINPUT HIGH	RFINPUT?	HIGH	*3)
	Low		RFINPUT LOW		LOW	
Preamplifier						
Pre Ampl	On		PREAMP ON	PREAMP?	ON	*4)
	Off		PREAMP OFF		OFF	
Level correction						
Correction	Off		CORR 0	CORR?	0	
	Table1		CORR 1		1	
	Table2		CORR 2		2	
	Table3		CORR 3		3	
	Table4		CORR 4		4	
	Table5		CORR 5		5	

*1) For MS268x, this Command is available when Option-17 or –18 I/Q Input is installed.

*2) Valid only for MS860x

*3) Valid only for MS8608A.

*4) This Command is available when main unit option MS8608A-08/09A-08/MS2681A-08/83A-08/87A-08 preamplifier installed.

Setup Common Parameter

Function	Item	Program Message	Query Message	Response Message	Remarks
Input					
Terminal	RF	TERM RF	TERM?	RF	*1)
	IQ-DC	TERM IQDC		IQDC	
	IQ-AC	TERM IQAC		IQAC	
	IQ-Balance	TERM IQBAL		IQBAL	
Impedance	50 Ω	IQINZ 50	IQINZ?	50	*1)
	1 MΩ	IQINZ 1M		1M	
Reference Level		RFLVL l	RFLVL?	L	l: <High> (-10.00 + offset) dBm to (42.00 + offset) dBm <Low> (-30.00 + offset) dBm to (22.00 + offset) dBm *2)
Offset		RFLVLOFS l	RFLVLOFS?	l	l::-99.99 dB to 99.99 dB *2)
Frequency					
Channel		CHAN n	CHAN?	n	n:0 to 20000 Setting range varies according to Frequency and Channel values. *2)
Frequency		FREQ f	FREQ?	f	f: <MS2681A> 100 Hz to 3 GHz <MS8608A/MS2683A> 100 Hz to 7.8 GHz <MS8609A> 100 Hz to 13.2 GHz <MS2687A?B> 100 Hz to 30 GHz *2)
Channel & Frequency		CHFREQ n,f	---	---	n:(see Channel) f:(see Frequency) *2)
Channel Spacing		CHSPC f	CHSPC?	f	f:-10GHz to 10GHz *2)

*1) For MS268x, IQ-x setting is available when Option-17 or –18 I/Q option is installed.

*2) Cannot be set when Terminal is set to other than RF.

Function	Item	Program Message	Query Message	Response Message	Remarks
Signal					
Target System	π/4DQPSK	TGTSYS PI4DPSK	TGTSYS?	PI4DPSK	
	PDC	TGTSYS PDC		PDC	
	PHS	TGTSYS PHS		PHS	
	NADC	TGTSYS NADC		NADC	
	STD-39,T79	TGTSYS STD39		STD39	
	STD-T61	TGTSYS STDT61		STDT61	
	STD-T61 v1.1	TGTSYS STDT61V1_1		STDT61V1_1	
Measuring Object	Burst	MEASOBJ BURST	MEASOBJ?	BURST	Can be set when Target System is set to π/4DQPSK.
	Continuous	MEASOBJ CONT		CONT	
	MS-TCH	MEASOBJ MSTCH		MSTCH	Can be set when Target System is set to PDC, STD-39,T79.
	MS-CCH	MEASOBJ MSCCH		MSCCH	
	MS-SYNC	MEASOBJ MSSYNC		MSSYNC	
	BS-CH	MEASOBJ BSCH		BSCH	
	BS-SYNC	MEASOBJ BSSYNC		BSSYNC	
	PS-TCH	MEASOBJ PSTCH		PSTCH	Can be set when Target System is set to PHS.
	PS-SYNC	MEASOBJ PSSYNC		PSSYNC	
	CS-TCH	MEASOBJ CSTCH		CSTCH	
	CS-SYNC	MEASOBJ CSSYNC		CSYSNC	
	Continuous	MEASOBJ CONT		CONT	
	Mobile	MEASOBJ MOBILE		MOBILE	Can be set when Target System is set to NADC.
	Short	MEASOBJ SHORT		SHORT	
	Base	MEASOBJ BASE		BASE	
	DC-CH	MEASOBJ DCCH		DCCH	Can be set when Target System is set to STD-39,T79.
	DC-SYNC	MEASOBJ DCSYNC		DCSYNC	
	SC	MEASOBJ SC		SC	Can be set when Target System is set to STD-T61.
	SB	MEASOBJ SB		SB	
	SC	MEASOBJ SC		SC	Can be set when Target System is set to STD-T61 v1.1.
	SCCONT	MEASOBJ SCCONT		SCCONT	
	MC	MEASOBJ MC		MC	
	MCCONT	MEASOBJ MCCONT		MCCONT	
Symbol Rate		SRATE f	SRATE?	f	f: 2ksymbol/s to 300ksymbol/s *1)

*1) This command is available only when Target System is set to π/4DQPSK.

Function	Item	Program Message	Query Message	Response Message	Remarks
Analysis Start		ANLYSTA n	ANLYSTA?	n	n: 0 symbol to (Frame Length –Analysis Length) symbol *1)
Analysis Length		ANLYLEN n	ANLYLEN?	n	n: 48 symbol to 1000 symbol *1)
Frame Length		FRMLEN n	FRMLEN?	n	n: Analysis Length to 2000 symbol *1)
Channels Per Carrier	Full Rate	CHCARR FULL	CHCARR?	FULL	
	Half Rate	CHCARR HALF		HALF	
STD-T61 v1.1 Frame Length	Basic(40msec)	FRMLENSTDT61V1_1 BASIC	FRMLENSTDT61V1_1?	BASIC	*2)
	Sub(20msec)	FRMLENSTDT61V1_1 SUB		SUB	
Filter	Root-Nyquist	FILTER RTNYQ	FILTER?	RTNYQ	
	Nyquist	FILTER NYQ		NYQ	
	Off	FILTER OFF		OFF	
Multi Carrier	ON	MLTCARR ON	MLTCARR?	ON	*3)
	OFF	MLTCARR OFF		OFF	
Rolloff Factor		ROLLOFF r	ROLLOFF?	r	r: 0.20 to 1.00 *1)
Sync Word					
Pattern	No	PATT NO	PATT?	NO	*1)
	User	PATT USER		USER	
	S1/S7	PATT S1S7		S1S7	*4)
	S2/S8	PATT S2S8		S2S8	
	S3/S9	PATT S3S9		S3S9	
	S4/S10	PATT S4S10		S4S10	
	S5/S11	PATT S5S11		S5S11	
	S6/S12	PATT S6S12		S6S12	
	No	PATT NO		NO	
	User	PATT USER		USER	

*1) This command is available only when Target System is set to π/4DQPSK.

*2) This command is available only when Target System is set to STD-T61 v1.1.

*3) This command is available only when Target System is set to PDC, PHS.

*4) This command is available only when Target System is PDC and Measuring Object is MS-TCH, MS-CCH, BS-CH.

Function	Item	Program Message	Query Message	Response Message	Remarks
Pattern	SS1	PATT SS1	PATT?	SS1	*1)
	SS2	PATT SS2		SS2	
	SS3	PATT SS3		SS3	
	SS4	PATT SS4		SS4	
	SS5	PATT SS5		SS5	
	SS6	PATT SS6		SS6	
	No	PATT NO		NO	
	User	PATT USER		USER	
	16bit	PATT B16		B16	*2)
	32bi	PATT B32		B32	
	No	PATT NO		NO	
	User	PATT USER		USER	
	32bit	PATT B32		B32	*3)
	No	PATT NO		NO	
	User	PATT USER		USER	
	No	PATT NO		NO	*4)
	User	PATT USER		USER	
	Sync1	PATT SYNC1		SYNC1	*5)
	Sync2	PATT SYNC2		SYNC2	
	Sync3	PATT SYNC3		SYNC3	
	Sync4	PATT SYNC4		SYNC4	
	Sync5	PATT SYNC5		SYNC5	
	Sync6	PATT SYNC6		SYNC6	
	No	PATT NO		NO	
	User	PATT USER		USER	
	S1/S5	PATT S1S5		S1S5	*6)
	S2/S6	PATT S2S6		S2S6	
	S3/S7	PATT S3S7		S3S7	
	S4/S8	PATT S4S8		S4S8	
	S9	PATT S9		S9	
	S10	PATT S10		S10	

*1) Available only when Target System is PDC and Measuring Object is MS-SYNC or BS-SYNC.
*2) Available only when Target System is PHS and Measuring Object is PS-TCH or CS-TCH.
*3) Available only when Target System is PHS and Measuring Object is PS-SYNC or CS-SYNC.
*4) Available only when Target System is PHS and Measuring Object is Continuous.
*5) Available only when Target System is NADC.
*6) Available only when Target System is STD-39,T79 and Measuring Object MS-TCH or MS-CCH or BS-CH.

Function	Item	Program Message	Query Message	Response Message	Remarks
Pattern	S11	PATT S11	PATT?	S11	*1)
	S12	PATT S12		S12	
	NO	PATT NO		NO	
	USER	PATT USER		USER	
	SS1	PATT SS1		SS1	*2)
	SS2	PATT SS2		SS2	
	SS3	PATT SS3		SS3	
	SS4	PATT SS4		SS4	
	No	PATT NO		NO	
	User	PATT USER		USER	
	S9/S10	PATT S9S10		S9S10	*3)
	S1/S11	PATT S1S11		S1S11	
	S6/S7	PATT S6S7		S6S7	
	S2/S8	PATT S2S8		S2S8	
	S4/S5	PATT S4S5		S4S5	
	S12/S3	PATT S12S3		S12S3	
	No	PATT NO		NO	
	User	PATT USER		USER	
	SS1	PATT SS1		SS1	*4)
	SS2	PATT SS2		SS2	
	SS3	PATT SS3		SS3	
	No	PATT NO		NO	
	User	PATT USER		USER	
	S2/S1	PATT S2S1		S2S1	*5)
	S2R/S1R	PATT S2RS1R		S2RS1R	
	S4/S3	PATT S4S3		S4S3	
	S4R/S3R	PATT S4RS3R		S4RS3R	
	No	PATT NO		NO	
	User	PATT USER		USER	
	SS1	PATT SS1		SS1	*6)
	SS1R	PATT SS1R		SS1R	

*1) Available only when Target System is STD-39,T79 and Measuring Object is MS-TCH or MS-CCH or BS-CH.

*2) Available only when Target System is STD-39,T79 and Measuring Object is MS-SYNC or BS-SYNC.

*3) Available only when Target System is STD-39,T79 and Measuring Object is DC-CH.

*4) Available only when Target System is STD-39,T79 and Measuring Object is DC-SYNC.

*5) Available only when Target System is STD-T61 and Measuring Object is SC.

*6) Available only when Target System is STD-T61 and Measuring Object is SB.

Function	Item	Program Message	Query Message	Response Message	Remarks
Pattern	No	PATT NO	PATT?	NO	*1)
	User	PATT USER		USER	
	SW1	PATT SW1		SW1	*2)
	No	PATT NO		NO	
	User	PATT USER		USER	
	SW2	PATT SW2		SW2	*3)
	No	PATT NO		NO	
	User	PATT USER		USER	
	No	PATT NO		NO	*4)
	User	PATT USER		USER	
User Pattern Length		PATT_ULEN n	PATT_ULEN?	n	n: 1 symbol to 32 symbol *5)
User Pattern Bit		PATT_UBIT h	PATT_UBIT?	h	h:0 to FFFFFFFF FFFFFFFF *5)
Start Point		PATT_USTART n	PATT_USTART?	n	n:0 symbol to (Frame Length - Analysis Length - User Pattern Length) symbol *5)
Trigger					
Trigger	Free Run	TRG FREE	TRG?	FREE	
	Wide IF	TRG WIDEVID		WIDEVID	
	External	TRG EXT		EXT	
Trigger Level	Low	TRGLVL LOW	TRGLVL?	LOW	*Available only when Trigger is set to Wide IF.
	Middle	TRGLVL MIDDLE		MIDDLE	
	High	TRGLVL HIGH		HIGH	
Trigger Edge	Rise	TRGEDGE RISE	TRGEDGE?	RISE	*6)
	Fall	TRGEDGE FALL		FALL	
Trigger Delay		TRGDLY r	TRGDLY?	r	r:-2000 to 2000 symbol *6)
Symbol Timing		SYMTIME r	SYMTIME?	r	r:-0.20 to 0.20 symbole

*1) Available only when Target System is STD-T61 and Measuring Object is SB.

*2) Available only when Target System is STD-T61 v1.1 and Measuring Object is SC(Burst) or SC(Continuous) and Frame Length(for STD-T61 v1.1) is Basic.

*3) Available only when Target System is STD-T61 v1.1 and Measuring Object is SC(Burst) or SC(Continuous) and Frame Length(for STD-T61 v1.1) is sub.

*4) Available only when Target System is STD-T61 v1.1 and Measuring Object is MC(Burst) or MC(Continuous)..

*5) Available only when Pattern is set to User.

*6) Available only when Trigger is set to Free Run.

Modulation Analysis

Function	Item	Program Message	Query Message	Response Message	Remarks
Parameters					
Trace Format	Non	TRFORM NON	TRFORM?	NON	
	Constellation	TRFORM CONSTEL		CONSTEL	
	Eye Diagram	TRFORM EYE		EYE	
	EVM	TRFORM VECT		VECT	
	Phase Error	TRFORM PHASE		PHASE	
	Magnitude Error	TRFORM MAGTD		MAGTD	
Bit Rate Measure	On	BRMEAS ON	BRMEAS?	ON	
	Off	BRMEAS OFF		OFF	
Interpolation	Non	INTPOL NON	INTPOL?	NON	*Cannot be set when Trace Format is set to other than Constellation.
	Linear	INTPOL LIN		LIN	
	10 points	INTPOL POINT10		POINT0	
	Linear & Symbol Position	INTPOL LINSYM		LINSYM	
	10 points & Symbol Position	INTPOL P10SYM		P10SYM	
Error Scale	5%	ERRSC 5	ERRSC?	5	*Cannot be set when Trace Format is set to other than Constellation.
	10%	ERRSC 10		10	
	20%	ERRSC 20		20	
	Off	ERRSC OFF		OFF	
Phase Offset	0°	SCOFS 0	SCOFS?	0	*Cannot be set when Trace Format is set to other than Constellation or Eye Diagram.
	22.5°	SCOFS 22.5		22.5	
Vertical Scale	5% or 5deg	VSCALE 5	VSCALE?	5	*Cannot be set when Trace Format is set to other than EVM, Phase Error or Magnitude Error.
	10% or 10deg	VSCALE 10		10	
	20% or 20deg	VSCALE 20		20	
	50% or 50deg	VSCALE 50		50	
	100% or 100deg	VSCALE 100		100	
Storage Mode	Normal	STRG_MOD NRM	STRG_MOD?	NRM	
	Average	STRG_MOD AVG		AVG	
	Overwrite	STRG_MOD OVER		OVER	
Average Count		AVR_MOD n	AVR_MOD?	n	n: 2 to 9999
Refresh Interval	Every	INTVAL_MOD EVERY	INTVAL_MOD?	EVERY	
	Once	INTVAL_MOD ONCE		ONCE	

Function	Item	Program Message	Query Message	Response Message	Remarks
Judge Signal Abnormal	On	JUDSIGABNORM ON	JUDSIGABNORM?	ON	
	Off	JUDSIGABNORM OFF		OFF	
Burst Threshold		BURSTTHRESHOLD l	BURSTTHRESHOLD?	l	
Marker Mode	Normal	MKR_MOD NRM	MKR_MOD?	NRM	*Cannot be set when Trace Format is set to Non.
	Off	MKR_MOD OFF		OFF	
Marker Position		MKP_MOD r	MKP_MOD?	r	r: Analysis Start to (Analysis Start + Analysis Length)
Calibration					
Adjust Range		ADJRNG	---	---	
Power Calibration		PWRCAL	PWRCAL?	l	*1)
Multi Carrier Calibration		MLTCARRCAL	---	---	
Calibration Cancel		CALCANCEL	---	---	
Calibration Value		CALVAL l	CALVAL?	n,l	n: 0:Not Calibration, 1:Internal Calibration, 2:External Calibration
Results					
Carrier Frequency		---	CARRF?	f	
Carrier Frequency Error		---	CARRFERR? u	f	
RMS EVM		---	VECTERR?	r	
First 10 Symbols EVM		---	FVECTERR?	r	
Peak EVM		---	PVECTERR?	r	
Phase Error		---	PHASEERR?	r	
Magnitude Error		---	MAGTDERR?	r	
Origin Offset		---	ORGNOFS?	l	
Droop Factor		---	DRPFACT?	r	
Bit Rate		---	BITR?	r	
Bit Rate Error		---	BITRERR?	r	
Peak EVM symbol (Remote Only)		---	PVECTSYM?	r	
+Peak Phase Error (Remote Only)		---	PPHASEERR? +	r	
-Peak Phase Error (Remote Only)		---	PPHASEERR? -	r	
+Peak Phase Error Symbol (Remote Only)		---	PPHASESYM? +	n	
-Peak Phase Error Symbol (Remote Only)		---	PPHASESYM? -	n	
Maximum Phase Error(Remote Only)		---	MAXPHASEERR?	n	
+Peak Magnitude Error (Remote Only)		---	PMAGTDERR? +	r	
-Peak Magnitude Error (Remote Only)		---	PMAGTDERR? -	r	
+Peak Magnitude Error Symbol (Remote Only)		---	PMGTDSYM? +	n	
-Peak Magnitude Error Symbol (Remote Only)		---	PMGTDSYM? -	n	

*1) Valid only for MS860x.

Function	Item		Program Message	Query Message	Response Message	Remarks
Maximum Magnitude Error (Remote Only)			---	MAXMAGTDERR?	n	
Marker Level	Constellation, Eye Diagram	I	---	MKL_MOD? I	r	*Outputs "***" when Trace Format is set to Non, or Marker Mode is set to Off.
Marker Level	Constellation, Eye Diagram	Q	---	MKL_MOD? Q	r	*Outputs "***" when Trace Format is set to Non, or Marker Mode is set to Off.
Marker Level	EVM, Phase Error, Magnitude Error		---	MKL_MOD?	r	*Outputs "***" when Trace Format is set to Non, or Marker Mode is set to Off.
Wave Data	Constellation, Eye Diagram	I	XMC 0,na,nb	XMC? 0,nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to (Analysis Length *10) nb:-32768 to 32767 nd: 1 to (Analysis Length *10 +1)
Wave Data	Constellation, Eye Diagram	Q	XMC 1,na,nb	XMC? 1,nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to (Analysis Length *10) nb:-32768 to 32767 nd: 1 to (Analysis Length *10 +1)
Wave Data	(Origin)		OXMC p,na	OXMC? p	nb	p:0(I) / 1(Q) na:-32768 to 32767
Wave Data	EVM		XMV na,nb	XMV? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to Analysis Length nb:-32768 to 32767 nd: 1 to (Analysis Length +1)
Wave Data	Phase Error		XMP na,nb	XMP? nc,nb	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to Analysis Length nb:-32768 to 32767 nd: 1 to (Analysis Length +1)
Wave Data	Magnitude Error		XMN na,nb	XMN? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to Analysis Length nb:-32768 to 32767 nd: 1 to (Analysis Length +1)
Demodulation Data	Decimal (Remot Only)		XMM na,nb	XMM? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to Analysis Length *2/16 -1) nb:-0 to 65535 nd: 1 to (Analysis Length *2/16)
Demodulation Data	Hexdecimal (Remote Only)		XMMH na,nb	XMMH? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to Analysis Length *2/16 -1) nb:-0×0000 to 0×FFFF nd: 1 to (Analysis Length *2/16)

RF Power

Function	Item	Program Message	Query Message	Response Message	Remarks
Parameters					
Window	Slot	WINDOW SLOT	WINDOW?	SLOT	
	Frame	WINDOW FRAME		FRAME	
	Leading	WINDOW LEAD		LEAD	
	Trailing	WINDOW TRAIL		TRAIL	
Transmit Timing	On	TXTIME ON	TXTIME?	ON	
	Off	TXTIME OFF		OFF	
Storage Mode	Normal	STRG_RFPWR NRM	STRG_RFPWR?	NRM	
	Average	STRG_RFPWR AVG		AVG	
	Max Hold	STRG_RFPWR MAX		MAX	
	Min Hold	STRG_RFPWR MIN		MIN	
Average Count		AVR_RFPWR n	AVR_RFPWR?	n	n:2 to 9999
Refresh Interval	Every	INTVAL_RFPWR EVERY	INTVAL_RFPWR?	EVERY	
	Once	INTVAL_RFPWR ONCE		ONCE	
Level	Relative	LVLREL_RFPWR ON	LVLREL_RFPWR?	ON	
	Absolute	LVLREL_RFPWR OFF		OFF	
Wide Dynamic Range	On	WIDE_RFPWR ON	WIDE_RFPWR?	ON	
	Off	WIDE_RFPWR OFF		OFF	
Judge Signal Abnormal	On	JUDSIGABNORM ON	JUDSIGABNORM?	ON	
	Off	JUDSIGABNORM OFF		OFF	
Burst Threshold		BURSTTHRESHOLD l	BURSTTHRESHOLD?	l	
Filter Type	Gaussian	FLTTYPE_RFPWR GAUSS	FLTTYPE_RFPWR?	GAUSS	
	Normal	FLTTYPE_RFPWR NRM		NRM	
Marker					
Marker Mode	Normal	MKR_RFPWR NRM	MKR_RFPWR?	NRM	
	Off	MKR_RFPWR OFF		OFF	
Marker Position		MKP_RFPWR r	MKP_RFPWR?	r	r: Setting range differs for each Window.

Function	Item	Program Message	Query Message	Response Message	Remarks
Calibration					
Adjust Range		ADJRNG	---	---	
Power Calibration		PWRCAL	PWRCAL?	l	*Valid only for MS860x.
Multi Carrier Calibration		MLTCARRCAL	---	---	
Calibration Cancel		CALCANCEL	---	---	
Calibration Value		CALVAL l	CALVAL?	n,l	
Setup Template					
Setup Template		DSPL SETTEMP_RFPWR	DSPL?	SETTEMP_RFPWR	
Off Level	dBm	TEMPOFFLVL DBM	TEMPOFFLVL?	DBM	
	dB	TEMPOFFLVL DB		DB	
Line Level	Upper	TEMPLVL_RFPWR UP,n,l	TEMPLVL_RFPWR? UP,n	l	n:Setting range differs for Target System value.
	Lower	TEMPLVL_RFPWR LOW,n,l	TEMPLVL_RFPWR? LOW,n	l	n:1 l:-110 to 10.0
Template Condition	Standard	SLCTTEMP_RFPWR STD	SLCTTEMP_RFPWR?	STD	
	Not Selected	---		NOT	
Results					
Tx Power		---	TXPWR? u	l	u:dBm, Watt
Mean Power		---	MEANPWR_RFPWR? u	l	u:dBm, Watt
Carrier Off Power		---	OFFPWR? U	l	u:dBm, Watt
On/Off Ratio		---	RATIO?	l	
Risiing Time		---	RISETM?	l	
Falling Time		---	FALLTM?	l	
Timing		---	TIMING?	r	
Jitter		---	JITTER?	r	Outputs the maximum value by comparing the absolute values for +Jitter and –Jitter.
	+	---	JITTER? +	r	
	-	---	JITTER? -	r	
Template Judgement	Template On	---	TEMPPASS_RFPWR? ON	j	j: Judge Pass: PASS Fail: FAIL
	Template Off	---	TEMPPASS_RFPWR? OFF		
Slot Power (Remote Only)		---	SLOTPWR? N	l	n:Setting range varies according Target System and Channel Per Carrier.

Function	Item	Program Message	Query Message	Response Message	Remarks
Reference Power for Template (Remote Only)		---	TEMPRPWR?	l	
Marker Level		---	MKL_RFPWR? u	l	u:DB, DBM
Wave Data		XMD na,nb	XMD? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to (Frame Length +40*2)*10 nb:-32768 to 32767 nd: 1 to (Frame Length +40*2)*10 +1

Occupied Bandwidth

Function	Item	Program Message	Query Message	Response Message	Remarks
Parameters					
Measure Method	Spectrum	DSPL OBW,SPECT	DSPL?	OBW,SPECT	
	FFT	DSPL OBW,FFT		OBW,FFT	
Storage Mode	Normal	STRG_OBW NRM	STRG_OBW?	NRM	
	Average	STRG_OBW AVG		AVG	
Average Count		AVR_OBW n	AVR_OBW?	n	n: 2 to 9999
Refresh Interval	Every	INTVAL_OBW EVERY	INTVAL_OBW?	EVERY	
	Once	INTVAL_OBW ONCE		ONCE	
Judge Signal Abnormal	On	JUDSIGABNORM ON	JUDSIGABNORM?	ON	
	Off	JUDSIGABNORM OFF		OFF	
Burst Threshold		BURSTTHRESHOLD l	BURSTTHRESHOLD?	l	
Spectrum Analyzer Condition					
Span		---	FSPAN_OBW?	f	
Reference Level		---	RL_OBW?	n	
Attenuator		---	ATT_OBW?	n	
RBW		---	RBW_OBW?	n	
VBW		---	VBW_OBW?	n	
Sweep Time		---	SWT_OBW?	n	
Detection	Positive	---	DET_OBW?	POS	
Data Points	501	---	DPTS_OBW?	501	
Calibration					
Adjust Range		ADJRNG	---	---	
Power Calibration		PWRCAL	PWRCAL?	l	*Valid only for MS860x.
Multi Carrier Calibration		MLTCARRCAL	---	---	
Calibration Cancel		CALCANCEL	---	---	
Calibration Value		CALVAL l	CALVAL?	n,l	
Results					
Occupied Bandwidth(99%)		---	OBW?	f	
Upper Limit		---	OBWFREQ? UPPER	f	
Lower Limit		---	OBWFREQ? LOWER	f	
Center (Upper+Lower)/2		---	OBWFREQ? CENTER	f	
Wave Data		XME na,nb	XME? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to 500 nb:-32768 to 32767 nd: 1 to 501

Adjacent Channel Power

Function	Item	Program Message	Query Message	Response Message	Remarks
Parameters					
Measure Method	Spectrum (All)	DSPL ADJ,SPECT1	DSPL?	ADJ,SPECT1	
	Spectrum (Separate)	DSPL ADJ,SPECT2		ADJ,SPECT2	
	High Speed	DSPL ADJ,HIGH		ADJ,HIGH	
Unit	dB	UNIT_ADJ DB	UNIT_ADJ?	DB	
	dBm	UNIT_ADJ DBM		DBM	
	mW	UNIT_ADJ MW		MW	
	μW	UNIT_ADJ UW		UW	
	nW	UNIT_ADJ NW		NW	
Storage Mode	Normal	STRG_ADJ NRM	STRG_ADJ?	NRM	
	Average	STRG_ADJ AVG		ADJ	
Average Count		AVR_ADJ n	AVR_ADJ?	n	n: 2 to 9999
Refresh Interval	Every	INTVAL_ADJ EVERY	INTVAL_ADJ?	EVERY	
	Once	INTVAL_ADJ ONCE		ONCE	
Judge Signal Abnormal	On	JUDSIGABNORM ON	JUDSIGABNORM?	ON	
	Off	JUDSIGABNORM OFF		OFF	
Burst Threshold		BURSTTHRESHOLD l	BURSTTHRESHOLD?	l	
Marker / Marker Mode	Normal	MKR_ADJ NRM	MKR_ADJ?	NRM	
	Off	MKR_ADJ OFF		OFF	
Marker / Marker Position	Point	MKP_ADJ n	MKR_ADJ?	n	n:0 to (Data Points-1)
	Frequency	MKN_ADJ f	MKN_ADJ?	f	-(span/2) to (span/2)
Spectrum Analyzer Condition					
Span		---	FSPAN_ADJ?	f	
Reference Level		---	RL_ADJ?	n	
Attenuator		---	ATT_ADJ?	n	
RBW		---	RBW_ADJ?	n	
VBW		---	VBW_ADJ?	n	
Sweep Time		---	SWT_ADJ?	n	
Detection	Positive	---	DET_ADJ?	POS	
Data Points	501	---	DPTS_ADJ?	501	
Offset Frequency					
Offset Data Points		---	OFSDPTS_ADJ?	n	
Offset Frequency	Frequency 1	---	OFSFREQ_ADJ? 1	f	
	Frequency 2	---	OFSFREQ_ADJ? 2	f	
	Frequency 3	---	OFSFREQ_ADJ? 3	f	

Function	Item	Program Message	Query Message	Response Message	Remarks
Channel Bandwidth					
Channel Bandwidth		---	CHBW_ADJ?	f	
Calibration					
Adjust Range		ADJRNG	---	---	
Power Calibration		PWRCAL	PWRCAL?	l	*Valid only for MS860x.
Multi Carrier Calibration		MLTCARRCAL	---	---	
Calibration Cancel		CALCANCEL	---	---	
Calibration Value		CALVAL l	CALVAL?	n,l	
Results					
Tx Power		---	TXPWR? u	l	
Leakage Power		---	ADJCH? p,u	l	
Peak Power		---	PEAKPWR? p,u	l	p: LOW1,UP1, LOW2,UP2,LOW3,UP3 u: DBM,DB,WATT
Mean Power		---	MEANPWR_ADJ? p,u	l	p: LOW1,UP1, LOW2,UP2,LOW3,UP3 u: DBM,DB,WATT
Mean Power due to Modulation		---	MODPWR? p,u	l	p: LOW1,UP1, LOW2,UP2,LOW3,UP3 u: DBM,DB,WATT
Marker Level		---	MKL_ADJ? u	l1,l2	u: DBM,DB,WATT
Wave Data	Spectrum(All)	XMB na,nb	XMB? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to 500 nb:-32768 to 32767 nd:1 to 501
	Spcetrum (Separate)	XMB na,nb,nc	XMBS? na,nb,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:1 to 7 nb:0 to 500 nc: -32768 to 32767 nd:1 to 501
	Integrated data	XMAG na,nb	XMAG? nc,nd	ne(1),ne(2),ne(3)...,ne(nd)	na,nc:0 to 500 nb:-32768 to 32767 nd:1 to 501

Spurious Emission

Function	Item		Program Message	Query Message	Response Message	Remarks
Parameters						
Spurious Mode	Spot		DSPL SPURIOUS,SPOT	DSPL?	SPURIOUS,SPOT	
	Search		DSPL SPURIOUS,SEARCH		SPURIOUS,SEARCH	
	Sweep		DSPL SPURIOUS,SWEEP		SPURIOUS,SWEEP	
Ref Power Mode	SPA		REFPWRMD_SPU SPA	REFPWRMD_SPU?	SPA	
	Tx Power		REFPWRMD_SPU TXPWR		TXPWR	
Detect Mode	Spot	Positive Peak	DET_SPU SPOT,POS	DET_SPU? SPOT	POS	
		Sample	DET_SPU SPOT,SMP		SMP	
		Negative Peak	DET_SPU SPOT,NEG		NEG	
		Average	DET_SPU SPOT,AVG		AVG	
		RMS	DET_SPU SPOT,RMS		RMS	
	Search	Positive Peak	DET_SPU SEARCH,POS	DET_SPU? SEARCH	POS	
		Sample	DET_SPU SEARCH,SMP		SMP	
		Negative Peak	DET_SPU SEARCH,NEG		NEG	
		Average	DET_SPU SEARCH,AVG		AVG	
		RMS	DET_SPU SEARCH,RMS		RMS	
	Sweep	Positive Peak	DET_SPU SWEEP,POS	DET_SPU? SWEEP	POS	
		Sample	DET_SPU SWEEP,SMP		SMP	
		Negative Peak	DET_SPU SWEEP,NEG		NEG	
		Average	DET_SPU SWEEP,AVG		AVG	
		RMS	DET_SPU SWEEP,RMS		RMS	
Preselector	Normal		BAND 0	BAND?	0	*1)
	Spurious		BAND 1		1	
Unit	dBm		UNIT_SPU DBM	UNIT_SPU?	DBM	
	dB		UNIT_SPU DB		DB	
View	Judgement		VIEW_SPU JDG	VIEW_SPU?	JDG	
	BW,SWT		VIEW_SPU BWSWT		BWSWT	
	Ref Level,ATT		VIEW_SPU REFATT		REFATT	

*1) This Command is available only when Option MS8608A-03/MS2683A-03 Pre-selector Lower Limit Expansion is installed.

Function	Item	Program Message	Query Message	Response Message	Remarks
Calibration					
Adjust Range		ADJRNG	---	---	
Power Calibration		PWRCAL	PWRCAL?	l	*Valid only for MS860x.
Multi Carrier Calibration		MLTCARRCAL	---	---	
Calibration Cancel		CALCANCEL	---	---	
Calibration Value		CALVAL l	CALVAL?	n,l	
Setup Spot Table					
Frequency		TBLFREQ_SPU SPOT,Fn,f	TBLFREQ_SPU? SPOT,Fn	f	n:1 to 15 Fn:REF,F1 to F15 f:100Hz to 3GHz (For MS2681A) f:100Hz to 7.8GHz (For MS8608A/MS2683A) f:100Hz to 13.2GHz (For MS8609A) f: 100Hz to 30GHz (For MS2687B)
Harmonics		TBLFREQ_SPU SPOT,HRM	---	----	
Attenuator Ref 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	
Ref Level		TBLRL_SPU SPOT,Fn,l	TBLRL_SPU? SPOT,Fn	l	Fn:REF, F1 to F15
Attenuator		TBLATT_SPU SPOT,Fn,l	TBLATT_SPU? SPOT,Fn	l	Fn:REF, F1 to F15
RBW		TBLRBW_SPU SPOT,Fn,f	TBLRBW_SPU? SPOT,Fn	f	
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	

<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 colspan="2">VBW</td><td>TBLVBW_SPU SPOT,Fn,f</td><td>TBLVBW_SPU? SPOT,Fn</td><td>f</td><td>Fn:REF,
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(1-3 sequence),
Off</td></tr>
<tr><td rowspan="2">VBW Mode</td><td>Auto</td><td>TBLVBWMD_SPU SPOT,AUTO</td><td rowspan="2">TBLVBWMD_SPU? SPOT</td><td>AUTO</td><td rowspan="2"></td></tr>
<tr><td>Manual</td><td>TBLVBWMD_SPU SPOT,MAN</td><td>MAN</td></tr>
<tr><td colspan="2">RBW/VBW Ratio</td><td>TBLVBWRT_SPU SPOT,r</td><td>TBLVBWRT_SPU? SPOT</td><td>r</td><td></td></tr>
<tr><td colspan="2">SWT</td><td>TBLSWT_SPU SPOT,Fn,ta</td><td>TBLSWT_SPU? SPOT,Fn</td><td>tb</td><td>Fn:REF,
F1 to F15</td></tr>
<tr><td rowspan="2">SWT Mode</td><td>Auto</td><td>TBLSWTMD_SPU SPOT,AUTO</td><td rowspan="2">TBLSWTMD_SPU? SPOT</td><td>AUTO</td><td rowspan="2"></td></tr>
<tr><td>Manual</td><td>TBLSWTMD_SPU SPOT,MAN</td><td>MAN</td></tr>
<tr><td colspan="2">Limit</td><td>SPULMT SPOT,Fn,l</td><td>SPULMT? SPOT,Fn</td><td>l</td><td></td></tr>
<tr><td rowspan="3">View</td><td>RBW,VBW,SWT</td><td>TBLVIEW_SPU SPOT,BWSWT</td><td rowspan="3">TBLVIEW_SPU? SPOT</td><td>BWSWT</td><td rowspan="3"></td></tr>
<tr><td>Ref Level, Attenuator</td><td>TBLVIEW_SPU SPOT,REFATT</td><td>REFATT</td></tr>
<tr><td>Limit</td><td>TBLVIEW_SPU SPOT,LMT</td><td>LMT</td></tr>
<tr><td colspan="2" rowspan="2">Judgement Level(Rel/Abs)</td><td>JUDGUNIT_SPTBL ON</td><td rowspan="2">JUDGUNIT_SPTBL?</td><td>ON</td><td rowspan="2"></td></tr>
<tr><td>JUDGUNIT_SPTBL OFF</td><td>OFF</td></tr>
<tr><td colspan="6">Setup Search/Sweep Table</td></tr>
<tr><td colspan="2">Start Frequency</td><td>TBLFREQ_SPU START,Fn,f</td><td>TBLFREQ_SPU? START,Fn</td><td>f</td><td>n:1 to 15
Fn:REF,F1 toF15
f:1kHz to 2999.999MHz
(For MS2681A)
f:1kHz to 7799.999MHz
(For MS8608A/MS2683A)
f:1kHz to 13199.999MHz
(For MS8609A)
f:1kHz to 29999.999MHz
(For MS2687B)</td></tr>
<tr><td colspan="2">Stop Frequency</td><td>TBLFREQ_SPU STOP,Fn,f</td><td>TBLFREQ_SPU? STOP,Fn</td><td>f</td><td>n:1 to 15
Fn:REF,F1 toF15
f:2kHz to 3GHz
(For MS2681A)
f:2kHz to 7.8GHz
(For MS8608A/MS2683A)
f:2kHz to 13.2GHz
(For MS8609A)
f:2kHz to 30GHz
(For MS2687B)</td></tr>
</table>

Function	Item	Program Message	Query Message	Response Message	Remarks
Attenuator Ref 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	
Ref Level		TBLRL_SPU SWEEP,Fn,l	TBLRL_SPU? SWEEP,Fn	l	Fn:REF, F1 to F15
Attenuator		TBLATT_SPU SWEEP,Fn,l	TBLATT_SPU? SWEEP,Fn	l	Fn:REF, F1 to F15
RBW		TBLRBW_SPU SWEEP,Fn,f	TBLRBW_SPU? SWEEP,Fn	f	
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		TBLVBW_SPU SWEEP,Fn,f	TBLVBW_SPU? SWEEP,Fn	f	Fn:REF, F1 to F15 f:1Hz to 3MHz (1-3 sequence), Off
VBW Mode	Auto	TBLVBWMD_SPU SWEEP,AUTO	TBLVBWMD_SPU? SWEEP	AUTO	
	Manual	TBLVBWMD_SPU SWEEP,MAN		MAN	
RBW/VBW Ratio		TBLVBWRT_SPU SWEEP,r	TBLVBWRT_SPU? SWEEP	r	
SWT		TBLSWT_SPU SWEEP,Fn,ta	TBLSWT_SPU? SWEEP,Fn	tb	Fn:REF, F1 to F15
SWT Mode	Auto	TBLSWTMD_SPU SWEEP,AUTO	TBLSWTMD_SPU? SWEEP	AUTO	
	Manual	TBLSWTMD_SPU SWEEP,MAN		MAN	
Limit		SPULMT SWEEP,Fn,l	SPULMT? SWEEP,Fn	l	
View	RBW,VBW,SWT	TBLVIEW_SPU SWEEP,BWSWT	TBLVIEW_SPU? SWEEP	BWSWT	
	Ref Level, Attenuator	TBLVIEW_SPU SWEEP,REFATT		REFATT	
	Limit	TBLVIEW_SPU SWEEP,LMT		LMT	

Function	Item	Program Message	Query Message	Response Message	Remarks
Judgement Level(Rel/Abs)		JUDGUNIT_SPTBL ON	JUDGUNIT_SPTBL?	ON	
		JUDGUNIT_SPTBL OFF		OFF	
Results					
Tx Power		---	TXPWR? u	l	
Frequency		---	SPUFREQ? Fna,nb	f(na),f(na+1),...,f(na+nb)	
Level		---	SPULVL? Fna,nb,u	l(na),l(na+1),...,l(na+nb)	
Frequency and Level		---	SPUFREQLVL? Fna,nb,u	f(na),l(na),f(na+1),l(na+1),...,f(na+nb),l(na+nb)	
Ref Level		---	SPURL? Fna,nb	l(na),l(na+1),...,l(na+nb)	
Attenuator		---	SPUATT? Fna,nb	l(na),l(na+1),...,l(na+nb)	
RBW		---	SPURBW? Fna,nb	f(na),f(na+1),...,f(na+nb)	
VBW		---	SPUVBW? Fna,nb	f(na),f(na+1),...,f(na+nb)	
Sweep Time		---	SPUSWT? Fna,nb	t(na),t(na+1),...,t(na+nb)	
ALL		---	SPUALL? Fna,nb,u	fa(na),la(na),lb(na),lc(na),fb(na),fc(na),t(na),...,fa(na+nb),la(na+nb),lb(na+nb),lc(na+nb),fb(na+nb),fc(na+nb),t(na+nb)	
Judgement		---	SPUPASS? Fn	jn	
	All	---	SPUPASS? ALL	j1,j2,j3,...,j15	
Total Judgement		---	SPUJDG?	j	

Power Meter

These Commands are valid only for MS860x.

Function	Item	Program Message	Query Message	Response Message	Remarks
Parameters					
Set Relative		SETREL	---	---	
Range	Up	RNG UP	---	---	
	Down	RNG DN			
	Range 1	RNG1	---	---	
	Range 2	RNG2	---	---	
	Range 3	RNG3	---	---	
	Range 4	RNG4	---	---	
	Range 5	RNG5	---	---	
Calibration					
Adjust Range		ADJRNG	---	---	
Zero Set		ZEROSET	---	---	
Results					
Power	dBm	---	POWER? DBM	l	
	dB	---	POWER? DB	l	
	Watt	---	POWER? WATT	l	

IQ Level

For MS268x, these Commands are available when Option-17,18 I/Q Input is installed.

Function	Item		Program Message	Query Message	Response Message	Remarks
Parameters						
Storage Mode	Normal		STRG_IQL NRM	STRG_IQL?	NRM	
	Average		STRG_IQL AVG		AVG	
Average Count			AVR_IQL n	AVR_IQL?	n	n: 2 to 9999
Refresh Interval	Every		INTVAL_IQL EVERY	INTVAL_IQL?	EVERY	
	Once		INTVAL_IQL ONCE		ONCE	
Unit	mV		UNIT_IQL MV	UNIT_IQL?	MV	
	dBmV		UNIT_IQL DBMV		DBMV	
Results						
Level	I		---	ILVL? u	l	
	Q		---	QLVL? u		
	I p-p		---	IPPLVL? u		
	Q p-p		---	QPPLVL? u		
	All	current unit	---	IQLVL?	la,lb,lc,ld	la:I Level lb:Q Level lc:Ip-p ld:Qp-p
		mV	---	IQLVL? MV	la,lb,lc,ld	
		dBmV	---	IQLVL? DBMV	la,lb,lc,ld	
Phase	I/Q Difference		---	IQPHASE?	r	unit:deg

Section 7 Detailed Explanations of Commands

This section provides the detailed explanation of the external control commands which can be used by the MX860x05A/MX268x05A Measurement Software for the MS860x/MS268x, in alphabetical order.

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How to Read the Detailed Description of Commands

This section provides the detailed specifications of the external control commands in alphabetical order. See Section 6 “Command List” to search a command for a desired function.

■ Description of the detailed explanation for each command

[1] CHAN

[2] ■ Function

Channel

Sets a channel.

[3] ■ Syntax

Program Message	Query Message	Response Message
CHAN a	CHAN?	a

[4] ■ Value of a

Channel

Range	Resolution	Initial value
0 to 20000	1	9600

[5] □Suffix code

None

[6] ■ Restrictions

- The “Terminal” must be set to “RF” beforehand. (*cf.* TERM)
- If the Frequency falls outside the specified setting range due to the Channel Spacing value, the Channel cannot be changed even within the specified channel setting range. (*cf.* CHSPC)

[7] ■ Initialization command

*RST

[8] ■ Use example

Sets the channel to 5.

<Program>

TERM RF

CHAN 5

CHAN?

<Response>

5

[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 Tx Tester 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] ■ Value of a: 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] □Suffix code: Shows the units given after the value of a.

[6] ■ Restrictions: Shows the precautions in using the command. The restrictions concern commands marked "*cf.*".

[7] ■ Initialization command: Shows the command which initializes the item targeted to be set by this command.

[8] ■ Use example: Shows the basic order in using the command. The value of <Response> shown in the command example which reads out the measured result is different from an actual value.

ADJCH

■ Function

Leakage Power

Outputs the leakage power for Spectrum.

■ Syntax

Program Message	Query Message	Response Message
---	ADJCH? a,b	c

■ Value of a

Frequency position

a	Frequency position
LOW1	Offset Frequency-1 (Lower)
UP1	Offset Frequency-1 (Upper)
LOW2	Offset Frequency-2 (Lower)
UP2	Offset Frequency-2 (Upper)
LOW3	Offset Frequency-3 (Lower)
UP3	Offset Frequency-3 (Upper)
ALL	All

■ Value of b

Reading unit

b	Unit
None	Uses the unit set in Unit (*cf.* UNIT_ADJ).
DBM	dBm
DB	dB
WATT	W

■ Value of c

Leakage power for Spectrum

Resolution	Unit
0.01	dBm
0.01	dB
Four significand digits (Floating-point type)	W

■ Restrictions

- LOW1, UP1, LOW2, UP2, LOW3 and UP3 are output in that order when the value of a is ALL.

■ Use example

Read the LOW1 power in dB units.

<Program>

ADJCH? LOW1,DB

<Response>

-43.8

ADJRNG

■ Function

Adjust Range

Executes Adjust Range.

■ Syntax

Program Message	Query Message	Response Message
ADJRNG	---	---

■ Restrictions

- The following are executable screens (*cf.* DSPL).
  - Modulation Analysis
  - RF Power
  - Occupied Bandwidth
  - Adjacent Channel Power
  - Spurious Emission
  - Power Meter
- Where the Terminal is other than RF, execution cannnot be performed (*cf.*TERM).
- Where the Frequency is less than 20 MHz, execution cannot be performed (*cf.* FREQ).

■ Use example

Executes Adjust Range.

<Program>

DSPL MODANAL

ADJRNG

ANLYLEN

■ Function

Analysis Length

Sets the measured signal analysis length.

■ Syntax

Program Message	Query Message	Response Message
ANLYLEN a	ANLYLEN?	a

■ Value of a

Number of symbols to be analyzed

Range	Resolution	Initial value	Unit
48 to 1000	1	134	Symbol

□ Suffix code

None

■ Restrictions

- Unabailable unless Target System is π/4DQPSK.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the analysis length to 320 symbol.

<Program>
DSPL SETCOM
TGTSYS PI4DQPSK
ANLYLEN 320
ANLYLEN?

<Response>
320

ANLYSTA

■ Function

Analysis Start

Sets the measured signal analysis starting position.

■ Syntax

Program Message	Query Message	Response Message
ANLYSTA a	ANLYSTA?	a

■ Value of a

Analysis starting position

Range	Resolution	Initial Value	Unit
0 to (Frame Length – Analysis Lenght)	1	2	symbol

□ Suffix code

None

■ Restrictions

- Unabailable unless Target System is π/4DQPSK.
- If the Analysis Start set value exceeds (Frame Length – Analysis Length) when changing Frame Length or Analysis Length, the Analysis Start value is set to (Frame Length – Analysis Length).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the analysis starting position to 0 symbol.

<Program>
DSPL SETCOM
TGTSYS PI4DQPSK
ANLYSTA 0
ANLYSTA?

<Response>
0

ATT_ADJ

■ Function

Attenuator for Adjacent Channel Power

Reads the attenuator set value for Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	ATT_ADJ?	a

■ Value of a

Attenuator

Range	Resolution	Initial Value	Unit
0 to 62	1	50.00	dB

□ Suffix code

None : dB

DB : dB

■ Restrictions

- Attenuator setting range depends on Ref Level (*cf.* RL_ADJ).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Read the attenuator set value.

<Program>

ATT_ADJ?

<Response>

20

ATT_OBW

■ Function

Attenuator for Occupied Bandwidth

Reads the attenuator set value for Occupied Bandwidth measurement using a spectrum analyzer.

■ Syntax

Program Message	Query Message	Response Message
ATT_OBW a	ATT_OBW?	a

■ Value of a

Attenuator

Range	Resolution	Initial Value	Unit
0 to 62	1	50.00	dB

□ Suffix code

None : dB

DB : dB

■ Restrictions

- Attenuator setting range depends on Ref Level (*cf.* RL_OBW).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Set Attenuator to 20 dB.

<Program>

ATTMD_OBW AUTO

RL_OBW –30DBM

ATT_OBW 20DB

ATT_OBW?

<Response>

20

AVR_ADJ

■ Function

Average Count for Adjacent Channel Power

On the Adjacent channel Power screen, sets the average (measurement) count when the Storage Mode is set to Average.

■ Syntax

Program Message	Query Message	Response Message
AVR_ADJ a	AVR_ADJ?	a

■ Value of a

Average (measurement) count

Range	Resolution	Initial Value
2 to 9999	1	10

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Average Count to 500.

<Program>
AVR_ADJ 500
AVR_ADJ?

<Response>
500

AVR_IQL

■ Function

Average Count for IQ Level

Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_IQL a	AVR_IQL?	a

■ Value of a

Average (measurement) count

Range	Resolution	Initial Value
2 to 9999	1	10

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Average Count to 500.

<Program>
AVR_IQL 500
AVR_IQL?

<Response>
500

■ Restrictions according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

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 a	AVR_MOD?	a

■ Value of a

Average (measurement) count

Range	Resolution	Initial Value
2 to 9999	1	10

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Average Count to 500.

<Program>
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 a	AVR_OBW?	a

■ Value of a

Average (measurement) count

Range	Resolution	Initial Value
2 to 9999	1	10

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Average Count to 500.

<Program>

AVR_OBW 500

AVR_OBW?

<Response>

500

AVR_RFPWR

■ Function
Average Count for RF Power
Sets the average (measurement) count (number of averaging processes) when Storage Mode is set to Average at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
AVR_RFPWR a	AVR_RFPWR?	a

■ Value of a
Average (measurement) count

Range	Resolution	Initial Value
2 to 9999	1	10

■ Restrictions
None

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets Average Count to 500.

<Program>
AVR_RFPWR 500
AVR_RFPWR?

<Response>
500

BAND

■ Function
Preselector for Spurious Emission
On the Spurious Emission Measurement, set the Preselector route for use or non-use.

■ Syntax

Program Message	Query Message	Response Message
BAND a	BAND?	a

■ Value of a
Route selection

a	Route selection	Initial Value
0	No use of Preselector route (Normal)	*
1	Use of Preselector route (Spurious)	

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Use Preselector route.

<Program>
BAND 1
BAND?

<Response>
1

■ Restrictions according to model type and options
This command is valid for MS8608A/MS2683A.
If Option MS8608A-03/MS2683A-03 Pre-selector Lower-limit Expansion is not installed, this command is invalid.

BITR

■ Function

Bit Rate

Outputs the transmission rate measurement results on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	BITR?	a

■ Value of a

Transmission rate

Resolution	Unit
0.0000001	kbps

■ Use example

Read the transmission rate measurement results.

<Program>
DSPL MODANAL
SWP
BITR?

<Response>
42.0000042

BITRERR

■ Function

Bit Rate Error

Outputs the transmission rate error measurement results on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	BITRERR?	a

■ Value of a

Transmission rate

Resolution	Unit
0.1	ppm

■ Use example

Read the transmission rate error measurement results.

<Program>
DSPL MODANAL
SWP
BITRERR?

<Response>
0.1

BRMEAS

■ Function

Bit Rate measure

Sets whether or not to measure the transmission rate.

■ Syntax

Program Message	Query Message	Response Message
BRMEAS a	BRMEAS?	a

■ Value of a

Sets performing transmission rate measurement.

a	Bit Rate measure	Initial Value
ON	Performs transmission rate measurement.	
OFF	Does not perform transmission rate measurement.	*

■ Restrictions

- When Trigger is set to Wide IF, Bit Rate Measure is not enabled if Storage Mode is other than average (*cf.* TRG).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Perform transmission rate measurement.

<Program>
BRMEAS ON
BRMEAS?

<Response>
ON

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	---	---

■ Restrictions

Switches to the upper screen of the currently displayed screen. The relationship among each of the screen is as follows:

```
Setup Common Parameter
   ├─ Modulation Analysis
   ├─ RF Power
   │     └─ Setup Template
   ├─ Occupied Bandwidth
   ├─ Adjacent Channel Power
   ├─ Spurious Emission
   │     ├─ Setup Spot Table
   │     └─ Setup Search/Sweep Table
   ├─ IQ Level
   └─ Power Meter
```

■ Use example

Shifting to the upper screen.

<Program>

BS

BURSTTHRESHOLD

■ Function
Burst Threshold
Sets Threshold Level for judge Burst ON/OFF.

■ Syntax

Program Message	Query Message	Response Message
BURSTTHRESHOLD l	BURSTTHRESHOLD?	l

■ Value of l
Threshold Level for judge Burst ON/OFF

Range	Resolution	Initial Value	Unit
-10.00 to –90.00	0.01	-30.00	dB

■ Restrictions
- This function is enabled only when the displayed measurement screen is the Modulation Analysis, RF Power, Occupied Bandwidth(Measure Method:FFT), Adjacent Channel Power(Measure Method:High Speed).

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets Threshold Level to –40.00 dB.

<Program>
BURSTTHRESHOLD –40.00
BURSTTHRESHOLD?

<Response>
-40.00

CALCANCEL

■ Function

Power Calibration Cancel

Cancels the power calibration and resets the calibration value to 0.00.

■ Syntax

Program Message	Query Message	Response Message
CALCANCEL	---	---

■ Restrictions

- This function cannot be executed when the displayed measurement screen is Setup Common Parameter, IQ Level (*cf.* DSPL).
- When the Terminal is other than RF, execution cannot be performed (*cf.*TERM).

■ Use example

Canceling Power Calibration.

<Program>
DSPL SETCOM
TERM RF
DSPL MODANAL
CALVAL 10.00DB
CALCANCEL
CALVAL?

<Response>
2,10.00
0,0.00

CALVAL

■ Function

Power Calibration Value

Sets the calibration value for Power Calibration.

■ Syntax

Program Message	Query Message	Response Message
CALVAL a	CALVAL?	b,a

■Value of a

Calibration value

Range	Resolution	Initial Value	Unit
−10.00 to 10.00	0.01	0.00	dB

□ Suffix code

None: dB

DB: dB

■Value of b

Calibration type

Value	Calibration Type	Initial Value
0	Uncalibrated	*
1	Internally calibrated (Power Cal.)	
2	Externally calibrated	
3	Internally calibrated (Multi Carr. Cal.)	

■ Restrictions

- This setting is not possible when the measurement screen is IQ Level. (*cf.* DSPL).

■ 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?	a

■ Value of a

Carrier frequency

Resolution	Unit
0.1	Hz

■ Restrictions

- When the Terminal is other than RF, measurement is not performed(*cf.* TERM).

■ Use example

Reads out the carrier frequency.

<Program>
MEAS MODANAL
CARRF?

<Response>
1922499857.2

CARRFERR

■ Function

Carrier Frequency Error

Outputs the carrier frequency error at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	CARRFERR? a	b

■ Value of a

Output unit

Value	Output Unit
None	Hz
HZ	Hz
PPM	ppm

■ Value of b

Frequency error

Resolution	Unit
0.1	Hz
0.01	ppm

■ Restrictions

- No setting is allowed when Terminal is other than RF (*cf.* TERM).

■ Use example

Reads out the carrier frequency error.

<Program>
MEAS MODANAL
CARRFERR? HZ

<Response>
-14.5

CHAN

■ Function

Channel

Setting of channel number.

■ Syntax

Program Message	Query Message	Response Message
CHAN a	CHAN?	a

■ Value of a

Channel

Range	Resolution	Initial Value
0 to 20000	1	1

■ Restrictions

- Terminal must be set to RF beforehand. (*cf.* TERM)
- If the frequency goes beyond the setting range when changing the channel, the channel cannot be changed even within the setting range (*cf.* FREQ). For example, the channel cannot be changed when channel = 0, frequency = 7.8 GHz and Channel Spacing = 0.2 MHz.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the channel to 5.

<Program>
TERM RF
CHAN 5
CHAN?

<Response>
5

CHBW_ADJ

■ Function

Channel Bandwidth for Adjacent Channel Power

Outputs the channel bandwidth on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
CHBW_ADJ a	CHBW_ADJ?	a

■ Value of a

Frequency bandwidth

Range	Resolution	Initial Value	Unit
1 to 600k	0.1k	21.0k (value of PDC)	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Restrictions

- Unavailable unless Target System is π /4DQPSK (*cf.* TGTSYS).

  Unless Target System is π /4DQPSK, reading Channel Bandwidth causes the following values to be output:

Target System	Channel Bandwidth
PDC	21.0kHz
PHS	192.0kHz
NADC	24.3kHz
STD-39,T79	16.0kHz
STD-T61	4.8kHz
STD-T61 v1.1	4.8kHz

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

When Target System is π /4DQPSK, set Channel Bandwidth to 200 kHz.

<Program>

DSPL SETCOM

TGTSYS PI4DQPSK

CHBW_ADJ 200KHZ
CHBW_ADJ?

<Response>
200000

CHCARR

■ Function

Channels Per Carrier

Sets Full Rate or Half Rate.

■ Syntax

Program Message	Query Message	Response Message
CHCARR a	CHCARR?	a

■ Value of a

Full Rate/Half Rate

a	Full Rate/Half Rate	Initial Value
FULL	Sets Full Rate.	*
HALF	Sets Half Rate.	

■ Restrictions

- Unavailable unless Target System is PDC or NADC
  When Target System is PDC or NADC, sets Frame Length to the following values:

Target System	Full Rate	Half Rate
PDC	420 symbol	840 symbol
NADC	486 symbol	972 symbol

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Half Rate.

<Program>
DSPL SETCOM
TGTSYS PDC
CHCARR HALF
CHCARR?

<Response>
HALF

CHFREQ

■ Function
Channel and Frequency
Sets the channel number and the frequency at the same time.

■ Syntax

Program Message	Query Message	Response Message
CHFREQ a,b	---	---

■ Value of a
Channel
Same as "CHAN a" (*cf.* CHAN).

■ Value of b
Carrier frequency
Same as "FREQ b" (*cf.* FREQ).

■ Restrictions
- Terminal must be set to RF beforehand. (*cf.* TERM)

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets the carrier frequency of Channel 2 to 1 GHz.

<Program>
DSPL SETCOM
TERM RF
CHFREQ 2,1GHZ
CHAN?
FREQ?

<Response>
2
1000000000

CHSPC

■ Function

Channel Spacing

Sets frequency spacing between channels.

■ Syntax

Program Message	Query Message	Response Message
CHSPC a	CHSPC?	a

■ Value of a

One channel Frequency Band.

Range	Resolution	Initial Value	Unit
–10000000000 to 10000000000	1	π /4DQPSK : 25000 PDC : 25000 PHS : 300000 NADC : 30000 STD39 : 25000 STD-T61 : 6250 STD-T61 v1.1 : 6250	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHZ, GZ: GHz

■ Restrictions

- No setting is allowed when the terminal is other than RF (*cf.* TERM).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Setting the inter-channel frequency band to 300 kHz.

<Program>

DSPL SETCOM

TERM RF

CHSPC 300KHZ

CHSPC?

<Response>
300000

CONTS

■ Function

Continuous Measure/Sweep

Executes continuous measurement(sweep).

■ Syntax

Program Message	Query Message	Response Message
CONTS	---	---

■ Restrictions

- Executable screens are as follow:
  - Modulation Analysis
  - RF Power
  - Occupied Bandwidth
  - Adjacent Channel Power
  - Spurious Emission
  - Power Meter
  - IQ Level

  However, forcibly executes Single measurement in the following condition.
  - On RF Power screen, when Wide Dynamic Range is turned on (*cf.*WIDE_RFPWR).
  - On Adjacent Channel Power screen, when Measure method is set to Spectrum (Separate) (*cf.*DSPL).

■ 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 a	CORR?	a

■ Value of a
Correction data table

Value	Correction Data Table	Initial Value
0	Does not perform data correction.	*
1	Table1	
2	Table2	
3	Table3	
4	Table4	
5	Table5	

■ Restrictions
- Cannot set when the Terminal is other than RF.

■ Initialization command
PRE, INI, IP, *RST

■ Use example
Selects Correction Data Table 3.

<Program>
CORR 3
CORR?

<Response>
3

DET_ADJ

■ Function

Detection Mode

Reads the wave-detection mode in Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	DET_ADJ?	a

■ Value of a

Wave-detection mode

a	Wave-detection mode
POS	Sets the wave-detection mode to Positive Peak. Makes the maximum value during one sampling period to the data of the point thereof.

■ Use example

Reads the wave-detection mode.

<Program>
DET_ADJ?

<Response>
POS

DET_OBW

■ Function

Detection Mode

Reads the wave-detection mode in Occupied Bandwidth.

■ Syntax

Program Message	Query Message	Response Message
---	DET_OBW?	a

■ Value of a

Wave-detection mode

a	Wave-detection mode
POS	Sets the wave-detection mode to Positive Peak. Makes the maximum value during one sampling period to the data of the point thereof.

■ Use example

Reads the wave-detection mode.

<Program>

DET_OBW?

<Response>

POS

DET_SPU

■ Function

Detection Mode

Sets the wave-detection mode of Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
DET_SPU a,b	DET_SPU? a	b

■ Value of a

Spurious mode

a	Spurious Mode
SPOT	The wave-detection mode used in the Spot measurement method is the object hereof.
SEARCH	The wave-detection mode used in the Searcg measurement method is the object hereof.
SWEEP	The wave-detection mode used in the Sweep measurement method is the object hereof.

■ Value of b

Wave-detection mode

a	Wave-detection mode	Initial value
POS	Sets the wave-detection mode to Positive Peak. Makes the maximum value during one sampling period to the data of the point thereof.	
NEG	Sets the wave-detection mode to Negative Peak. Makes the minimum value during one sampling period to the data of the point thereof.	
SMP	Sets the wave-detection mode to Sample. Makes the instantaneous data at the point of when the hardware executes sampling operation to the data of that point.	
AVG	Sets the wave-detection mode to Average. Makes the average value between sampling points to the data of the points.	*
RMS	Sets the wave-detection mode to RMS. Makes the RMS value between the sampling points to the data of the points.	

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Set the wave-detection mode of the Sweep method to Positive Peak.

<Program>

DET_SPU? SWEEP,POS

DET_SPU? SWEEP

<Response>
POS

■ Notes
RMS is an option.

DPTS_ADJ

■ Function

Data Points

Reads the number of data points received from Spectrum-Analyzer sweeping on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	DPTS_ADJ?	a

■ Value of a

Data number

a	Data number
501	501 data points are obtained.

■ Use example

Reads the number of sweeping data points.

<Program>
DPTS_ADJ?

<Response>
501

DPTS_OBW

■ Function

Data Points

Reads the number of data points received from Spectrum-Analyzer sweeping on the Occupied Bandwidth.

■ Syntax

Program Message	Query Message	Response Message
---	DPTS_OBW?	a

■ Value of a

Data number

a	Data number
501	Sets so that 501 data points are received.

■ Use example

Reads the number of sweeping data points.

<Program>
DPTS_OBW?

<Response>
501

DRPFACT

■ Function

Droop Factor

Outputs the Droop Factor measurement results on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	DRPFACT?	a

■ Value of a

Droop Factor

Resolution	Unit
0.0001	dB/symbol

■ Use example

Reads the Droop Factor measurement results.

<Program>
DSPL MODANAL
SWP
DRPFACT?

<Response>
-0.0002

DSPL

■ Function

Change Screen

Sets the measurement screen and measurement method, but does not start a measurement.

■ Syntax

Program Message	Query Message	Response Message
DSPL a	DSPL?	a
DSPL a,b	DSPL?	a,b

■ Parameter

a: Name of the measurement screen

b: Measurement method / table selection

a	b	Name of the Measurement Screen	Measurement Method/ table selection	Initial Value	Change Condition
SETCOM	---	Setup Common Paramter	---	*	
MODANAL	---	Modulation Ananlysis	---		
RFPWR	---	RF Power	---		
SETTEMP_RFPWR	---	Setup Template(for RF Power)	---		C,D
OBW	SPECT	Occupied Bandwidth	Spectrum		A,C
	FFT		FFT		C
ADJ	SPECT1	Adjacent Channel Power	Spectrum(All)		A,C,E
	SPECT2		Spectrum(Separate)		
	HIGH		High Speed		
SPURIOUS	SPOT	Spurious Emission	Spot		A
	SEARCH		Search		A
	SWEEP		Sweep		A
SETTBL_SPU	SPOT	Setup Table (for Spurious Emission)	Soit		A
	SWEEP		Search & Sweep		A
IQLVL	---	IQ Level	---		B
PWRMTR	---	Power Meter	---		A

□ Change conditions

A: Change is not allowed when the Terminal is other than RF.

B: Change is not allowed when Terminal is RF.

C: Change is not allowed when the Target System is π/4DQPSK.

D: Change is not allowed when the Measuring Object is other than Burst.

E: Change is not allowed when the Mlt. Carrier is On while the Target System is PDC or PHS.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

[1] Changing to the Modulation Analysis screen.

<Program>
DSPL MODANAL
DSPL?

<Response>
MODANAL

[2] Changing to the sweep measurement on the Spurious Emission screen.

<Program>
DSPL SPURIOUS,SWEEP
DSPL?

<Response>
SPURIOUS,SWEEP

■ Restrictions according to model type and options

- For MS268x, changing to IQ Level Screen is not allowed when Option-17 or –18 I/Q Input is not installed.
- For MS268x, changing to Power Meter Screen is not allowed.

ERRSC

■ Function

Error Scale for Constellation

Sets a circle which shows the error range of each chip point (symbol point) in Constellation display at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
ERRSC a	ERRSC?	a

■ Value of a

Error range

Value	Error Range	Initial Value
5	5%	
10	10%	
20	20%	
OFF	Off	*

■ Restrictions

- No setting is allowed when the Trace Format is other than Constellation (*cf.* TRFORM).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the error scale to 20%.

<Program>
MEAS MODANAL
TRFORM CONSTEL
ERRSC 20
ERRSC?

<Response>
20

FALLTM

■ Function

Falling Time

Reads the Falling time on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	FALLTM?	a

■ Value of a

Falling Time

Resolution	Unit
0.01	us

■ Use example

Reads the Falling Time measurement results.

<Program>
DSPL RFPWR
SWP
FALLTM?

<Response>
11.06

FILTER

■ Function

Filter

Sets filtering to be performed on the analyzed signal.

■ Syntax

Program Message	Query Message	Response Message
FILTER a	FILTER?	a

■ Value of a

Filtering

a	Perform filtering	Initial Value
RTNYQ	Root-Nyquist: Performs Root-Nyquist filtering.	*
NYQ	Nyquist: Performs Nyquist filtering.	
OFF	Off: Not filtering.	

■ Restrictions

- This setting is allowed only when current screen is set to Setup Common Parameter screen. (*cf.* DSPL)

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Performs Nyquist filtering.

<Program>
DSPL SETCOM
FILTER NYQ
FILTER?

<Response>
NYQ

FLTTYPE_RFPWR

■ Function
Filter Type
Sets Filter Type for PHS at RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
FLTTYPE_RFPWR a	FLTTYPE_RFPWR?	a

■ Value of a
Filter Type

a	Filter Type	Initial Value
GAUSS	Gaussian Filter.	
NRM	Normal Filter.	*

■ Restrictions
- This setting is enabled when Target System is set to PHS and Multi Carrier is set to OFF (*cf.* TGTSYS, MLTCARR).

■ Initialization command
PRE, INI, IP, *RST

■ Use example
Sets Filter Type to gaussian filter.

<Program>
DSPL SETCOM
TGTSYS PHS
DSPL RFPWR
FLTTYPE_RFPWR GAUSS
FLTTYPE_RFPWR?

<Response>
GAUSS

FREQ

■ Function

Frequency

Sets carrier frequency for measured frequency.

■ Syntax

Program Message	Query Message	Response Message
FREQ a	FREQ?	a

■ Value of a

Carrier frequency

Range	Model	Resolution	Initial Value	Unit
100 to 7800000000	MS8608A	1	940025000	Hz
100 to 13200000000	MS8609A	1	940025000	Hz
100 to 3000000000	MS2681A	1	940025000	Hz
100 to 7800000000	MS2683A	1	940025000	Hz
100 to 13200000000	MS2687A/B	1	940025000	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHZ, MZ: MHz

GHz, GZ: GHz

■ Restrictions

- No setting is allowed when the terminal is one other than RF (*cf.* TERM).
- When the channel value changes only by Ch, carrier frequency Fnew after changing is found by Fnew = Fold + {(Channle Spcing) ×Ch }, where Fold is carrier frequency before changing (*cf.* CHAN).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the carrier frequency to 1 GHz.

<Program>

DSPL SETCOM

TERM RF

FREQ 1GHZ

<Response>

1000000000

FRMLEN

■ Function
Frame Length
Sets the measured signal frame length.

■ Syntax

Program Message	Query Message	Response Message
FRMLEN a	FRMLEN?	a

■ Value of a
Frame length

Range	Resolution	Initial Value	Unit
Analysis Length to 2000	1	840	symbol

□ Suffix code
None

■ Restrictions
- Unavailable unless Target System is π /4DQPSK (*cf.* TGTSYS).
- If the Frame Length set value is less than the Analysis Length when changing the Analysis Length, Frame Length is set to the Analysis Length set value.

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets the frame length to 900 symbol.

<Program>
DSPL SETCOM
TGTSYS PI4DQPSK
FRMLEN 900
FRMLEN?

<Response>
900

FRMLENSTDT61V1_1

■ Function

Frame Length for STD-T61 v1.1

Sets the measured signal frame length for STD-T61 v1.1.

■ Syntax

Program Message	Query Message	Response Message
FRMLENSTDT61V1_1 a	FRMLENSTDT61V1_1?	a

■ Value of a

Frame length

a	Frame Length	Initial Value
BASIC	Basic: 40ms(192symbol)	*
SUB	Sub: 20ms (96symbol)	

■ Restrictions

- The measurement screen must be set to Setup Common Parameter (*cf.* DSPL).
- Unavailable unless Target System is STD-T61 v1.1 (*cf.* TGTSYS).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the frame length to BASIC 40msec for STD-T61 v1.1.

<Program>
DSPL SETCOM
TGTSYS STDT61V1_1
FRMLENSTDT61V1_1 BASIC
FRMLENSTDT61V1_1?

<Response>
BASIC

FSPAN_ADJ

■ Function

Frequency Span on Adjacent Channel Power

Outputs the measurement frequency bandwidth on the Adjacent Channel Power.

■ Syntax

Program Message	Query Message	Response Message
---	FSPAN_ADJ?	a

■ Value of a

Frequency bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out Span on the Adjacent Channel Power screen.

<Program>

FSPAN_ADJ?

<Response>

50000

FSPAN_OBW

■ Function

Frequency Span on Occupied Bandwidth

Outputs the measurement frequency bandwidth on the Occupied Bandwidth.

■ Syntax

Program Message	Query Message	Response Message
---	FSPAN_OBW?	a

■ Value of a

Frequency bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out Span on the Occupied Bandwidth.

<Program>
FSPAN_OBW?

<Response>
50000

FVECTERR

■ Function

First 10 Symbols RMS EVM

Outputs the RMS value measurement results for EVM of the first 10 symbols on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	FVECTERR?	a

■ Value of a

First 10 Symbols RMS EVM

Resolution	Unit
0.01	%

■ Use example

Reads out RMS EVM measurement results for the first 10 symbols.

<Program>
DSPL MODANAL
SWP
FVECTERR?

<Response>
2.55

ILVL

■ Function

I Level (RMS)

Reads out the measured results of the RMS value of Signal I on the IQ Level screen.

■ Syntax

Program Message	Query Message	Response Message
---	ILVL? a	b

■ Value of a

Readout unit

a	Readout unit
None	Conforms to the unit set by the Unit (*cf.* UNIT_IQL).
MV	mV
DBMV	dBmV

■ Value of a

RMS value of Signal I

Resolution	Unit
0.01	mV
	dBmV

■ Use example

Reads out the RMS value of Level I.

<Program>
DSPL SETCOM
TERM IQAC
DSPL IQLVL
SWP
ILVL? MV

<Response>
1.42

■ Restrictions according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

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	---	---

■ Restrictions

- None

■ Use example

Initializes the parameters to be enabled for initialization.

<Program>
INI

INTPOL

■ Function

Interpolation for Constellation

Sets the interpolation display on the Modulation Analysis screen when Trace Format is set at Constellation.

■ Syntax

Program Message	Query Message	Response Message
INTPOL a	INTPOL?	a

■ Value of a

Interpolation display

a	Interpolation mode	Initial Value
NON	Non: Displays only chip (symbol) points.	*
LIN	Linear: Displays linearly interpolated chip (symbol) points.	
POINT10	10 points: Displays interval between 2 chip (symbol) points interpolated by 10 segments.	
LINSYM	Linear & Symbol Position: Displays chip (symbol) points and linearly interpolated chip (symbol) points.	
P10SYM	10 points & Symbol Position: Displays chip (symbol) points and interval between 2 chip (symbol) points interpolated by 10 segments.	

■ Restrictions

- No setting is allowed when Trace Format is set to other than Constellation (*cf*. TRFORM).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Linearly interpolating the symbol points.

<Program>
TRFORM CONSTEL
INTPOL LIN
INTPOL?

<Response>
LIN

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 a	INTVAL_ADJ?	a

■ Value of a

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.	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the updating interval to Once.

<Program>
MEAS ADJ,HIGH
INTVAL_ADJ ONCE
INTVAL_ADJ?

<Response>
ONCE

INTVAL_IQL

■ Function

Refresh Interval for IQ Level

Sets the display updating interval when Storage Mode is set to Average at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
INTVAL_IQL a	INTVAL_IQL?	a

■ Value of a

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.	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the updating interval to Once.

<Program>
TERM IQDC
MEAS IQLVL
INTVAL_IQL ONCE
INTVAL_IQL?

<Response>
ONCE

■ Restrictions according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

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 a	INTVAL_MOD?	a

■ Value of a

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.	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the updating interval to Once.

<Program>
MEAS MODANAL
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 a	INTVAL_OBW?	a

■ Value of a

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.	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the updating interval to Once.

<Program>
MEAS OBW,FFT
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 a	INTVAL_ RFPWR ?	a

■ Value of a

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.	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the updating interval to Once.

<Program>

MEAS RFPWR

INTVAL_RFPWR ONCE

INTVAL_RFPWR?

<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	---	---

■ Restrictions

None

■ 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 at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IPPLVL? a	a

■ Value of a
Readout unit

a	Readout Unit
None	Current set unit
MV	mV
DBMV	dBmV

■ Value of b
Peak to Peak value of Signal I

Resolution	Unit
0.01	mV
	dBmV

■ Restrictions
None

■ Use example
Reads out the I Level (Peak to Peak) value.

<Program>
DSPL SETCOM
TERM IQDC
MEAS IQLVL
IPPLVL? MV

<Response>
4.07

■ Restrictions according to model type and options
For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

IQINZ

■ Function

IQ Impedance

Sets the input impedance for I/Q signals on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
IQINZ a	IQINZ?	a

■ Value of a

Impedance

Value	Impedance	Initial Value
50	Sets input impedance to 50 Ω.	*
1M	Sets input impedance to 1 MΩ.	

■ Restrictions

- This setting is not enabled when the measurement screen is not the Setup Common Parameter screen. (*cf.* DSPL)
- This setting is not enabled when Terminal is set to one other than IQ-AC, IQ-DC or IQ-Balance. (*cf.* TERM)

■ Use example

Reads out the I Level (Peak to Peak) value.

<Program>
DSPL SETCOM
TERM IQAC
IQINZ 50
IQINZ?

<Response>
50

■ Restrictions according to model type and options

For MS268x, if Option–17 or –18 I/Q Input is not installed, this command is invalid.

IQLVL

■ Function

IQ Level

Reads out the measured results of the RMS values and the peak-to-peak values for I and Q signals at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IQLVL? a	b,c,d,e

■ Value of a

Readout unit

a	Readout Unit
None	Current set unit (*cf.* UNIT_IQL)
MV	mV
DBMV	dBmV

■ Value of b

Same as result of “ILVL? a” (*cf.* ILVL).

■ Value of c

Same as result of “QLVL? a” (*cf.* QLVL).

■ Value of d

Same as result of “IPPVL? a” (*cf.* IPPLVL).

■ Value of e

Same as result of “QPPLVL? a” (*cf.* QPPLVL).

■ Use example

Reads out the I/Q Level value.

<Program>
TERM IQDC
MEAS IQLVL
IQLVL? MV

<Response>
1.42,0.53,4.07,3.55

■ Restrictions according to model type and options

For MS268x, if Option–17 or –18 I/Q Input is not installed, this command is invalid.

IQPHASE

■ Function

IQ Phase difference

Reads out the measured results of the phase difference between I/Q signals at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	IQPHASE?	a

■ Value of a

Phase difference of I/Q

Resolution	Unit
0.01	deg

■ Use example

Reads out the phase difference of I/Q.

<Program>
DSPL SETCOM
TERM IQDC
MEAS IQLVL?
IQPHASE?

<Response>
99.97

■ Restrictions according to model type and options

For MS268x, if Option–17 or –18 I/Q Input is not installed, this command is invalid.

JITTER

■ Function

Jitter

Outputs the transmission jitter value on the RF Jitter screen.

■ Syntax

Program Message	Query Message	Response Message
---	JITTER? a	b

■ Value of a

Transmission jitter plus/minus sign

a	Plus/minus sign
None	Transmission jitter absolute maximum value
+	Plus transmission jitter value
-	Absolute value of minus transmission jitter value

■ Value of b

Transmission jitter maximum value with the sign specified in a

Resolution	Unit
0.001	symbol

■ Use example

Reads the maximum transmission jitter value.

<Program>
DSPL RFPWR
TXTIME ON
SWP
JITTER? +

<Response>
0.056

JUDGUNIT_SPTBL

■ Function

Judge Unit

Switches a unit of judgement in the Spot method of Spurious measurement.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SPTBL a	JUDGUNIT_SPTBL?	a

■ Value of a

Relative/Absolute

a	Plus/minus sign	Initial value
ON	Judge in dBm	*
OFF	Judge in dB	

■ Restriction

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets Unit Judge to Relative.

<Program>
DSPL SPURIOUS,SPOT
JUDGUNIT_SPTBL ON
JUDGUNIT_SPTBL?

<Response>
ON

JUDGUNIT_SWTBL

■ Function

Judge Unit

Switches a unit of judgement in the Search/Sweep method of Spurious measurement.

■ Syntax

Program Message	Query Message	Response Message
JUDGUNIT_SWTBL a	JUDGUNIT_SWTBL?	a

■ Value of a

Relative/Absolute

a	Plus/minus sign	Initial value
ON	Judge in dBm	*
OFF	Judge in dB	

■ Restriction

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets Unit Judge to Relative.

<Program>
DSPL SPURIOUS,SWEEP
JUDGUNIT_SWTBL ON
JUDGUNIT_SWTBL?

<Response>
ON

JUDSIGABNORM

■ Function

Judge Sig- Abnormal

Sets the judge signal abnormal or not.

■ Syntax

Program Message	Query Message	Response Message
JUDSIGABNORM a	JUDSIGABNORM?	a

■ Value of a

Judge signal abnormal

a	Judge signal abnormal	Initial value
ON	Judge signal abnormal.	*
OFF	Not judge signal abnormal.	

■ Restriction

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets not judge signal abnormal.

<Program>

JUDSIGABNORM OFF

JUDSIGABNORM?

<Response>

OFF

LVLREL_RFPWR

■ Function

Relative Level

Sets the relative display of the waveform on the RF Power screen. When displaying the relative value, burst average power becomes the reference value. When displaying the absolute value, template indication and Pass/Fail judgment is not performed.

■ Syntax

Program Message	Query Message	Response Message
LVLREL_RFPWR a	LVLREL_RFPWR?	a

■ Value of a

On/Off of Relative Value Display

a	On/Off of relative value display	Initial value
ON	Relative Level:Displays the relative value(dB unit) of the vertical axis graduation of the waveform.	*
OFF	Absolute Level:Displays the absolute value(dBm unit) of the vertical axis graduation of the waveform.	

■ Restriction

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Display the absolute value of the waveform.

<Program>
LVLREL_RFPWR OFF
LVLREL_RFPWR?

<Response>
OFF

MAGTDERR

■ Function

RMS Magnitude Error

Outputs the measurement results of the RMS value of Magnitude Error on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	MAGTDERR?	a

■ Value of a

RMS value of Magnitude Error

Resolution	Unit
0.01	%

■ Use example

Reads out the measurement results of Magnitude Error.

<Program>
DSPL MODANAL
SWP
MAGTDERR?

<Response>
16.67

MAXMAGTDERR

■ Function

RMS Magnitude Error Max Hold Value

Outputs the Magnitude Error RMS maximum value on the Modulation Analysis screen (maximum value in Average).

■ Syntax

Program Message	Query Message	Response Message
---	MAXMAGTDERR?	a

■ Value of a

Magnitude Error RMS maximum value

Resolution	Unit
0.01	%

■ Use example

Reads out the Magnitude Error RMS maximum value.

<Program>
DSPL MODANAL
SWP
MAXMAGTDERR?

<Response>
16.67

MAXPHASEERR

■ Function

RMS Phase Error MAX Hold Value

Outputs the phase error RMS maximum value on the Modulation Analysis screen (maximum value in Average).

■ Syntax

Program Message	Query Message	Response Message
---	MAXPHASEERR?	a

■ Value of a

Phase Error RMS maximum value

Resolution	Unit
0.01	deg

■ Use example

Reads out Phase Error RMS maximum value.

<Program>
DSPL MODANAL
SWP
MAXPHASEERR?

<Response>
7.21

MEANPWR_ADJ

■ Function

Mean Power

Outputs the average leakage power in one frame at High Speed (Adjacent Channel Power measurement).

■ Syntax

Program Message	Query Message	Response Message
---	MEANPWR_ADJ? a,b	a

■ Value of a

Frequency position

a	Frequency position
LOW1	Offset Frequency-1(Lower)
UP1	Offset Frequency-1(Upper)
LOW2	Offset Frequency-2(Lower)
UP2	Offset Frequency-2(Upper)
LOW3	Offset Frequency-3(Lower)
UP3	Offset Frequency-3(Upper)
ALL	All

■ Value of b

Reading unit

b	Unit
None	Uses the unit set in Unit（*cf.* UNIT_ADJ）.
DBM	dBm
DB	dB
WATT	W

■ Value of c

Average leakage power in one frame at High Speed

Resolution	Unit
0.01	dBm
0.01	dB
Four significant digits (Floating-point type)	W

■ Restrictions

- LOW1, UP1, LOW2, UP2, LOW3 and UP3 are output in that order when the value of a is ALL.

■ Use example

Reads out LOW1 power in dB units.

<Program>
DSPL ADJ,HIGH
SWP
MEANPWR_ADJ? LOW1,DB

<Response>
-43.81

MEANPWR_RFPWR

■ Function

Mean Power

Reads the average power in one frame.

■ Syntax

Program Message	Query Message	Response Message
---	MEANPWR_RFPWR? a	b

■ Value of a

Specifies output unit

a	Output Unit
DBM	dBm
WATT	W

■ Value of b

Mean Power

Resolution	Unit
0.01	dBm
Four significant digits (Floating-point type)	W

■ Use example

Reads out Mean Power measurement results.

<Program>
DSPL RFPWR
SWP
MEANPWR_RFPWR? DBM

<Response>
3.14

MEAS

■ Function

Change Screen and measure

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 a	MEAS?	a
MEAS a,b		a,b

■ Value of a,b

Same as DSPL command（*cf.* DSPL）.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

[1] Executes a measurement on the Modulation Analysis screen.

<Program>
MEAS MODANAL
MEAS?

<Response>
MODANAL

[2] Executes a sweep measurement on the Spurious Emission screen.

<Program>
MEAS SPURIOUS,SWEEP
MEAS?

<Response>
SPURIOUS,SWEEP

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*

■ Value of a

Signal type

a	Measurement target	Initial Value
BURST	Burst: Burst wave	
CONT	Continuous: Continuous wave	
MSTCH	MS-TCH: Mobile station communication channel	*
MSCCH	MS-CCH: Mobile station control channel	
MSSYNC	MS-SYNC: Mobile station synchronous burst	
BSCH	BS-CH: Base station communication channel, base station control channel	
BSSYNC	BS-SYNC: Base station synchronous burst	
PSTCH	PS-TCH: Mobile station communication channel	
PSSYNC	PS-SYNC: Mobile station synchronous burst, mobile station control channel	
CSTCH	CS-TCH: Base station communication channel	
CSSYNC	CS-SYNC: Base station synchronous burst, base station control channel	
MOBILE	Mobile: Mobile station	
SHORT	Short: Mobile station shortened burst	
BASE	Base: Base station	
DCCH	DC-CH: Communication/control channels for direct communication	
DCSYNC	DC-SYNC: Direct communication synchronous burst	
SC	SC: Communication channel	
SB	SB: Synchronous burst	
SCCONT	SCCONT: Communication channel (continuous)	
MC	MC: Multi channel burst	
MCCONT	MCCONT: Multi channel continuous	

■ Restrictions

- The measurement screen displayed must be set to the Setup Common Parameter screen. (*cf.* DSPL)

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the analyzing object to Continuous (continuous wave).

<Program>
DSPL SETCOM
TGTSYS PI4DQPSK
MEASOBJ CONT
MEASOBJ?

<Response>
CONT

MKL_ADJ

■ Function

Marker Level for Adjacent Channel Power

Outputs the measurement value of the marker position on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_ADJ? a	b,c

■ Value of a

Output unit

a	Output unit
None	Conforms to the Unit setting (*cf*. UNIT_ADJ)
DB	dB
DBM	dBm
WATT	W

■ Value of b

Marker Level (Level value)

Resolution	Unit
0.01	dBm
0.01	dB
Four significant digits (Floating-point type)	W

■ Value of c

Marker Level (Level value integrated by channel BW)

Resolution	Unit
0.01	dBm
0.01	dB
Four significant digits (Floating-point type)	W

■ Restriction

- In Channel BW data, some data is invalid due to arithmetic computation. In the case of invalid data, the following values are output.

Output value	Unit
-21474836.48	dBm
	dB
0.00E-12	W

- Outputs channel data only when Measure Method is set to Spectrum(All).

■ Use example

Reads out the level at offset frequency 50kHz.

<Program>

DSPL ADJ,SPECT2
MKN_ADJ 50KHZ
SWP
MKL_ADJ? DB

<Response>

-34.08,-22.77

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, Phase Error or Magnitude Error at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_MOD? a	b

■ Value of a

Type of marked signal

a	Marked signal	Trace Format (*cf.* TRFORM)
I	I signal	Constellation, Eye Diagram
Q	Q signal	
None	---	EVM, Phase Error, Magnitude Error

■ Value of b

Marker Level

Resolution	Unit	Trace Format (*cf.* TRFORM)
0.0001	None	Constellation, Eye Diagram
0.001	%	EVM, Magnitude Error
	deg.	Phase Error

■ Restrictions

- *** is read out when Trace Format is set to other than Constellation, Eye Diagram, EVM, Phase Error or Magnitude Error. (*cf.* TRFORM)
- *** is read out when Marker is set to Off. (*cf.* MKR_MOD)
- In the following cases, Insufficient data error results.
  - Whrere Parameter (a) has not been specified, when Trace Format is Constellation or Eye Diagram.
  - Whrere Parameter (a) has been specified, when Trace Format is EVM, Phase Error, or Magnitude Error.

■ Use example

Reads out the value at the 20 symbol point at the Constellation I signal.

<Program>
DSPL MODANAL
TRFORM CONSTEL
MKR_MOD NRM
SWP
MKP_MOD 20
MKL_MOD? I

<Response>
-0.2889

MKL_RFPWR

■ Function

Marker Level for RF Power

Outputs the measurement value of the marker position on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	MKL_RFPWR? a	b

■ Value of a

Output unit

a	Output unit
None	When the Relative Level is On(Relative), it is deemed that dB has been specified; and in the event of Off(Absolute), it is deemed that dBm has been specified (*cf.* LVLREL_RFPWR)
DB	dB
DBM	dBm

■ Value of b

Marker Level

Resolution	Unit
0.01	dBm
0.01	dB

■ Restriction

- *** is output when the Marker Mode is off (*cf.* MKR_RFPWR)

■ Use example

Reads out power at position of 80.00 symbol.

<Program>

DSPL RFPWR

MKR_RFPWR NRM

MKP_RFPWR 80.00

SWP

MKL_RFPWR?

<Response>

-10.62

MKN_ADJ

■ Function

Marker Position for Adjacent Channel Power (in frequency)

Uses the frequency to specify the Marker position on the Adjacent Channel Power screen. The function is the same as that of MKP_ADJ.

■ Syntax

Program Message	Query Message	Response Message
MKN_ADJ a	MKN_ADJ?	a

■ Value of a

Frequency position

Data Points	Range	Resolution	Initial value	Unit
501	-(Span/2) to (Span/2)	Span/500	0	Hz

☐ 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 100kHz.

<Program>

MKN_ADJ 100KHZ

MKN_ADJ?

<Response>

100000

MKP_ADJ

■ Function

Marker Position for Adjacent Channel Power (in points)
Specifies the Marker position of the Adjacent Channel Power screen with the point number.

■ Syntax

Program Message	Query Message	Response Message
MKP_ADJ a	MKP_ADJ?	a

■ Value of a

Frequency position

Data Points	Range	Resolution	Initial value
501	0 to 500	1	250

□ Suffix code

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the marker position to the point of 250.

<Program>
MKP_ADJ 250
MKP_ADJ?

<Response>
250

MKP_MOD

■ Function

Marker Position for Modulation Analysis (Constellation, Eye Diagram, EVM, Phase Error, Magnitude Error)
On the Modulation Analysis screen, specifies Marker position when Trace Format is Constellation, Eye Diagram, EVM, Phase Error, Magnitude Error.

■ Syntax

Program Message	Query Message	Response Message
MKP_MOD a	MKP_MOD?	a

■ Value of a

Marker Position

<table>
<tr><th colspan="2">Trace Format</th><th>Range</th><th>Resolution</th><th>Initial value</th><th>Unit</th></tr>
<tr><td colspan="2">Non</td><td rowspan="10">(Analysis Start) to
(Analysis Start + Analysis Length)</td><td rowspan="7">1.0</td><td rowspan="10">Screen center</td><td rowspan="10">Symbol</td></tr>
<tr><td colspan="2">EVM</td></tr>
<tr><td colspan="2">Phase Error</td></tr>
<tr><td colspan="2">Magnitude Error</td></tr>
<tr><td rowspan="5">Constellation</td><td>Non</td></tr>
<tr><td>Linear</td></tr>
<tr><td>Linear & Symbol Position</td></tr>
<tr><td>10 Points</td><td rowspan="3">0.1</td></tr>
<tr><td>10 Points & Symbol Position</td></tr>
<tr><td colspan="2">Eye Diagram</td></tr>
</table>

□ Suffix code

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Set the Marker position at 60 symbol.

<Program>
DSPL MODANAL
TRFORM EVM
MKP_MOD 60
SWP
MKP_MOD?

<Response>

60.0

MKP_RFPWR

■ Function

Marker Position for RF Power

Specifies the Marker position on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
MKP_RFPWR a	MKP_RFPWR?	a

■ Value of a

Symbol position

Window	Range	Resolution	Initial value	Unit
Slot	(Analysis Start-30.0) to (Analysis Start+Analysis Length+30.0)	0.1	Graph Center	symbol
Leading	(Analysis Start-10.0) to (Analysis Start+8.0)			
Trailing	(Analysis Start+ Analysis Length -8.0) to (Analysis Start+Analysis Length+10.0)			
Frame	(Analysis Start-40.0) to (Analysis Start+Frame Length+40.0)			

□ Suffix code

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the marker on the 50 symbol of the Slot display.

<Program>

DSPL RFPWR

WINDOW SLOT

MKR_RFPWR NRM

MKP_RFPWR 50

MKP_RFPWR?

<Response>

50.0

MKR_ADJ

■ Function

Marker Mode for Adjacent Channel Power
Sets marker On/Off on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
MKR_ADJ a	MKR_ADJ?	a

■ Value of a

Marker On/Off

a	Marker On/Off	Initial Value
NRM	Normal(On): Displays the marker and places the marker position in entry status.	
OFF	Off: Erases the marker and clears the marker position entry status.	*

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Display a marker on the Adjacent Channel Power screen.

<Program>
DSPL ADJ
MKR_ADJ NRM
MKR_ADJ?

<Response>
NRM

MKR_MOD

■ Function

Marker Mode for Modulation Analysis

Sets the marker On/Off of each Trace on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
MKR_MOD a	MKR_MOD?	a

■ Value of a

Marker On/Off

a	Marker On/Off	Initial Value
NRM	Normal(On): Displays the marker and places the marker position in entry status.	
OFF	Off: Erases the marker and clears the marker position entry status.	*

■ Restriction

- No setting is allowed when the Trace Format is set to Non (*cf.* TRFORM).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Displays a marker on the EVM display of the Modulation Analysis screen.

<Program>
DSPL MODANAL
TRFORM EVM
MKR_MOD NRM
MKR_MOD?

<Response>
NRM

MKR_RFPWR

■ Function

Marker Mode for RF Power

Sets the marker On/Off on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
MKR_RFPWR a	MKR_RFPWR?	a

■ Value of a

Marker On/Off

a	Marker On/Off	Initial Value
NRM	Normal(On): Displays the marker and places the marker position in entry status.	
OFF	Off: Erases the marker and clears the marker position entry status.	*

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Displays a marker on the RF Power screen.

<Program>
DSPL RFPWR
MKR_RFPWR NRM
MKR_RFPWR?

<Response>
NRM

MLTCARR

■ Function

Multi Carrier

Sets the measured signal to a multi-carrier or a single carrier.

■ Syntax

Program Message	Query Message	Response Message
MLTCARR a	MLTCARR?	a

■ Value of a

Multi Carrier On/Off

a	Multi Carrier On/Off	Initial Value
ON	Measures multi Carrier signal.	
OFF	Measures single Carrier signal.	*

■ Restriction

- Valid only when the Target System is set to PDC or PHS (*cf.* TGTSYS).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Multi Carrier to On.

<Program>

DSPL SETCOM
TGTSYS PDC
MLTCARR ON
MLTCARR?

<Response>

ON

MLTCARRCAL

■ Function

Multi Carrier Power Calibration

Executes multi carrier calibration.

■ Syntax

Program Message	Query Message	Response Message
MLTCARRCAL	---	---

■ Restrictions

- This command is enabled only when the measurement screen is set to (*cf.* DSPL)
  Modulation Analysis
  RF Power
  Occupied Bandwidth
  Adjacent Channel Power
  Spurious Emission
- Cannot be performed when the Terminal is other than RF. (*cf.* TERM)

■ Use example

Performs multi-carrier calibration.

<Program>
DSPL MODANAL
MLTCARRCAL

MODPWR

■ Function

Mean Power due to Modulation

Outputs the leakage power average value for burst-on period at High Speed.

■ Syntax

Program Message	Query Message	Response Message
---	MODPWR? a,b	c

■ Value of a

Frequency position

a	Frequency position
LOW1	Offset Frequency-1(Lower)
UP1	Offset Frequency-1(Upper)
LOW2	Offset Frequency-2(Lower)
UP2	Offset Frequency-2(Upper)
LOW3	Offset Frequency-3(Lower)
UP3	Offset Frequency-3(Upper)
ALL	All

■ Value of b

Reading unit

b	Unit
None	Uses the unit set in Unit (*cf.* UNIT_ADJ).
DBM	dBm
DB	dB
WATT	W

■ Value of c

Leakage power average value for burst-on period at High Speed

Resolution	Unit
0.01	dBm
0.01	dB
Four significand digits (Floating-point type)	W

■ Restrictions

- LOW1, UP1, LOW2, UP2, LOW3 and UP3 are output in that order when the value of a is ALL.

■ Use example

Read the LOW1 power in dB units.

<Program>

MODPWR? LOW1,DB

<Response>

-43.8

MSTAT

■ Function

Status of Result

Returns the current measurement status.

■ Syntax

Program Message	Query Message	Response Message
---	MSTAT?	a

■ Value of a

Measurement status

a	Measurement State
0	Normal termination
1	RF-signal level limit
2	Level over
3	Level under
4	Signal Abnormal
5	Sync Word Not Found
6	Trigger timeout
9	Not-measured

- “Level limit” refers to a signal which has gone beyond the RF level limit that can be input to the Tx Tester.
- “Level over” refers to a signal which 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

OBW

■ Function

Occupied Bandwidth

On the Occupied Bandwidth screen, reads out the range of frequency that remains 99% of the total power of carrier frequency.

■ Syntax

Program Message	Query Message	Response Message
---	OBW?	a

■ Value of a

99% occupied bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out the 99% occupied bandwidth.

<Program>
DSPL OBW,SPECT
SWP
OBW?

<Response>
1152750

OBWFREQ

■ Function

Occupied Bandwidth Limit and Center

On the Occupied Bandwidth screen, reads out upper and lower frequency bands from the center frequency.

■ Syntax

Program Message	Query Message	Response Message
---	OBWFREQ? a	b

■ Value of a

Frequency bands from center

a	Frequency bands from center
UPPER	Upper Limit: Displays the bandwidth accounting for 49.5% of the total power in the upper frequency area from the displayed waveform center frequency in MHz unit.
LOWER	Lower Limit: Displays the bandwidth accounting for 49.5% of the total power in the lower frequency area from the displayed waveform center frequency in MHz unit.
CENTER	(Upper + Lower)/2: Displays the half-value of the sum of the upper-limit frequency and lower-limit frequency.

■ Value of b

Bandwidth

Resolution	Unit
1	Hz

■ Use example

Reads out the Upper Limit of the occupied bandwidth.

<Program>

DSPL OBW,FFT

SWP

OBWFREQ? UPPER

<Response>

807124

OFFPWR

■ Function

Carrier Off Power

Displays average power when transmission for one frame is set to off on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	OFFPWR? a	b

■ Value of a

Output unit

a	Output Unit
DBM	dBm
WATT	W

■ Value of b

Average power when transmission is set to off

Resolution	Unit
0.01	dBm
Significant digits, four places (floating decimal-point type)	W

■ Use example

Reads out average power when transmission is set to off.

<Program>
DSPL RFPWR
SWP
OFFPWR? DBM

<Response>
-47.63

OFSDPTS_ADJ

■ Function

Offset Data Points:1/2/3

Reads the offset frequency data count on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	OFSDPTS_ADJ?	a

■ Value of a

Data count

a	Data count	Initial value
1	One offset frequency	
2	Two offset frequenies	* (value of PDC)
3	Three offset frequencies	

■ Use example

Reads out offset frequency data count.

<Program>
OFSDPTS_ADJ?

<Response>
3

OFSFREQ_ADJ

■ Function

Offset Frequency for Adjacent Channel Power

Reads the offset frequencies for Leakage Power, Peak Power, Mean Power and Mean Power due to Modulation on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	OFSFREQ_ADJ? a	b

■ Value of a

Target offset number

a	Offset number
1	Offset Frequency-1
2	Offset Frequency-2
3	Offset Frequency-3

■ Value of b

Offset frequency

Resolution	Unit
1	kHz

□ Suffix code

None: Hz

HZ: Hz

KHZ: kHz

MHZ: MHz

GHZ: GHz

□ Suffix code

Target offset frequency	Initial value
Offset Frequency-1	50kHz (value of PDC)
Offset Frequency-2	100kHz (value of PDC)
Offset Frequency-3	0 (unused)

■ Restrictions

- Reading an unused offset frequency causes “0” to be output.

■ Use example

Reads out offset frequency-1.

<Program>

OFSFREQ_ADJ? 1

<Response>

50000

ORGNOFS

■ Function

Origin Offset

Outputs origin offset (carrier leakage component) measured results for the signal measured at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	ORGNOFS?	a

■ Value of a

Origin offset value

Resolution	Unit
0.01	dB

■ Use example

Reads out the measurement result of Origin Offset.

<Program>
DSPL MODANAL
SWP
ORGNOFS?

<Response>
-34.33

OXMC

■ Function

Wave Data for origin I-Q Signal

Reads out and processes origin I-Q Signal on the Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
OXMC a,b	OXMC? c	d

■ Value of a

Selection of I or Q

a	Selection of I or Q
0	I signal
1	Q Signal

■ Value of b

16 bit waveform data for input

Range	Resolution
– 32768 to 32767	1

- Data are set using integers in 0.0001 units, where the ideal signal “1” becomes 10,000.

■ Value of c

Selection of I or Q

a	Selection of I or Q
0	I signal
1	Q Signal

■ Value of d

Read-out data of 32 bit waveform data

Range	Resolution
– 2147483648 to 2147483647	1

- Data are set using integers in 0.0001 units, where the ideal signal “1” becomes 10,000.

■ Use example

Reads out origin I-signal and Q-signal.

<Program>

DSPL MODANAL

SWP

OXMC? 0

OXMC? 1

<Response>

0

0

PATT

■ Function

Sync Word Pattern

Set the type of Sync Word on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
PATT a	PATT?	a

■ Value of a

Sync Word

a	Target System	Measuring Object	Sync Word	Initial value
S1S7	PDC	MS-TCH MS-CCH BS-CH	S1/S7	*
S2S8			S2/S8	
S3S9			S3/S9	
S4S10			S4/S10	
S5S11			S5/S11	
S6S12			S6/S12	
SS1		MS-SYNC BS-SYNC	SS1	
SS2			SS2	
SS3			SS3	
SS4			SS4	
SS5			SS5	
SS6			SS6	
B16	PHS	PS-TCH CS-TCH	16 bit	
B32			32 bit	
B32		PS-SYNC CS-SYNC	32 bit	
SYNC1	NADC	Mobile Shortened Burst Base	Sync1	
SYNC2			Sync2	
SYNC3			Sync3	
SYNC4			Sync4	
SYNC5			Sync5	
SYNC6			Sync6	
S1S5	STD-T39,T79	MS-TCH MS-CCH BS-CH	S1/S5	
S2S6			S2/S6	
S3S7			S3/S7	
S4S8			S4/S8	
S9			S9	
S10			S10	
S11			S11	
S12			S12	

a	Target System	Measuring Object	Sync Word	Initial value
SS1		MS-SYNC	SS1	
SS2		BS-SYNC	SS2	
SS3		DC-SYNC	SS3	
SS4		MS-SYNC	SS4	
SS4		BS-SYNC	SS4	
S9S10		DC-CH	S9/S10	
S1S11			S1/S11	
S6S7			S6/S7	
S2S8			S2/S8	
S4S5			S4/S5	
S12S3			S12/S3	
S2S1	STD-T61	SC	S2/S1	
S2RS1R			S2R/S1R	
S4S3			S4/S3	
S4RS3R			S4R/S3R	
SS1		SB	SS1	
SS1R			SS1R	
SW1	STD-T61 v1.1	SC(Burst) *1	SW1	
SW2		SC(Continuous) *2	SW2	
NO	All	All	No *3	
USER			User *4	

*1 SW1: when Frame Lnegth for STD-T61 v1.1 is set to Basic

*2 SW1: when Frame Lnegth for STD-T61 v1.1 is set to sub

*3 No: Detects/positions the measured signal by amplitude change.

*4 User: Detects/positions the measured signal by user-specific pattern.

■ Restrictions

- No setting is allowed on measurement screen other than the Setup Common Parameter (*cf*. DSPL).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Sync Word to S1/S7.

<Program>
DSPL SETCOM
TGTSYS PDC
MEASOBJ MSTCH
PATT S1S7
PATT?

<Response>
S1S7

PATT_UBIT

■ Function

Sync Word Pattern by user setting

Sets Sync Word Bit Pattern when Sync Word is user-set on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
PATT_UBIT a	PATT_UBIT?	a

■ Value of a

Sync Word Bit Pattern

Range *	Resolution	Initial value	Unit
0 to FFFFFFFFFFFFFFFF	1	00000	bit

*Range is determined by the User Pattern Length value.

■ Restrictions

- Unavailable unless Sync Word Bit Pattern is User.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the user-defined Sync Word bit pattern to FFFF.

<Program>
DSPL SETCOM
PATT USER
PATT_ULEN 8
PATT_UBIT FFFF
PATT_UBIT?

<Response>
FFFF

PATT_ULEN

■ Function

Sync Word Length by User setting

Sets Sync Word length when Sync Word is user-set on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
PATT_ULEN a	PATT_ULEN?	a

■ Value of a

Sync Word length

Range	Resolution	Initial value	Unit
1 to 32	1	10	symbol

■ Restrictions

- Unavailable unless Sync Word Bit Pattern is User.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Sync Word length to 32 symbols.

<Program>
DSPL SETCOM
PATT USER
PATT_ULEN 32
PATT_ULEN?

<Response>
32

PATT_USTART

■ Function

Start Point of Sync Word by user setting

Sets the Sync Word starting position in the analysis range when using user-set Sync Word pattern on the Setup Common Parameter screen.

■ Syntax

Program Message	Query Message	Response Message
PATT_USTART a	PATT_USTART?	a

■ Value of a

Sync Word starting position

Range	Resolution	Initial value	Unit
0 to (Analysis Start + Analysis Length – User Pattern Length)	1	59	symbol

■ Restrictions

- Unavailable unless Sync Word Bit Pattern is User.
- If the Start Point set value exceeds (Analysis Start + Analysis Length – User Pattern Length) when changing Frame Length, Analysis Length or (Sync Word) Pattern Length, Start Point is set to (Analysis Start + Analysis Length – User Pattern Length).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Sync Word starting position to 10 symbols.

<Program>
DSPL SETCOM
TGTSYS PDC
PATT USER
PATT_USTART 10
PATT_USTART?

<Response>
10

PEAKPWR

■ Function

Peak Power

Outputs the maximum leakage power in one frame for High Speed.

■ Syntax

Program Message	Query Message	Response Message
---	PEAKPWR? a,b	c

■ Value of a

Frequency position

a	Frequency position
LOW1	Offset Frequency-1 (Lower)
UP1	Offset Frequency-1 (Upper)
LOW2	Offset Frequency-2 (Lower)
UP2	Offset Frequency-2 (Upper)
LOW3	Offset Frequency-3 (Lower)
UP3	Offset Frequency-3(Upper)
ALL	All

■ Value of b

Reading unit

b	Unit
None	Uses the unit set in Unit（*cf.* UNIT_ADJ）.
DBM	dBm
DB	dB
WATT	W

■ Value of c

Maximum leakage power in one frame at High Speed

Resolution	Unit
0.01	dBm
0.01	dB
Four significand digits (Floating-point type)	W

■ Restrictions

- LOW1, UP1, LOW2, UP2, LOW3 and UP3 are output in that order when the value of a is ALL.

■ Use example

Reads the LOW1 power in dB units.

<Program>

PEAKPWR? LOW1,DB

<Response>

-43.8

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?	a

■ Value of a

RMS value of Phase Error

Resolution	Unit
0.01	deg

■ Use example

Reads out the measured results of phase error.

<Program>
DSPL MODANAL
SWP
PHASEERR?

<Response>
11.58

PMAGTDERR

■ Function

Peak Magnitude Error

Outputs maximum instantaneous value of Magnitude Error on Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	PMAGTDERR? a	b

■ Value of a

Positive and negative code of Magnitude Error

a	Positive and negative code
None	Absolute value at peak value
+	Positive peak value
-	Negative peak value

■ Value of b

The maximum value of Magnitude Error for the code specified in “a”.

Resolution	Unit
0.01	%

■ Use example

Reads out the maximum value of Magnitude Error.

<Program>
DSPL MODANAL
SWP
PMAGTDERR?

<Response>
16.67

PMAGTDSYM

■ Function

Symbol at Peak Magnitude Error

Outputs the symbol value on the Modulation Analysis screen when Magnitude Error is at the maximum peak value.

■ Syntax

Program Message	Query Message	Response Message
---	PMAGTDSYM? a	b

■ Value of a

Magnitude Error plus/minus sign

a	Plus/minus sign
None	Absolute peak value
+	Plus peak value
-	Minus peak value

■ Value of b

Symbol value

Resolution	Unit
1	symbol

■ Use example

Reads out the symbol value when the Magnitude Error value is maximum.

<Program>
MEAS MODANAL
PMAGTDSYM?

<Response>
13.1

POWER

■ Function

Power

Outputs the absolute value or relative value of RF average power measured by the power meter.

■ Syntax

Program Message	Query Message	Response Message
---	POWER? a	b

■ Value of a

Readout unit

a	Unit
DBM	dBm
DB	dB
WATT	W

■ Value of b

Absolute value or relative value of RF average power

Resolution	Unit
0.01	dBm
0.01	dB
Four significant digits (Floating-point type)	W

■ Use example

Reads out RF average power in dBm units.

<Program>
DSPL PWRMTR
SWP
POWER? DBM

<Response>
-1.43

■ Restrictions according to model type and options

For MS268x, this command is not available.

PPHASEERR

■ Function

Peak Phase Error

Outputs the maximum instantaneous value of Phase Error on Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
---	PPHASEERR? a	b

■ Value of a

Positive and negative codes of phase error

a	Positive and negative code
None	Absolute value at peak value
+	Positive peak value
-	Negative peak value

■ Value of b

The maximum value of phase error for the code specified in “a”.

Resolution	Unit
0.01	deg

■ Use example

Reads out the maximum value of Phase Error.

<Program>
MEAS MODANAL
PPHASEERR? +

<Response>
7.21

PPHASESYM

■ Function

Symbol at Peak Phase Error

Outputs the symbol value on the Modulation Analysis screen when Phase Error is at the maximum peak value.

■ Syntax

Program Message	Query Message	Response Message
---	PPHASESYM? a	b

■ Value of a

Phase Error plus/minus sign

a	Plus/minus sign
None	Absolute peak value
+	Plus peak value
-	Minus peak value

■ Value of b

Symbol value

Resolution	Unit
1	symbol

■ Use example

Reads out the symbol value when the Phase Error value is maximum.

<Program>
MEAS MODANAL
PPHASESYM?

<Response>
83.1

PRE

■ Function

Preset

Initializes all the measurement control parameters to be initialized. This function has the same as the INI and IP command (*cf.* INI, IP).

■ Syntax

Program Message	Query Message	Response Message
PRE	---	---

■ Restrictions

None

■ Use example

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
PREAMP a	PREAMP?	a

■ Value of a

On or Off setting of Pre Ampl

a	Pre Ampl	Initial Value
ON	Sets Pre Ampl to On.	
OFF	Sets Pre Ampl to Off.	*

■ Restrictions

- No setting is allowed when a value in excess of 3GHz is set for the frequency (*cf*. FREQ).
- Cannot set when the Terminal is other than RF (*cf*. TERN).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets Pre Ampl to On.

<Program>
PREAMP ON
PREAMP?

<Response>
ON

■ Restrictions according model type and options

- This command is invalid when option MS860xA-08/MS268x-08 Preamp is not loaded.

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?	a

■ Value of a

Peak EVM

Resolution	Unit
0.01	%

■ Use example

Reads out the peak EVM value.

<Program>
DSPL MODANAL
SWP
PVECTERR?

<Response>
45.23

PVECTSYM

■Function

Symbol at Peak EVM

Outputs the symbol value on the Modulation Analysis screen when EVM is at the maximum peak value.

■ Syntax

Program Message	Query Message	Response Message
---	PVECTSYM?	a

■ Value of a

Symbol value

Resolution	Unit
1	symbol

■ Use example

Reads out the symbol value when EVM is at the maximum peak value.

<Program>
DSPL MODANAL
SWP
PVECTSYM?

<Response>
50.2

PWRCAL

■Function

Power Calibration

"PWRCAL" enables calibration at power measurement, and "PWRCAL?" enables readout of the calibration value. "CALVAL" enables the setting of calibration value only through an external control.

■ Syntax

Program Message	Query Message	Response Message
PWRCAL	PWRCAL?	a

■ Value of a

Calibration value

Range	Resolution	Initial Value	Unit
−10.00 to 10.00	0.01	0.00	dB

■ Restrictions

- Executable screens are as follow (*cf.* DSPL):
  - Modulation Analysis
  - RF Power
  - Occupied Bandwidth
  - Adjacent Channel Power
  - Spurious Emission
- Where the Terminal is other than RF, execution cannot be performed (*cf.* TERM).
- Where the Frequency is less than 50MHz, execution cannot be performed (*cf.* FREQ)

■ Use example

Performs calibration at power measurement.

<Program>
DSPL SETCOM
TERM RF
FREQ 1920MHZ
DSPL RFPWR
PWRCAL
PWRCAL?

<Response>
2.33

■ Restrictions according to model type and options

For MS268x, this command is not available.

QLVL

■ Function

Q Level (RMS)

Reads out the measured results of RMS value for Q signal on the IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	QLVL? a	b

■ Value of a

Readout unit

a	Readout Unit
None	Current set unit (*cf.* UNIT_IQL)
MV	mV
DBMV	dBmV

■ Value of a

RMS value for Signal Q

Resolution	Unit
0.01	mV
	dBmV

■ Use example

Reads out the Q Level (RMS) value.

<Program>
DSPL SETCOM
TERM IQAC
MEAS IQLVL
QLVL? MV

<Response>
0.53

■ Restrictions according to model type and options

For MS268x, if Option –17 or –18 I/Q Input is not installed, this command is invalid.

QPPLVL

■ Function

Q Level (Peak to Peak)

Reads out the measured results of peak-to-peak value for Q signal on the IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
---	QPPLVL? a	b

■ Value of a

Readout unit

Value	Readout Unit
None	Current set unit (*cf.* UNIT_IQL)
MV	mV
DBMV	dBmV

■ Value of b

Peak-to-Peak value for Q signal

Resolution	Unit
0.01	mV
	dBmV

■ Use example

Reads out the Q Level (peak to peak) value.

<Program>
DSPL SETCOM
TERM IQAC
MEAS IQLVL
QPPLVL? MV

<Response>
3.55

■ Restrictions according to model type and options

For MS268x, if Option –17 or –18 I/Q Input is not installed, this command is invalid.

RATIO

■ Function

On/Off Ratio

Outputs the ratio of average intra-burst power (Tx Power) to average power (Carrier Off Power) when transmission for one frame is set to off on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	RATIO?	a

■ Value of a

On/Off Ratio

Resolution	Unit
0.01	dB

■ Use example

Reads out the On/Off Ratio.

<Program>
DSPL RFPWR
SWP
RATIO?

<Response>
72.66

RBW_ADJ

■ Function

Resolution Bandwidth for Adjacent Channel Power

Sets the Resolution Bandwidth(RBW) in the Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	RBW_ADJ?	a

■ Value of a

RBW

Resolution	Unit
1	Hz

■ Use example

Reads RBW.

<Program>

RBW_ADJ?

<Response>

1000

RBW_OBW

■ Function

Resolution Bandwidth for Occupied Bandwidth

Reads setting of Resolution Bandwidth (RBW) in Occupied Bandwidth measurement using a Spectrum Analyzer.

■ Syntax

Program Message	Query Message	Response Message
---	RBW_OBW?	a

■ Value of a

RBW

Resolution	Unit
1	Hz

■ Use example

Reads RBW.

<Program>

RBW_OBW?

<Response>

3000

REFPWRMD_SPU

■ Function

REF Power Mode for Spurious Emission

During Spurious Emission measurement, sets the measurement method for Reference Power to calculate the relative value.

■ Syntax

Program Message	Query Message	Response Message
REFPWRMD_SPU a	REFPWRMD_SPU?	a

■ Value of a

Calculation method selection

a	Calculation method	Initial Value
TXPWR	Sets the Tx Power as Ref. Power.	*
SPA	Sets the measured value with user-defined RBW as Ref. Power.	

■ Restrictions

- Can be performed on the Spurious Emission screen (*cf.* DSPL):

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the measured value with user-defined RBW as Ref. Power

<Program>
DSPL SPURIOUS,SPOT
REFPOWER_SPU SPA
REFPOWER_SPU?

<Response>
SPA

RFINPUT

■ Function

RF Input connector

Sets the connector for the input RF signal.

■ Syntax

Program Message	Query Message	Response Message
RFINPUT a	RFINPUT?	a

■ Value of a

RF signal level

a	RF Signal connector	Initial Value
HIGH	High Power	*
LOW	Low Power	

■ Restrictions

- The terminal must be set to RF (*cf.* TERM).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the RF input connector to High Power.

<Program>
RFINPUT HIGH
RFINPUT?

<Response>
HIGH

■ Restrictions according model type and options

This command is available only for MS8608A.

RFLVL

■ Function
Reference Level
Sets the Reference Level.

■ Syntax

Program Message	Query Message	Response Message
RFLVL a	RFLVL?	a

■ Value of a
Reference Level

Range	RF Input	Initial Value	Resolution	Unit
–(10.00 + *offset*) to (42.00 + *offset*)	MS8608A High Power	30.00	0.01	dBm
–(30.00 + *offset*) to (22.00 + *offset*)	MS8608A Low Power MS8609A	22.00	0.01	dBm

- *offset* represents the value set for the reference level offset. (*cf*. RFLVLOFS)

□ Suffix code
None: dBm
DBM: dBm

■Restrictions
- This setting is not possible when Terminal is set to other than RF. (*cf*. TERM)
- The setting range of the reference level depends on status of RF Input and Pre Ampl (*cf*. RFINPUT, PREAMP)

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets the reference level to -10.00 dBm.

<Program>
DSPL SETCOM
TERM RF
RFLVLOFS 0
RFLVL –10.00
RFLVL?

<Response>
-10.00

RFLVLOFS

■ Function

Reference Level Offset for RF

Sets the Reference Level Offset of Measuring Object that is RF.

■ Syntax

Program Message	Query Message	Response Message
RFLVLOFS a	RFLVLOFS?	a

■ Value of a

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 set to other than RF. (*cf.* TERM)

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the reference level offset to 0 dB.

<Program>

```
DSPL SETCOM
TERM RF
RFLVLOFS 0.00
RFLVLOFS?
```

<Response>

```
0.00
```

RISETM

■ Function

Rising Time

Reads the rising time on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	RISETM?	a

■ Value of a

Rising Time

Resolution	Unit
0.01	μs

■ Use example

Reads the Rising Time measurement results.

<Program>
DSPL RFPWR
SWP
RISETM?

<Response>
11.06

RL_ADJ

■ Function

Reference Level for Adjacent Channel Power

Reads the Ref. Level set value for Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	RL_ADJ?	a

■ Value of a

Ref. Level

Resolution	Unit
0.01	dBm

■ Use example

Reads the Ref. Level.

<Program>

DSPL ADJ,SPECT1

SWP

RL_ADJ?

<Response>

-30.00

RL_OBW

■ Function

Reference Level for Occupied Bandwidth

Reads the Ref. Level set value for Occupied Bandwidth.

■ Syntax

Program Message	Query Message	Response Message
---	RL_OBW?	a

■ Value of a

Ref. Level

Resolution	Unit
0.01	dBm

■ Use example

Reads the Ref. Level.

<Program>
DSPL OBW,SPECT
SWP
RL_OBW?

<Response>
-30.00

RNG

■ Function

Range

Increases or decreases the measurement range for the power meter.

■ Syntax

Program Message	Query Message	Response Message
RNG a	---	---

■ Value of a

Operation of the power meter range

a	Operation of Power Meter Range
UP	Increases the measurement range by one step.
DN	Decreases the measurement range by one step.

- Transmitting RNG UP command while the range is set to maximum does not change the range.
- Transmitting RNG DN command while the range is set to minimum does not change the range.

■ 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>

DSPL PWRMTR

RNG UP

■ Restrictions according to model type and options

For MS268x, this command is not available.

RNG1

■ Function

Range1

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>
DSPL PWRMTR
RNG1

■ Restrictions according to model type and options

For MS268x, this command is not available.

RNG2

■ Function

Range2

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>
DSPL PWRMTR
RNG2

■ Restrictions according to model type and options

For MS268x, this command is not available.

RNG3

■ Function

Range3

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 for the power meter to the intermediate level.

<Program>
DSPL PWRMTR
RNG3

■ Restrictions according to model type and options

For MS268x, this command is not available.

RNG4

■ Function

Range4

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>
DSPL PWRMTR
RNG4

■ Restrictions according to model type and options

For MS268x, this command is not available.

RNG5

■ Function

Range5

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>
DSPL PWRMTR
RNG5

■ Restrictions according to model type and options

For MS268x, this command is not available.

ROLLOFF

■Function

Rolloff Factor

Sets the Root-Nyquist filter rolloff factor.

■ Syntax

Program Message	Query Message	Response Message
ROLLOFF a	ROLLOFF?	a

■ Value of a

Rolloff factor

Range	Resolution	Initial Value	Unit
0.20 to 1.00	0.01	0.50	None

□ Suffix code

None

■ Restrictions

- Unavailable unless Target System is π/4DQPSK (*cf.* TGTSYS).

■ Use example

Set the rolloff factor to 0.35.

```
<Program>
DSPL SETCOM
TERM RF
TGTSYS PDC
ROLLOFF 0.35
ROLLOFF?

<Response>
0.35
```

SCOFS

■Function

Phase Offset for Constellation, Eye Diagram

Sets the error rotation display for Constellation or Eye Diagram display on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
SCOFS a	SCOFS?	a

■ Value of a

Error range

a	Rotation angle	Initial Value
0	0°	*
22.5	22.5°	

■ Restrictions

- Unavailable unless Trace Format is Constellation or Eye Diagram (*cf.* TRFORM).

■ Use example

Sets Phase Offset to 22.5.

<Program>
DSPL MODANAL
TRFORM CONSTEL
SCOFS 22.5
SCOFS?

<Response>
22.5

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

- Executable screen is as follows (*cf.* DSPL).
  - Power Meter

■ Use example

Sets the currently displayed power value to the reference value for relative value display.

<Program>
MEAS PWRMTR
SETREL

■ Restrictions according to model type and options

For MS268x, this command is not available.

SLCTTEMP_RFPWR

■Function

Select Template for RF Power

Sets the template to initial condition.

■ Syntax

Program Message	Query Message	Response Message
SLCTTEMP_RFPWR a	SLCTTEMP_RFPWR?	a

■ Value of a

Status of Template

a	Status of template	Initial Value
NOT	Level value has been changed.	
STD	Value prescribed by standard.	*

- When the Line Level is changed, the status becomes “NOT”.
  “NOT” is retained until “SLCTTEMP_RFPWR STD” is executed.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Return of template to standard value.

<Program>
DSPL SETTEMP_RFPWR
SLCTTEMP_RFPWR STD
SLCTTEMP_RFPWR?

<Response>
STD

SLOTPWR

■Function

Slot Power for RF Power

Reads the average power of each slot.

■ Syntax

Program Message	Query Message	Response Message
---	SLOTPWR? a	b

■ Value of a

Slot number

Range	Target System	Channels Per Carrier	Resolution
0～2	PDC	Full Rate	1
0～5		Half Rate	
0～7	PHS		
0～2	NADC	Full Rate	
0～5		Half Rate	
0～3	STD39		
0	STDT61		
0	STDT61V1_1		

■ Value of b

Slot Power

Resolution	Unit
0.01	dBm

■ Restrictions

- Changing Target System causes the slot number range to be changed (*cf.*TGTSYS)

■ Use example

Read the Slot Power measurement results for slot No.0.

<Program>
DSPL RFPWR
SWP
SLOTPWR? 0

<Response>
3.14

SNGLS

■ Function

Single Measure/Sweep

Executes a measurement or sweeping once.

Accepts a command even during measurement.

Stops the current measurement and starts with a new measurement when a measurement execution command, such as SINGLS 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

None

■ Use example

Executes a measurement or sweeping once.

<Program>

SNGLS

SPUALL

■ Function

Frequency, Level, Ref Level, Attenuator, RBW, VBW, Sweep Time

Outputs the Frequency, Level, Ref Level, Attenuator, RBW, VBW and Sweep Time measurement results at the same time on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUALL? Fa,b,c	d(a),e(a),f(a),g(a),h(a),i(a),j(a), d(a+1),e(a+1),f(a+1),g(a+1),h(a+1),i(a+1),j(a+1),..., d(a+b–1),e(a+b–1),f(a+b–1),g(a+b–1),h(a+b–1),i(a +b-1),j(a+b-1)

■ Value of a

Read starting frequency point

Range	Resolution
1 to 15	1

■ Value of b

Read count

Range	Resolution
1 to 15	1

■ Value of c

Output unit

Range	Unit
None	Uses the unit set in Unit (*cf.* UNIT_SPU).
DBM	dBm
DB	dB

■ Value of d: Frequency measurement result

Same as c in SPUFREQ.

■ Value of e: Level measurement results

Same as c in SPULVL.

■ Value of f: Ref Level

Same as c in SPULVL.

■ Value of g: Attenuator

Same as c in SPUATT.

■ Value of h: RBW

Same as c in SPURBW.

■ Value of i: VBW

Same as c in SPUVBW.

■ Use example

Reads all results for f1 to f2.

<Program>

DSPL SPURIOUS,SEARCH
SWP
SPUALL? F1,2

<Response>

1775300000,−33.97,50.00,60,1000,3000,200000,2162950000,−37.87,50.00,60,10000,30000,600000

SPUATT

■ Function

Attenuator for Spurious Emission

Outputs the attenuator set from the Setup Spot Table screen when Spurious Mode is Spot or the attenuator set from the Setup Search/Sweep Table screen when Search or Sweep (*cf*. TBLATT_SPU).

■ Syntax

Program Message	Query Message	Response Message
---	SPUATT? Fa,b	c

■ Value of a

Read starting frequency point

Range	Resolution
1 to 15	1

■ Value of b

Number of reading frequency points

Range	Resolution
1 to 15	1

■ Value of c

Attenuator

Resolution	Unit
1	dB

□ Suffix code

None

■ Use example

Reads the attenuator for f1 to f3.

<Program>

SPUATT? F1,3

<Response>

60,61,62

SPUFREQ

■ Function

Frequency for Spurious Emission

Outputs the measurement result for Frequency on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQ? Fa,b	c(a),c(a+1),...c(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

Result of frequency measurement

Resolution	Unit
1	Hz

■ Restrictions

- When the Spurious Mode is Spot, the result of output always matches the Frequency set up on the Setup Spot Table screen (*cf.* DSPL).

■ Use example

Reads out the frequencies of f1 to f3.

<Program>
DSPL SPURIOUS,SEARCH
SWP
SPUFREQ? F1,3

<Response>
1775300000,2162950000,255060000

SPUFREQLVL

■ Function

Frequency and Level

Simultaneously outputs the measurement results of Frequency and Level on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUFREQLVL? Fa,b,c	d(a),e(a),d(a+1),e(a+1), ...,d(b),e(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

Level output unit

Range	Unit
None	Uses the unit set in Unit (*cf.* UNIT_SPU).
DBM	dBm
DB	dB

■ Value of d

Result of frequency measurement

Resolution	Unit
1	Hz

■ Value of e

Result of level measurement

Resolution	Unit
0.01	dB or dBm

■ Use example

Reads out the frequency and level of f1 to f3.

<Program>
DSPL SPURIOUS,SEARCH
SWP
SPUFREQLVL? F1,3,DB

<Response>
1775300000,-33.97,2162950000,-37.87,255060000,-68.69

SPUJDG

■ Function

Total Judgment for Spurious Emission

Reads out the total result of Level pass/fail judgment by means of the Limit value on the Spurious Emission screen. If the Spurious Mode is Spot, judge with the Limit value set on the Setup Spot Table screen as the reference, and if Search or Sweep, use the Limit value set on the Setup Search/Sweep Table screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPUJDG?	a

■ Value of a

Judgment result

a	Pass/fail judgment
PASS	Pass
FAIL	Fail
OFF	Unmeasured

■ Restrictions

- In order to pass, all valid measurements from f1 to f15 must be completed, and the result of judgment of each point must be Pass.
- Fail woudl result if the judgment result is Fail on any voluntary valide measurement from f1 to f15.

■ Use example

Reads out the total result of pass/fail judgment.

<Program>
DSPL SPURIOUS,SWEEP
SWP
SPUJDG?

<Response>
PASS

SPULMT

■ Function

Limit for Spurious Emission

Sets the Limit value on the Pass/Fail judgment during Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
SPULMT a,Fb,c	SPULMT? a,Fb	c

■ Value of a

Selection of means of measurement

a	Means of measurement
SPOT	The Limit value used in the Spot method measurement is subjected.
SWEEP	The Limit value used in the Search or Sweep method measurement is subjected.

■ Value of b

Frequency point

Range	Resolution
1 to 15	1

■ Value of c

Limit value

Range	Resolution	Initial value	Unit
-100.00 to 100.00	0.01	Please see initial value column of TBLFREQ_SPU.	dBm

□ Suffix code

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Limit value of f1 of Search method measurement to –13.00 dBm.

<Program>

SPULMT SWEEP,F1,-13.00

SPULMT? SWEEP,F1

<Response>

-13.00

SPULVL

■ Function

Level for Spurious Emission

Outputs the result of Level measurement on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
---	SPULVL? Fa,b,c	d(a),d(a+1),...,d(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

Level output unit

Range	Unit
None	Uses the unit set in Unit (*cf.* UNIT_SPU).
DBM	dBm
DB	dB

■ Value of d

Result of Level measurement

Resolution	Unit
1	dB or dBm

■ Use example

Reads out Level from f1 to f3.

<Program>
DSPL SPURIOUS,SEARCH
SWP
SPULVL? F1,3,DB

<Response>
-33.97,-37.87,-68.69

SPUPASS

■ Function

Judgment for Spurious Emission

On the Spurious Emission screen, reads out the pass/fail judgment result of Level by means of Limit value. When the Spurious Mode is Spot, the Limit value set on the Setup Spot Table screen is used as the reference for judgment, and when the Search or Sweep, the Limit value set on the Setup Search/Sweep Table screen is used.

■ Syntax

Program Message	Query Message	Response Message
---	SPUPASS? a	b

■ Value of a

Frequency point

a	Frequency point
Fn	Reads out result of certain frequency point (n: 1-15).
ALL	Reads out the result of all frequency points at one time.

■ Value of b

Judgement Result

b	Pass/fail judgment
PASS	Pass
FAIL	Fail
OFF	Unmeasured

■ Use example

Reads out the result of Pass/Fail judgment of f3.

<Program>
DSPL SPURIOUS,SWEEP
SWP
SPUPASS? F3

<Response>
PASS

SPURBW

■ Function

RBW for Spurious Emission

Outputs the RBW value at the measurement on the Spurious Emission screen.

When the Spurious Mode is Spot, the RBW set on the Setup Spot Table screen is output, and when the Search or Sweep, the RBW set on the Setup Search/Sweep Table screen is output (*cf.* TBLRBW_SPU).

■ Syntax

Program Message	Query Message	Response Message
---	SPURBW? Fa,b	c(a),c(a+1),...,c(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

RBW

Resolution	Unit
1	Hz

■ Use example

Reads out the RBW value from f1 to f3.

<Program>
DSPL SPURIOUS,SEARCH
SWP
SPURBW? F1,3

<Response>
1000,100000,100000

SPURL

■ Function
Ref Level for Spurious Emission

Outputs the Ref Level for Spurious Emission measurement.

When the Spurious Mode is Spot, outputs Ref Level set from the Setup Spot Table screen; when Spurious Mode is Search or Sweep, outputs Ref Level set from the Setup Search/Sweep Table screen (*cf.* TBLRL_SPU).

■ Syntax

Program Message	Query Message	Response Message
---	SPURL? Fa,b	c(a),c(a+1),...,c(b)

■ Value of a
Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b
Number of readouts

Range	Resolution
1 to 15	1

■ Value of c
Ref Level

Resolution	Unit
0.01	dBm

□ Suffix code
None

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Reads out the Ref Level from f1 to f3.

<Program>

SPURL? F1,3

<Response>

50.00,51.00,52.00

SPUSWT

■ Function

Sweep Time for Spurious Emission

Outputs the Sweep Time value at the time of measurement on the Spurious Emission screen.

When the Spurious Mode is Spot, the Sweep Time set on the Setup Spot Table screen is output, and when Search or Sweep, the Sweep Time set on the Setup Search/Sweep Table screen is output (*cf.* TBLSWT_SPU).

■ Syntax

Program Message	Query Message	Response Message
---	SPUSWT? Fa,b	c(a),c(a+1),...,c(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

Sweep Time

Resolution	Unit
1	µs

■ Use example

Reads out the Sweep Time from f1 to f3.

<Program>

DSPL SPURIOUS,SEARCH

SWP

SPUSWT? F1,3

<Response>

200000,600000,5000000

SPUVBW

■ Function

VBW for Spurious Emission

Outputs the VBW value at the measurement on the Spurious Emission screen.

When the Spurious Mode is Spot, outputs VBW set on the Setup Spot Table screen, and when Search or Sweep, outputs VBW set on the Setup Search/Sweep Table screen (*cf.* TBLVBW_SPU).

■ Syntax

Program Message	Query Message	Response Message
---	SPUVBW? Fa,b	c(a),c(a+1),...,c(b)

■ Value of a

Start frequency point for reading out

Range	Resolution
1 to 15	1

■ Value of b

Number of readouts

Range	Resolution
1 to 15	1

■ Value of c

VBW

Resolution	Unit
1	Hz

■ Use example

Reads out the VBW from f1 to f3.

<Program>
DSPL SPURIOUS,SEARCH
SWP
SPUVBW? F1,3

<Response>
3000,30000,300000

SRATE

■ Function
Symbol Rate
Sets the symbol rate of measured signal.

■ Syntax

Program Message	Query Message	Response Message
SRATE a	SRATE?	a

■ Value of a
Symbol rate

Range	Resolution	Initial value	Unit
2000 to 300000	0.1	21000	symbol/s

□ Suffix code
None: symbol/s
HZ: symbol/s
KHZ, KZ: ksymbol/s
MHZ, MZ: Msymbol/s
GHZ, GZ: Gsymbol/s

■ Restrictions
- Unavailable unless Target System is π /4DQPSK (*cf.* TGTSYS)

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets the symbol rate to 192 ksymbol/s.

<Program>
DSPL SETCOM
TGTSYS PI4DQPSK
SRATE 192000
SRATE?

<Response>
192000

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 a	STRG_ADJ?	a

■ Value of a

Display method

a	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.	

■ Initialization command

PRE, INI, IP, *RST

■ Restrictions

None

■ Use example

Displays the average value at Adjacent Channel Power.

<Program>

DSPL ADJ,HIGH

STRG_ADJ AVG

STRG_ADJ?

<Response>

AVG

STRG_IQL

■ Function

Storage Mode for IQ Level

Sets the method for displaying the measured results at IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
STRG_IQL a	STRG_IQL?	a

■ Value of a

Display method

a	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.	

■ Initialization command

PRE, INI, IP, *RST

■ Restrictions

None

■ Use example

Displays the average value at IQ Level measurement.

<Program>
DSPL SETCOM
TERM IQDC
DSPL IQLVL
STRG_IQL AVG
STRG_IQL?

<Response>
AVG

■ Restrictions according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

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 a	STRG_MOD?	a

■ Value of a

Display method

a	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

■ Restrictions

None

■ Use example

Displays the average value at Modulation Analysis measurement.

<Program>
MEAS 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 screen.

■ Syntax

Program Message	Query Message	Response Message
STRG_OBW a	STRG_OBW?	a

■ Value of a

Display method

a	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.	

■ Initialization command

PRE, INI, IP, *RST

■ Restrictions

None

■ Use example

Displays the average value at Occupied Bandwidth.

<Program>
DSPL OBW,SPECT
STRG_OBW AVG
STRG_OBW?

<Response>
AVG

STRG_RFPWR

■ Function

Storage Mode for RF Power

Sets the display mode on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
STRG_RFPWR a	STRG_RFPWR?	a

■ Value of a

Display method

a	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.	
MAX	Max hold: Displays the maximum measurement results at every measurement.	
MIN	Min hold: Displays the minimum measurement results at every measurement.	

■ Initialization command

PRE, INI, IP, *RST

■ Restrictions

None

■ Use example

Displays the average value at RF Power.

<Program>
DSPL RFPWR
STRG_RFPWR AVG
STRG_RFPWR?

<Response>
AVG

■ Note

When the wide dynamic range is ON, Max hold or Min hold is not available.

SWP

■ Function

Single Measure/Sweep

Executes a measurement and sweeping once.

Unlike the SNGLS command, when the Tx Tester 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 Tx Tester operation and the program (which sends the command) is ensured.

■ Syntax

Program Message	Query Message	Response Message
SWP	SWP?	a

■ Value of a

Measurement status

a	Measurement status
0	Measurement completion
1	Measurement in process

■ Restrictions

- Executable screens as follows (*cf.* DSPL).
  - Modulation Analysis
  - RF Power
  - Occupied Bandwidth
  - Adjacent Channel Power
  - Spurious Emission
  - IQ Level
  - Power Meter

■ Use example

Executes a measurement and sweeping once.

<Program>
DSPL MODANAL
SWP

■ Note

Even if the “SWP?” command is sent imidiately after the “SWP” command, processing thereof must wait until measurement is completed, therefore respense is always 0.

SWT_ADJ

■ Function

Sweep Time for Adjacent Channel Power

Sets the Sweep Time for Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
SWT_ADJ a	SWT_ADJ?	b

■ Value of a

Sweep Time

Range	Resolution	Initial value	Unit
1000 to 40000	0.1	5.0	ms

□ Suffix code

None: s

S: s

MS: ms

US: µs

■ Value of b

Sweep Time

Resolution	Unit
1	ns

■ Restrictions

- No setting is allowed when the Target System is other than STDT61 or STDT61V1_1 (*cf.* TGTSYS).
- No setting is allowed when the Measure Method is other than Spectrum(All) or Spectrum(Separate).
- In case other than above, the Sweep Time is set automatically according to the Target System.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Sweep Time to 10s.

<Program>
DSPL SETCOM
TGTSYS STDT61
DSPL ADJ,SPECT1
SWT_ADJ 10S
SWT_ADJ?

<Response>
10000000000

SWT_OBW

■ Function

Sweep Time for Occupied Bandwidth

Sets the Sweep Time for Occupied Bandwidth measurement using the spectrum analyzer.

■ Syntax

Program Message	Query Message	Response Message
SWT_OBW a	SWT_OBW?	b

■ Value of a

Sweep Time

Range	Resolution	Initial value	Unit
1000 to 40000	0.1	5.0	ms

□ Suffix code

None: s

S: s

MS: ms

US: μs

■ Value of b

Sweep Time

Resolution	Unit
1	ns

■ Restrictions

- No setting is allowed when the Target System is other than STDT61 or STDT61V1_1 (*cf.* TGTSYS).
- No setting is allowed when the Measure Method is other than Spectrum.
- In case other than above, the Sweep Time is set automatically according to the Target System.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Sweep Time to 10s.

<Program>
DSPL SETCOM
TGTSYS STDT61
DSPL OBW,SPECT
SWT_OBW 10S
SWT_OBW?

<Response>
10000000000

SYMTIME

■ Function

Symbol Timing

Changes the symbol timing in the tester for Modulation Analysis or RF Power measurement.

■ Syntax

Program Message	Query Message	Response Message
SYMTIME a	SYMTIME?	a

■ Value of a

Symbol timing

Range	Resolution	Initial value	Unit
-0.20 to 0.20	0.01	0.00	symbol

□ Suffix code

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Set the symbol timing to 0.10 symbol.

<Program>

SYMTIME 0.1

SYMTIME?

<Response>

0.1

TBLATT_SPU

■ Function

Attenuator for Spurious Emission

Sets the attenuator for Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLATT_SPU a,b,c	TBLATT_SPU? a,b	c

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets the attenuator to be used in Spot.
SWEEP	Targets the attenuator to be used in Search or Sweep method.

■ Value of b

Number of frequency point for reading out

Range	Resolution
REF, F1 to F15	1

■ Value of c

Attenuator

Range	Resolution	Unit
See Restricting Conditions.	1	dB

□ Suffix code

None: dB

DB: dB

■ Initialization command

PRE, INI, IP, ∗RST

■ Restrictions

- The attenuator set range varies depending on Ref Level (*cf.* TBLRL_SPU).

■ Use example

Sets the attenuator for frequency point 10 in Spot method to 20 dB.

<Program>
TBLATTMD_SPU SPOT,AUTO
TBLRL_SPU SPOT,F10,-30DBM
TBLATT_SPU SPOT,F10,20DB
TBLATT_SPU? SPOT,F10

<Response>
20

TBLATTMD_SPU

■ Function

Attenuator Mode: Manual/Auto for Spurious Emission

Sets manual or automatic mode for the spectrum analyzer attenuator setting on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLATTMD_SPU a,b	TBLATTMD_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets the attenuator to be used in Spot.
SWEEP	Targets the attenuator to be used in Search or Sweep method.

■ Value of b

Attenuator set mode

b	Mode	Initial value
MAN	Sets the attenuator in manual mode.	
AUTO	Sets the attenuator in automatic mode.	*

■ Restrictions

- When the attenuator is changed in Auto mode, it is forced into Manual mode.
- In Auto mode, Attenuator values are automatically set.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the attenuator for Spot method in automatic mode.

<Program>
TBLATTMD_SPU SPOT,AUTO
TBLATTMD_SPU? SPOT

<Response>
AUTO

TBLATTRLMD_SPU

■ Function

Attenuator Ref Level Mode: Manual/Auto for Spurious Emission

Sets the spectrum analyzer Attenuator and Ref Level setting to manual or automatic mode on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLATTRLMD_SPU a,b	TBLATTRLMD_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets the attenuator to be used in Spot.
SWEEP	Targets the attenuator to be used in Search or Sweep method.

■ Value of b

Attenuator, Ref Level setting mode

b	Mode	Initial value
MAN	Sets the attenuator and Ref Level to manual mode.	
AUTO	Sets the attenuator and Ref Level to automatic mode.	*

■ Restrictions

- When the Attenuator or Ref Level is changed in Auto mode, it is forced into Manual mode.
- In Auto mode, Attenuator and Ref Level are automatically set.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Attenuator and Ref Level for Spot method in automatic mode.

<Program>
TBLATTRLMD_SPU SPOT,AUTO
TBLATTRLMD_SPU? SPOT

<Response>
AUTO

TBLFREQ_SPU

■ Function

Frequency for Spurious Emission

Sets the frequency for Spurious Emission measurement.

The Harmonics function allows automatic setting of a frequency of n times (n=2,3,4,...) the carrier frequency until it reaches the upper frequency limit. For the measurement method, see Spurious Mode.

■ Syntax

Program Message	Query Message	Response Message	Function
TBLFREQ_SPU SPOT,Fa,c	TBLFREQ_SPU? SPOT,b	c	Sets the frequency for Spot Method.
TBLFREQ_SPU SPOT,HRM	---	---	Sets the frequency for Spot method to Harmonics
TBLFREQ_SPU START,Fa,d	TBLFREQ_SPU? START,b	d	Sets the sweeping start frequency for Search or Sweep method.
TBLFREQ_SPU STOP,Fa,e	TBLFREQ_SPU? STOP,b	e	Sets the sweeping stop frequency for Search or Sweep method.

■ Value of a

Frequency point

Range	Resolution
1 to 15	1

■ Value of b

Number of frequency point

Range	Resolution
REF, 1 to 15	1

■ Value of c

Frequency

Range	Resolution	Initial value	Unit
Note1	1	Note2	Hz

- Note1. Same as FREQ. The upper limit is not influenced by Pre Ampl.
- Note2. Same value as when Harmonics function is executed for initial value of FREQ. For details, see Initial value.
- Setting 0 Hz causes the field to be cleared.

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHz, MHz: MHz

GHZ, GZ: GHz

■ Value of d

Start Frequency (Search/Sweep)

Range	Resolution	Initial value	Unit
Note3	1	See Initial value.	Hz

- Note3. The lower limit becomes 1 kHz and the upper limit becomes (FREQ upper limit – 1 kHz). The upper limit is not influenced by Pre Ampl.
- When setting Start Frequency causes the relationship of Stop Frequency < (Start Frequency + 1 kHz) to be established, Stop Frequency = (Start Frequency + 1 kHz) is automatically set. That is, the width of the frequency to be swept is always 1 kHz or more.
- Setting 0 Hz causes the field to be cleared.

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHz, MHz: MHz

GHZ, GZ: GHz

■ Value of e

Stop Frequency (Search/Sweep)

Range	Resolution	Initial value	Unit
Note4	1	See Initial value.	Hz

- Note4. Same as FREQ, but the lower limit is 2 kHz. The upper limit is not influenced by Pre Ampl.
- When setting Stop Frequency causes the relationship of Start Frequency > (Stop Frequency - 1 kHz) to be established, Start Frequency = (Stop Frequency - 1 kHz) is automatically set. That is, the width of the frequency to be swept is always 1 kHz or more.
- Setting 0 Hz causes the field to be cleared.

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHz, MHz: MHz

GHZ, GZ: GHz

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the f1 sweep period for Search method 846MHz to 860MHz.

<Program>
TBLFREQ_SPU START,F1,846MHZ
TBLFREQ_SPU STOP,F1,860MHZ
TBLFREQ_SPU? START,F1
TBLFREQ_SPU? STOP,F1

<Response>
846000000
860000000

■ Initial value

The parameter initial values are as listed below. "---" shows a cleared state.
Frequency is calculated from the PDC carrier frequency.
Initial values of the other parameters vary depending on Target System and Channels Per Carrier.

When Spurious Mode is Spot

- VBW/RBW Ratio = 0.003

				Full Rate	Half Rate		
	Frequency	**RBW**	**VBW**	**SWT**		**Limit**	**Remarks**
f1	470.012500 MHz						
f2	1880.050000 MHz						
f3	2820.075000 MHz						For MS2681A, displays to this point.
f4	3760.100000 MHz						
f5	4700.125000 MHz						
f6	5640.150000 MHz						
f7	6580.175000 MHz						
f8	7520.200000 MHz	100 kHz	300Hz	20ms	40ms	0.00 dBm	For MS2683A/MS8608A, displays to this point.
f9	8460.225000 MHz						
f10	9400.250000 MHz						
f11	10340.275000 MHz						
f12	11280.300000 MHz						
f13	12220.325000 MHz						
f14	13160.350000 MHz						For MS8609A, displays to this point.
f15	14100.375000 MHz						For MS2687A/B, displays to this point.

When Spurious Mode is Search or Sweep

	Start Frequency	Stop Frequency	RBW	VBW	SWT	Limit
f1	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f2	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f3	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f4	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f5	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f6	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f7	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f8	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f9	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f10	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f11	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f12	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f13	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f14	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm
f15	-----.------ MHz	-----.------ MHz	--- Hz	--- Hz	---- ms	----.-- dBm

TBLRBW_SPU

■ Function

RBW for Spurious Emission

Sets RBW for Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLRBW_SPU a,b,c	TBLRBW_SPU? a,b	c

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets RBW to be used in Spot.
SWEEP	Targets RBW to be used in Search or Sweep method.

■ Value of b

Frequency point

Range	Resolution
REF, F1 to F15	1

■ Value of c

RBW

Range	Resolution	Initial value	Unit
300 Hz to 20 MHz	1	See Initial value of TBLFREQ_SPU.	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHz, MHz: MHz

GHZ, GZ: GHz

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets f2 RBW for Search method to 30 kHz.

<Program>

```
DSPL SETTBL_SPU,SWEEP
TBLRBW_SPU SWEEP,F2,30KHZ
TBLRBW_SPU? SWEEP,F2
```

<Response>

```
30000
```

TBLRBWMD_SPU

■ Function

RBW: Manual/Auto for Spurious Emission

Sets manual or automatic mode for RBW setting on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLRBWMD_SPU a,b	TBLRBWMD_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets RBW to be used in Spot.
SWEEP	Targets RBW to be used in Search or Sweep method.

■ Value of b

RBW setting mode

b	Mode	Initial value
MAN	Sets RBW to manual mode.	
AUTO	Sets RBW to automatic mode.	*

■ Restrictions

- When RBW is changed in Auto mode, the mode is focibly set to Manual.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets RBW for Spot method in automatic mode.

<Program>
TBLRBWMD_SPU SPOT,AUTO
TBLRBWMD_SPU? SPOT

<Response>
AUTO

TBLRBWTP_SPU

■ Function

RBW Mode: Digital/Normal for Spurious Emission

Sets whether or not the Digital Filter Sweep mode is executed on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLRBWTP_SPU a,b	TBLRBWTP_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets Sweep mode to be used in Spot.
SWEEP	Targets Sweep mode to be used in Search or Sweep method.

■ Value of b

Sweep mode

b	Mode	Initial value
DGTL	Sets the Digital Filter Sweep mode (Digital).	
NRM	Sets the Sweep mode in normal.	*

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Digital Filter Sweep mode to be used for Sweep method.

<Program>
TBLRBWTP_SPU SWEEP,DGTL
TBLRBWTP_SPU? SWEEP

<Response>
DGTL

■ Note

This function is an option.

TBLRL_SPU

■ Function

Ref Level for Spurious Emission

Sets Ref Level for Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLRL_SPU a,b,c	TBLRL_SPU? a,b	c

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets Sweep mode to be used in Spot.
SWEEP	Targets Sweep mode to be used in Search or Sweep method.

■ Value of b

Frequency point

Range	Resolution
REF, F1 to F15	1

■ Value of c

Ref Level

Range	Resolution	Initial value	Unit
See Restricting Conditions.	0.01	50.00	dBm

□ Suffix code

None: dBm

DBM: dBm

■ Restriction

- The reference level set range becomes the following when RF Input: High/Low (*cf.* RFINPUT) and Pre Ampl: On/Off (*cf.* PREAMP) as shown below. For Ref Level Offset, see RFLVLOFS.

		RF Input	
		High	Low
Attenuator Mode: Auto	Pre Ampl: Off	(－100.00＋RefLevelOffset) to (50.00＋RefLevelOffset)	(－120.00＋RefLevelOffset) to (40.00＋RefLevelOffset)
	Pre Ampl: On	(－120.00＋RefLevelOffset) to (30.00＋RefLevelOffset)	(－140.00＋RefLevelOffset) to (20.00＋RefLevelOffset)

- When the reference level goes outside the set range due to a change in RF Input or Pre Ampl, it is rounded to the nearest value within the range.
- For details, see Common Specifications.

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets Frequency point –10 Ref Level for Spot method to –30 dBm.

<Program>
TBLATTMD_SPU SPOT,AUTO
TBLRL_SPU SPOT,F10,-30DBM
TBLRL_SPU? SPOT,F10

<Response>
-30.00

TBLSWT_SPU

■ Function

Sweep Time for Spurious Emission

Sets the sweep time for Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLSWT_SPU a,b,c	TBLSWT_SPU? a,b	d

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets the Sweep time to be used for Spot method.
SWEEP	Targets the Sweep mode to be used for Search or Sweep method.

■ Value of b

Frequency point

Range	Resolution
REF, F1 to F15	1

■ Value of c

Sweep Time

Resolution	Unit
1	msec

□ Suffix code

None: msec

S: sec

MS: msec

US: μsec

■ Value of d

Sweep Time

Resolution	Unit
1	μsec

■ Restriction

- Any value in the set range may be entered. For the values actually set, see Common Specifications. For initial values, see Initial value of TBLFREQ_SPU.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets f3 sweep time for Search method to 100msec.

<Program>

TBLSWT_SPU SWEEP,F3,100MS

TBLSWT_SPU? SWEEP,F3

<Response>

1000000

TBLSWTMD_SPU

■ Function

Sweep Time: Manual/Auto for Spurious Emission

Sets either the manual or automatic operation of Sweep Time setting on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLSWTMD_SPU a,b	TBLSWTMD_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets Sweep Time to be used in Spot.
SWEEP	Targets Sweep Time to be used in Search or Sweep method.

■ Value of b

Sweep Time setting mode

b	Mode	Initial value
MAN	Sets Sweep Time to manual mode.	
AUTO	Sets Sweep Time to automatic mode.	*

■ Restrictions

- When Sweep Time is changed during Auto, the System compulsorily becomes Manual.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets Sweep Time of Spot method measurement to Manual setting mode.

<Program>
TBLSWTMD_SPU SPOT,MAN
TBLSWTMD_SPU? SPOT

<Response>
MAN

TBLVBW_SPU

■ Function

VBW for Spurious Emission

Sets the VBW for Spurious Emission measurement.

■ Syntax

Program Message	Query Message	Response Message
TBLVBW_SPU a,b,c	TBLVBW_SPU? a,b	c

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets VBW to be used in Spot.
SWEEP	Targets VBW to be used in Search or Sweep method.

■ Value of b

Frequency point

Range	Resolution
REF, F1 to F15	1

■ Value of c

VBW

Range	Resolution	Initial value	Unit
0,1,3,10,30,100,300,1000,3000,10000, 30000,100000,300000,1000000,3000000	1	See Initial value of TBLFREQ_SPU.	Hz

□ Suffix code

None: Hz

HZ: Hz

KHZ, KZ: kHz

MHz, MHz: MHz

GHZ, GZ: GHz

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets f2 VBW of search method measurement to 30kHz.

<Program>

TBLVBW_SPU SWEEP,F2,30KHZ

TBLVBW_SPU? SWEEP,F2

<Response>

30000

TBLVBWMD_SPU

■ Function

VBW: Manual/Auto for Spurious Emission

Sets manual or automatic mode for VBW setting on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLVBWMD_SPU a,b	TBLVBWMD_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets VBW to be used in Spot.
SWEEP	Targets VBW to be used in Search or Sweep method.

■ Value of b

VBW setting mode

b	Mode	Initial value
MAN	Sets VBW to manual mode.	
AUTO	Sets VBW to automatic mode.	*

■ Restrictions

- When VBW is changed during Auto mode, the mode is forcibly set to Manual.
- In the Auto, VBW value is set automatically from the RBW value and the VBW/RBW Ratio value.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets VBW of Spot method in automatic mode.

<Program>
TBLVBWMD_SPU SPOT,AUTO
TBLVBWMD_SPU? SPOT

<Response>
AUTO

TBLVBWRT_SPU

■ Function

VBW/RBW Ratio for Spurious Emission

Sets VBW and RBW ratio used in VBW automatic setting on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
TBLVBWRT_SPU a,b	TBLVBWRT_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets VBW to be used in Spot.
SWEEP	Targets VBW to be used in Search or Sweep method.

■ Value of b

VBW/RBW Ratio

Range	Resolution	Initial value
0.0001 to 100	0.0001	See descriptions in Initial value column of TBLFREQ_SPU.

■ Restrictions

- Any value may be input within setting range. However, actually set values are shown as in Table below.

Setting value												
0.0001	0.0003	0.001	0.003	0.01	0.03	0.1	0.3	1	3	10	30	100

- When Target System is changed, the values are switched. For setting value, see descriptions in Initial value of TBLFREQ_SPU.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Search method measurement VBW/RBW Ratio to 3.

<Program>

TBLVBWRT_SPU SWEEP,3

TBLVBWRT_SPU? SWEEP

<Response>

3

TBLVIEW_SPU

■ Function

View for Setup Spurious Table

Sets whether to display RBW/VBW/SWT, Ref Level/ATT or Limit on the right side of the Setup Spurious Table screen.

■ Syntax

Program Message	Query Message	Response Message
TBLVIEW_SPU a,b	TBLVIEW_SPU? a	b

■ Value of a

Selects the measurement method

a	Measurement method
SPOT	Targets the set screen to be used in Spot.
SWEEP	Targets the set screen to be used in Search or Sweep.

■ Value of b

Display items

a	Display items	Initial value
None	Switches the display in the order of RBW, VBW, SWT ->Ref Level, ATT ->Limit ->RBW, VBW, SWT.	
BWSWT	Display RBW, VBW and SWT.	*
REFATT	Display Ref Level and ATT.	
LMT	Display Limit.	

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Displays Setup Spurious Table in Limit.

<Program>

DSPL SETTBL_SPU,SWEEP

TBLVIEW_SPU SWEEP,LMT

TBLVIEW_SPU? SWEEP

<Response>

LMT

TEMPLVL_RFPWR

■ Function

Level Modify for RF Power Template

Sets the template line level for the Setup Template screen.

■ Syntax

Program Message	Query Message	Response Message
TEMPLVL_RFPWR a,b,c	TEMPLVL_RFPWR? a,b	c

■ Value of a

Selects the upper- or lower- limit template line.

a	Upper- or lower- limit template line
UP	Uses the upper-limit template.
LOW	Uses the lower-limit template.

■ Value of b

Selects the template line level

Target System	Measuring Object	Range (a=UP)	Range (a=LOW)	Resolution
PDC	MS-TCH, MS-CCH	1 to 4	1	1
PHS	All	1 to 2	1	1
NADC	Mobile, Shortened Burst	1 to 2	1	1
STD39	MS-TCH,DC-CH	1 to 4	1	1
	MS-CCH, MS-SYNC, DC-SYNC	1 to 3	1	1
STDT61	—	—	—	—
STDT61V1_1	SC(Burst), MC(Continuous)	1 to 4	—	1

■ Value of c

Level value based on Tx Power

Range	Resolution	Unit
–110.0 to 10.0	0.1	dB

□ Suffix code

None: dB

DB: dB

☐ Initial value (Standard)

Target System = PDC, Measuring Object = MS-TCH, MS-CCH, MS-SYNC

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−56.0 dBm
	2	−60.0 dBm
	3	4.0 dBm
	4	−60.0 dBm
Lower	1	−14.0 dBm

Target System = PHS, Measuring Object = Other than Continuous

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−45.0 dBm
	2	4.0 dBm
Lower	1	−14.0 dBm

Target System = NADC, Measuring Object = Mobile, Shortened Burst

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−60.0 dBm
	2	3.0 dBm
Lower	1	−14.0 dBm

Target System = STD-39,T79, Measuring Object = MS-TCH, DC-CH

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−50.0 dBm
	2	−60.0 dBm
	3	4.0 dBm
	4	−60.0 dBm
Lower	1	−14.0 dBm

Target System = STD-39,T79, Measuring Object = MS-CCH, MS-SYNC, DC-SYNC

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−50.0 dBm
	2	−60.0 dBm
	3	5.0 dBm
	4	4.0 dBm
Lower	1	−14.0 dBm

Target System = STD-T61, Measuring Object = SC(Burst), MC(Burst)

Upper/lower limit	Level position	Initial value (Standard)
Upper	1	−50.0 dBm
	2	−60.0 dBm
	3	6.0 dBm
	4	−60.0 dBm

■ Restrictions

- This setting is not possible when Target System is set to STD-T61 (*cf.* TGTSYS).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

When the Target System is PDC and the Measuring Object is MS-TCH, set the level to –20.0 dB.

<Program>

```
DSPL SETCOM
TGTSYS PDC
MEASOBJ MSTCH
DSPL SETTEMP_RFPWR
TEMPLVL_RFPWR UP,2,-20.0
TEMPLVL_RFPWR? UP,2
```

<Response>

```
-20.0
```

TEMPOFFLVL

■ Function
Off Level
Sets the level unit for the off-level standard line (upper-limit line 1) on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
TEMPOFFLVL a	TEMPOFFLVL?	a

■ Value of a
Off-level standard line (upper-limit line 1) level unit

a	Measurement method	Initial value
DBM	Sets the off-level standard line (upper-limit line 1) level unit to dBm.	*
DB	Sets the off-level standard line (upper-limit line 1) level unit to dB.	

■ Restriction
- None

■ Initialization command
PRE, INI, IP, ∗RST

■ Use example
Sets the off-level standard line (upper-limit line 1) level unit to dBm.

<Program>
TEMPOFFLVL DBM
TEMPOFFLVL?

<Response>
DBM

TEMPPASS_RFPWR

■ Function

Template Pass

Reads the measured waveform pass/fail results with the template on the RF Power screen.

According to the judgment criterion, when the waveform is inside the template at all points, the result is pass; when the waveform is outside the template at least one point, the result is fail.

■ Syntax

Program Message	Query Message	Response Message
---	TEMPPASS_RFPWR? a	b

■ Value of a

Period

a	Period
ON	On-period
OFF	Off-period

■ Value of b

Judgment results

b	Pass/fail judgment
PASS	Pass: Passed
FAIL	Fail: Failed
OFF	Judgment disabled

■ Restriction

- Judgment is performed only when Target System (*cf.* TGTSYS) and Measuring Object (*cf.* MEASOBJ) are as shown below and Relative Level (*cf.* LVLREL_RFPWR) is On (Relative).

Target System	Measuring Object
PDC	MS-TCH, MS-CCH
PHS	Other than Continuous
NADC	Mobile, Shortened Burst
STD39	MS-CCH, MS-SYNC, DC-SYNC
STDT61V1_1	SC(Burst), MC(Burst)

■ Use example

Reads the pass/fail judgment results for the waveform measured by RF Power.

<Program>
DSPL SETCOM
TGTSYS PDC
MEASOBJ MSTCH
DSPL RFPWR
LVLREL_RFPWR ON
SWP
TEMPPASS_RFPWR? ON

<Response>
PASS

TEMPRPWR

■ Function

Reference Power for Template (Remote Only)

Reads the off-level standard line (upper-limit line 1) on the RF Power screen.

The read value is a dB value based on Tx Power.

■ Syntax

Program Message	Query Message	Response Message
---	TEMPRPWR?	a

■ Value of a

Reference Power for Template

Resolution	Unit
0.01	dB

■ Use example

Reads the off-level standard line (upper-limit line 1) level.

<Program>

TEMPRPWR?

<Response>

-59.0

TERM

■ Function

Terminal

Sets the connector for the input signal to be measured.

■ Syntax

Program Message	Query Message	Response Message
TERM a	TERM?	a

■ Value of a

Connector for the input signal to be measured

Value	Connector for the Input Signal to be Measured	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

- The displayed measurement screen must be set to the Setup Common Parameter screen (*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 according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

TGTSYS

■ Function

Target System

Selects the system to be measured.

■ Syntax

Program Message	Query Message	Response Message
TGTSYS a	TGTSYS?	a

■ Value of a

System to be measured

a	Meanings	Initial value
PI4DQPSK	Sets π/4DQPSK.	
PDC	Sets PDC.	*
PHS	Sets PHS.	
NADC	Sets NADC.	
STD39	Sets STD-39,T79.	
STDT61	Sets STD-T61.	
STDT61V1_1	Sets STD-T61 version1.1.	

■ Restrictions

- The measurement screen must be set to Setup Common Parameter (*cf*. DSPL).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the measurement system to PDC.

<Program>
DSPL SETCOM
TGTSYS PDC
TGTSYS?

<Response>
PDC

TIMING

■ Function

Timing

Reads the transmission timing on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
---	TIMING?	a

■ Value of a

Timing

Resolution	Unit
0.01	symbol

■ Use example

Reads the transmission timing measurement results.

<Program>
DSPL RFPWR
TXTIME ON
SWP
TIMING?

<Response>
2.012

TRFORM

■ Function

Trace Fomat

Sets the waveform display format on the Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
TRFORM a	TRFORM?	a

■ Value of a

Waveform format

a	Waveform Format	Initial Value
NON	None: Displays the numeric results only. Does not display a waveform.	*
CONSTEL	Constellation: Displays the IQ diagram.	
EYE	Eye Diagram: Displays the change in the IQ signals via the elapse of time.	
VECT	EVM: Displays the EVM.	
PHASE	Phase Error: Displays the phase error.	
MAGTD	Magnitude: Displays the amplitude error.	

■ Restrictions

- None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the waveform display format to Phase Error.

<Program>
MEAS MODANAL
TRFORM PHASE
TRFORM?

<Response>
PHASE

TRG

■ Function

Trigger

Specifies whether to start the measurement using internal timing or external trigger.

■ Syntax

Program Message	Query Message	Response Message
TRG a	TRG?	a

■ Value of a

Trigger setting

Value	Trigger Setting	Initial Value
FREE	Free Run: Starts a measurement using internal timing.	*
WIDEVID	Wide IF: Starts a measurement using Wide IF Video Trigger.	
EXT	External: Starts a measurement using external trigger.	

■ Restrictions

- This setting is not possible when the displayed measurement screen is the Power Meter screen (*cf.* DSPL).
- When the trigger is set to WIDEVID, it measures as FREE if the displayed measurement screen is other than Modulation Analysis or RF Power.

■ 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 difference from the trigger input to the actual timing execution.

■ Syntax

Program Message	Query Message	Response Message
TRGDLY a	TRGDLY?	a

■ Value of a

Trigger difference value

Range	Resolution	Initial Value	Unit
–2000.0 to 2000.0	0.1	0.0	symbol

■ Restrictions

- This setting is not enabled when Trigger is set to Free Run (*cf.* TRG).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Sets the Trigger Delay value to 50.0 symbol.

<Program>
DSPL SETCOM
TRG EXT
TRGDLY 50.0
TRGDLY?

<Response>
50.0

TRGEDGE

■ Function

Trigger Edge

Setting trigger-signal rise or fall slope as the trigger timing reference.

■ Syntax

Program Message	Query Message	Response Message
TRGEDGE a	TRGEDGE?	a

■ Value of a

Trigger reference

a	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 Trigger Level when Trigger is set to Wide IF.

■ Syntax

Program Message	Query Message	Response Message
TRGLVL a	TRGLVL?	a

■ Value of a

Trigger level setting

Level	Trigger (Wide IF) Level Setting	Initial Value
LOW	Sets trigger level to Low.	*
MIDDLE	Sets trigger level to Middle.	
HIGH	Sets trigger level to High.	

■ Restrictions

- This setting is not enabled when Trigger is set to other than Wide IF. (*cf*. TRG)

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets Trigger Level to Middle.

<Program>
DSPL SETCOM
TRG WIDEVID
TRGLVL MIDDLE
TRGLVL?

<Response>
MIDDLE

TXPWR

■ Function

Tx Power

Reads out the average power inside burst.

■ Syntax

Program Message	Query Message	Response Message
---	TXPWR? a	b

■ Value of a

Specification for output unit

a	Output Unit
DBM	dBm
WATT	W

■ Value of b

Tx Power

Resolution	Unit
0.01	dBm
Significant digits, four places (floating decimal-point type)	W

■ Use example

Reads out the measured results for Tx Power.

<Program>
DSPL RFPWR
SWP
TXPWR? DBM

<Response>
-18.53

TXTIME

■ Function

Transmit Timing

Sets whether or not to perform timing measurement on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
TXTIME a	TXTIME?	a

■ Value of a

Timing measurement On/Off

a	Timing measurement On/Off	Initial value
ON	Performs timing measurement.	
OFF	Performs no timing measurement.	*

■ Restrictions

- Unavailable unless Target System is PHS (*cf.* TGTSYS).
- Unavailable when Measuring Object is Continuous (*cf.* MEASOBJ).
- Unavailable when Pattern is No or User (*cf.* PATT).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Performs timing measurement.

<Program>
TXTIME ON
TXTIME?

<Response>
ON

UNIT_ADJ

■ Function

Unit for Adjacent Channel Power

Sets the unit of measurement result for Leakage Power, Peak Power, Mean Power due to Modulation on the Adjacent Channel Power screen.

■ Syntax

Program Message	Query Message	Response Message
UNIT_ADJ a	UNIT_ADJ?	a

■ Value of a

Unit

a	Unit	Initial Value
DB	dB	*
DBM	dBm	
MW	mW	
UW	μW	
NW	nW	*

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the unit of measurement result for Leakage, Peak Power, Mean Power, Mean Power due to Modulation to mW.

<Program>
UNIT_ADJ MW
UNIT_ADJ?

<Response>
MW

UNIT_IQL

■ Function

Unit for IQ Level

Sets unit for the IQ level on the IQ Level measurement.

■ Syntax

Program Message	Query Message	Response Message
UNIT_IQL a	UNIT_IQL?	a

■ Value of a

Unit for the IQ level

a	Unit for the IQ Level	Initial Value
DBMV	dBmV	*
MV	mV	

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the IQ Level unit to mV.

<Program>
UNIT_IQL MV
UNIT_IQL?

<Response>
MV

■ Restrictions according to model type and options

For MS268x, if Option-17 or –18 I/Q Input is not installed, this command is invalid.

UNIT_SPU

■ Function

Unit for Spurious Emission

Sets the unit for each measurement result of level at f1 to f15 on the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
UNIT_SPU a	UNIT_SPU?	a

■ Value of a

Unit for each level

a	Unit for each level	Initial Value
DB	dB	
DBM	dBm	*

■ Restrictions

None

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the unit to dB for each level at f1 to f15.

<Program>
UNIT_SPU DB
UNIT_SPU?

<Response>
DB

VBW_ADJ

■ Function

Video Bandwidth for Adjacent Channel Power

Reads VBW (Video Bandwidth) on the Adjacent Channel Power measurement.

■ Syntax

Program Message	Query Message	Response Message
---	VBW_ADJ?	a

■ Value of a

VBW

Resolution	Unit
1	Hz

■ Use example

Reads VBW.

<Program>

VBW_ADJ?

<Response>

30000

VBW_OBW

■ Function

Video Bandwidth for Occupied Bandwidth

Reads VBW (Video Bandwidth) on the Occupied Bandwidth measurement using a spectrum analyzer.

■ Syntax

Program Message	Query Message	Response Message
---	VBW_ADJ?	a

■ Value of a

VBW

Resolution	Unit
1	Hz

■ Use example

Reads VBW.

<Program>

VBW_OBW?

<Response>

30000

VECTERR

■ Function

RMS EVM

Outputs the measured results of the RMS value for EVM at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
---	VECTERR?	a

■ Value of a

RMS EVM

Resolution	Unit
0.01	%

■ Use example

Reads out the measurement result for RMS EVM.

<Program>
DSPL MODANAL
SWP
VECTERR?

<Response>
23.48

VIEW_SPU

■ Function

View for Spurious Emission

Sets whether to display the judgment results, RBW/VBW/SWT or Ref Level/ATT on the right area of the Spurious Emission screen.

■ Syntax

Program Message	Query Message	Response Message
VIEW_SPU a	VIEW_SPU?	a

■ Value of a

Display item

a	Display item	Initial value
None	Switches the display in the order of Judgment ->RBW, VBW, SWT ->Ref Level, ATT ->Judgment.	
JDG	Displays Judgement.	*
BWSWT	Displays RBW, VBW and SWT.	
REFATT	Displays Ref Level and ATT.	

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Displays RBW, VBW and SWT.

<Program>
DSPL SPURIOUS,SPOT
VIEW_SPU BWSWT
VIEW_SPU?

<Response>
BWSWT

VSCALE

■ Function

Vertical Scale for EVM, Phase Error and Magnitude Error

Sets upper limit value of vertical scale of displayed coordinates when Trace Format is set to EVM, Phase Error or Magnitude Error on the Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
VSCALE a	VSCALE?	a

■ Value of a

Upper limit value of vertical scale

a	Upper limit value of vertical scale	Initial Value
5	5% (EVM, Magnitude Error), 5 deg (Phase Error)	
10	10% (EVM, Magnitude Error), 10 deg (Phase Error)	
20	20% (EVM, Magnitude Error), 20 deg (Phase Error)	*
50	50% (EVM, Magnitude Error), 50 deg (Phase Error)	
100	100% (EVM, Magnitude Error), 100 deg (Phase Error)	

■ Restrictions

- This setting is not possible when Trace Format is set to other than EVM, Phase Error or Magnitude Error. (*cf.* TRFORM).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Sets the upper limit value of the Phase Error vertical scale to 50 [deg].

<Program>
MEAS MODANAL
TRFORM PHASE
VSCALE 50
VSCALE?

<Response>
50

WIDE_RFPWR

■ Function

Wide Dynamic Range

Sets the dynamic range on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
WIDE_RFPWR a	WIDE_RFPWR?	a

■ Value of a

Wide dynamic range On/Off

a	Wide dynamic range On/Off	Initial Value
ON	Measures in the on and off periods while changing the ATT settings to expand the dynamic range. Note: Measurement in single mode.	
OFF	Measures once in the on and off periods.	*

■ Restrictions

- Unavailable unless Terminal is set to RF (*cf.* TRFORM).
- Unavailable unless Measuring Object is Burst wave (*cf.* MEASOBJ).
- Unavailable unless Storage Mode is Max hold or Min hold (*cf.* STRG_RFPWRJ).
- Unavailable when Trigger is Wide IF. (*cf.* TRG).

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Expand the dynamic range.

<Program>
WIDE_RFPWR ON
WIDE_RFPWR?

<Response>
ON

WINDOW

■ Function

Window

Sets the interval to display the waveform on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
WINDOW a	WINDOW?	a

■ Value of a

Interval to display the waveform

a	Interval to display the waveform	Initial Value
SLOT	Slot: Displays the waveform corresponding to one slot.	*
FRAME	Frame: Displays the waveform of one frame.	
LEAD	Leading: Displays the waveform of burst rising edge.	
TRAIL	Trailing: Displays the waveform of burst falling edge.	

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Displays the waveform of burst rising edge.

<Program>
DSPL RFPWR
WINDOW LEAD
WINDOW?

<Response>
LEAD

XMAG

■ Function

Wave Data for Adjacent Channel Power (Channel BW)

Reads out and processes the waveform data (Channel BW) by digital signal process on the Adjacent Channel Power screen. Use XMB to access to the processed data of spectrum analyzer.

■ Syntax

Program Message	Query Message	Response Message
XMAG a,b	XMAG? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to 500	1

■ Value of b

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Setting is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Value of c

Start address for reading out the data

Range	Resolution
0 to 500	1

■ Value of d

Number of data read out

Range	Resolution
1 to 501	1

■ Value of e(n)

32-bit waveform data to be read out

Range	Resolution
-2147483648 to 2147483647	1

- Reading out is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Restrictions

- In relation to the calculation, some part of the data is invalid. –2147483648 is output if the data is invalid.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out 10 waveform data of Adjacent Channel Power, starting from the memory address 0.

<Program>

```
DSPL ADJ,SPECT1
SWP
XMAG? 0,10
```

<Response>

```
-8829,-8925,-8776,-8771,-8735,-8636,-8882,-8806,-8700,-8846
```

XMB

■ Function

Wave Data for Adjacent Channel Power (Spectrum Analyzer)

Reads out and processes the waveform data by spectrum analyzer on the Adjacent Channel Power screen. Use XMAG to access to the digital signal processed data (Channel BW).

■ Syntax

Program Message	Query Message	Response Message
XMB a,b	XMB? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to 500	1

■ Value of b

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Setting is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Value of c

Start address for reading out the data

Range	Resolution
0 to 500	1

■ Value of d

Number of data read out

Range	Resolution
1 to 501	1

■ Value of e(n)

32-bit waveform data to be read out

Range	Resolution
-2147483648 to 2147483647	1

- Reading out is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Restrictions

- In relation to the calculation, some part of the data is invalid. –2147483648 is output if the data is invalid.

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out 10 waveform data of Adjacent Channel Power, starting from the memory address 0.

<Program>
DSPL ADJ,SPECT1
SWP
XMB? 0,10

<Response>
-8829,-8925,-8776,-8771,-8735,-8636,-8882,-8806,-8700,-8846

XMBS

■ Function

Wave Data for Adjacent Channel Power (Spectrum Analyzer Separate)

Reads out and processes the waveform data on the Adjacent Channel Power screen using a spectrum analyzer(separate).

■ Syntax

Program Message	Query Message	Response Message
XMBS a,b,c	XMBS? d,e,f	g(1),g(2),...,g(d)

■ Value of a

Data writing address

Offset Data Points	Range	Resolution
1	1 to 3	1
2	1 to 5	
3	1 to 7	

■ Value of b

Data writing address

Range	Resolution
0 to 500	1

■ Value of c

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Setting is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Value of d

Start address for reading out the data

Offset Data Points	Range	Resolution
1	1 to 3	1
2	1 to 5	
3	1 to 7	

■ Value of e

Data read starting address

Range	Resolution
0 to 500	1

■ Value of f

Number of data read out

Range	Resolution
1 to 501	1

■ Value of g(n)

32-bit waveform data to be read out

Range	Resolution
-2147483648 to 2147483647	1

- Reading out is made by using an integer in 0.01 dB units so that 1 dB is shown as 100.

■ Restrictions

- This data storage address changes when the following settings have changed:
  - Target System (*cf.* TGTSYS)
  - Offset Data Points (*cf.* OFSDPTS_ADJ)
  - Data Points (*cf.* DPTS_ADJ)

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads ten pieces of Adjacent Channel Power waveform data from memory address 0.

<Program>
DSPL ADJ,SPECT2
SWP
XMBS? 1,0,10

<Response>
-8829,-8925,-8776,-8771,-8735,-8636,-8882,-8806,-8700,-8846

XMC

■ Function

Wave Data for I-Q Signal

Reads out and processes the IQ signal waveform data at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
XMBS a,b,c	XMBS? d,e,f	g(1),g(2),...,g(d)

■ Value of a

Selects IQ

a	Selects IQ
0	I signal
1	Q signal

■ Value of b

Data writing address

Range	Resolution
0 to (Analysis Length *10)	1

■ Value of c

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Sets an integer in 0.0001 units assuming that ideal signal “1” is 10000.

■ Value of d

Selects IQ

d	Selects IQ
0	I signal
1	Q signal

■ Value of e

16-bit waveform data to be written

Range	Resolution
0 to (Analysis Length *10)	1

■ Value of f

Data reading count

Range	Resolution
1 to (Analysis Length *10 +1)	1

■ Value of g(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- Sets an integer in 0.0001 units assuming that ideal signal “1” is 10000.

■ Restrictions

- When Phase Offset is 22.5[deg], the read value is pahse-rotated by 22.5[deg] (*cf.* SCOFS).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads five pieces of IQ signal waveform data from memory address 0.

<Program>

DSPL MODANAL

SWP

XMC? 0,0,5

<Response>

0,-10000,0,-10000,10000

XMD

■ Function

Frame Wave Data for RF Power

Reads out and processes the Frame waveform data on the RF Power screen.

■ Syntax

Program Message	Query Message	Response Message
XMD a,b	XMD? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to ((Frame Length + 40*2) *10) (Max:20800)	1

- The relationships between the data storage addresses and Marker Positions are as follows.
  (Frame Length is assumed to be 2000.)

Data Storage Addresses	0	1	2		399	400	401		20799
Marker Position [symbol]	(Analysis Start –40.0)	(Analysis Start –39.9)	(Analysis Start –39.8)		(Analysis Start –0.1)	(Analysis Start)	(Analysis Start +0.1)		(Analysis Start +Frame Length +99.9)

■ Value of b

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Sets an integer in 0.01 dB units (1 dB is 100).

■ Value of c

Data reading start address

Range	Resolution
0 to ((Frame Length + 40*2)*10) (Max:20800)	1

■ Value of d

Data reading count

Range	Resolution
1 to ((Frame Length + 40*2)*10 +1) (Max:20800)	1

■ Value of e(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- Sets an integer in 0.01 dB units (1 dB is 100).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads five pieces of RF Power waveform data from memory address 0.

<Program>
DSPL RFPWR
SWP
XMD? 0,5

<Response>
-1012,-1743,-1823,-1272,-1055

XME

■ Function

Wave Data for Occupied Bandwidth

Reads out and processes the Frame waveform data on the Occupied Bandwidth.

■ Syntax

Program Message	Query Message	Response Message
XME a,b	XME? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Measurement Method	Range	Resolution
FFT	0 to 500	1
Spectrum		1

■ Value of b

16-bit waveform data to be written

Range	Resolution
–32768 to 32767	1

- Sets an integer in 0.01 dB units (1 dB is 100).

■ Value of c

Data reading start address

Measurement Method	Range	Resolution
FFT	0 to 500	1
Spectrum		1

■ Value of d

Data reading count

Measurement Method	Range	Resolution
FFT	1 to 501	1
Spectrum		1

■ Value of e(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- Sets an integer in 0.01 dB units (1 dB is 100).

■ Restrictions

- When Measurement Method is Spectrum, the waveform data for Spectrum method is to be processed; when Measurement Method is FFT, the waveform data for FFT method is to be processed.

■ Initialization command

PRE, INI, IP, *RST

■ Use example

Reads ten pieces of Occupied Bandwidth waveform data from memory address 0.

<Program>

DSPL OBW,FFT
SWP
XME? 0,10

<Response>

-8829,-8925,-8776,-8771,-8735,-8636,-8882,-8806,-8700,-8846

XMM

■ Function

Demodulation Data

Outputs and processes the demodulation data on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
XMM a,b	XMM? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing point

Range	Resolution
0 to (Analysis Length*2/16 -1) (Max:124)	1

■ Value of b

16-bit demodulation data to be written

Range	Resolution
0 to 65535	1

■ Value of c

Data reading start point

Range	Resolution
0 to (Analysis Length*2/16 -1) (Max:124)	1

■ Value of d

Data reading count

Range	Resolution
1 to (Analysis Length*2/16) (Max:124)	1

■ Value of e

16-bit demodulation data read

Range	Resolution
0 to 65535	1

■ Restrictions

None

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out five pieces of demodulation data from memory address 0.

<Program>

DSPL MODANAL

SWP

XMM? 0,5

<Response>

0,3743,0,9272,0

XMMH

■ Function

Demodulation Data Hex

Reads or processes demodulation data on the Modulation Analysis screen.

■ Syntax

Program Message	Query Message	Response Message
XMMH a,b	XMMH? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing point

Range	Resolution
0 to (Analysis Length*2/16 -1) (Max:124)	1

■ Value of b

16-bit demodulation data to be written

Range	Resolution
0X0000 to 0XFFFF	1

■ Value of c

Data reading start point

Range	Resolution
0 to (Analysis Length*2/16 -1) (Max:124)	1

■ Value of d

Data reading count

Range	Resolution
1 to (Analysis Length*2/16)	1

■ Value of e(n)

16-bit demodulation data read

Range	Resolution
0X0000 to 0XFFFF	1

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example
Reads out five pieces of demodulation data from memory address 0.

<Program>
DSPL MODANAL
SWP
XMMH? 0,5

<Response>
0,E9F,0,2438,0

XMN

■ Function

Wave Data for Magnitude Error

Reads out and processes the Magnitude Error waveform data at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
XMN a,b	XMN? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

- The relationships between the data storage addresses and Marker Positions are as shown below.

  Example: When Target System = PDC, Measuring Object = MS-TCH

Data storage addresses	0	1	2		131	132	133	134	135	136		998	999
Marker Position [symbol]	2.0	3.0	4.0		133.0	134.0	135.0	136.0	---	---		---	---

■ Value of b

16-bit waveform data to be written

Range	Resolution
-32768 to 32767	1

- Sets an integer in 0.01% units (1% is 100).

■ Value of c

Data reading start address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

■ Value of d

Data reading count

Range	Resolution
1 to (Analysis Length + 1) (Max:1001)	1

■ Value of e(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- The read integer is in 0.01% units (1% is 100).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out five Magnitude Error waveform data starting from memory address 0.

<Program>
DSPL MODANAL
SWP
XMN? 0,5

<Response>
0,1413,-1,-7415,-1

XMP

■ Function

Wave Data for Phase Error

Reads out and processes the Phase Error waveform data at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
XMP a,b	XMP? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

- The relationships between the data storage addresses and Marker Positions are as shown below.
  Example: When Target System = PDC, Measuring Object = MS-TCH

Data storage addresses	0	1	2		131	132	133	134	135	136		998	999
Marker Position ［symbol］	2.0	3.0	4.0		133.0	134.0	135.0	136.0	---	---		---	---

■ Value of b

16-bit waveform data to be written

Range	Resolution
-32768 to 32767	1

- Sets an integer in 0.01deg units (1deg is 100).

■ Value of c

Data reading start address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

■ Value of d

Data reading count

Range	Resolution
1 to (Analysis Length + 1) (Max:1001)	1

■ Value of e(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- The read integer is in 0.01deg units (1deg is 100).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out five Phase Error waveform data starting from memory address 0.

<Program>
DSPL MODANAL
SWP
XMP? 0,5

<Response>
-1,-1660,0,8679,0

XMV

■ Function

Wave Data for EVM

Reads out and processes the EVM waveform data at Modulation Analysis measurement.

■ Syntax

Program Message	Query Message	Response Message
XMV a,b	XMV? c,d	e(1),e(2),...,e(d)

■ Value of a

Data writing address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

- The relationships between the data storage addresses and Marker Positions are as shown below.
  Example: When Target System = PDC, Measuring Object = MS-TCH

Data storage addresses	0	1	2		131	132	133	134	135	136		998	999
Marker Position [symbol]	2.0	3.0	4.0		133.0	134.0	135.0	136.0	---	---		---	---

■ Value of b

16-bit waveform data to be written

Range	Resolution
-32768 to 32767	1

- Sets an integer in 0.01% units (1% is 100).

■ Value of c

Data reading start address

Range	Resolution
0 to (Analysis Length) (Max:1000)	1

■ Value of d

Data reading count

Range	Resolution
1 to (Analysis Length + 1) (Max:1001)	1

■ Value of e(n)

32-bit waveform data read

Range	Resolution
–2147483648 to 2147483647	1

- The read integer is in 0.01% units (1% is 100).

■ Initialization command

PRE, INI, IP, ∗RST

■ Use example

Reads out five pieces of EVM waveform data from memory address 0.

<Program>
DSPL MODANAL
SWP
XMV? 0,5

<Response>
0,3743,0,9272,0

ZEROSET

■ Function

Zero Set

Executes zero-point calibration for the power meter.

■ 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

■ Restrictions according to model type and options

For MS268x, this command is not available.