ADVANTEST®

ADVANTEST CORPORATION

Q8331

Multi Wavelength Meter

Operation Manual

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Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

- **Warning Labels**

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

- **Basic Precautions**

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.
- Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.
- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.
- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

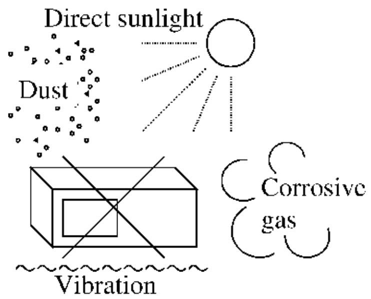
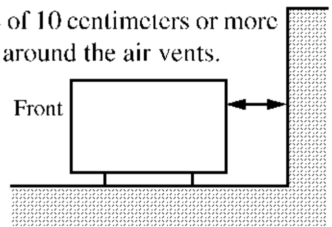


Figure-1 Environmental Conditions

- Operating position

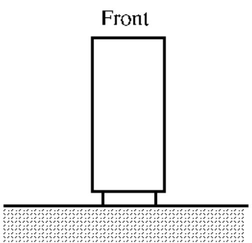
A clear space of 10 centimeters or more must be kept around the air vents.



The instrument must be used in a horizontal position.
A cooling fan, which prevents the internal temperature from rising, is equipped with the instrument.
The air vents on the case must be unblocked.

Figure-2 Operating Position

- Storage position



This instrument should be stored in a horizontal position.
When placed in a vertical (upright) position for storage or transportation, ensure the instrument is stable and secure.

-Ensure the instrument is stable.
-Pay special attention not to fall.

Figure-3 Storage Position

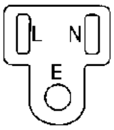
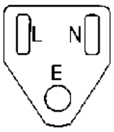
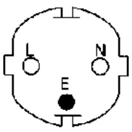
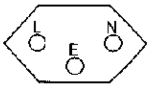
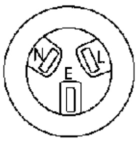
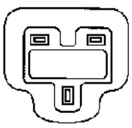
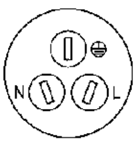
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

Certificate of Conformity

This is to certify, that

Multi Wavelength Meter

Q8331

instrument, type, designation

complies with the provisions of the EMC Directive 89/336/EEC in accordance with EN61326 and Low Voltage Directive 73/23/EEC in accordance with EN61010.

ADVANTEST Corp.

Tokyo, Japan

ROHDE&SCHWARZ

Engineering and Sales GmbH
Munich, Germany

PREFACE

This manual provides the information necessary to check functionality, operate and program the Q8331 Multi Wavelength Meter. Be sure to read this manual carefully in order to use the Q8331 safely.

1. Organization of this manual

This manual consists of the following chapters:

Safety Summary	To use the analyzer safely, be sure to read this manual first.
1. INTRODUCTION	Includes the accessories along with information on the Q8331 operating environment, and information on how to perform a system checkout for users who operate the Q8331 for the first time.
2. OPERATION	Describes the names and functions of each part on each panel and explains the basic functions of the Q8331.
3. MEASUREMENT SAMPLES	Shows some setup examples to help you learn how to operate the Q8331.
4. REFERENCE	Shows a list of operation keys, and describes the function of each key.
5. REMOTE PROGRAMMING	Gives an outline of the GPIB interface, and how to connect and set them up. Also included are a list of commands necessary for programming and using the program examples.
6. TECHNICAL DOCUMENTS	Describes the principle of operation necessary for taking measurements more accurately.
7. PERFORMANCE TEST	The Q8331 performance test methods are described.
8. SPECIFICATIONS	Shows the specifications of the Q8331.
APPENDIX	Refer to this section when you have any problems. If an error occurs during operation, an error number and its corresponding error message are displayed. The meaning of each error is explained in this section.

2. Key notations in this manual

- Typeface conventions used in this manual.

  Panel keys: In bold type Example: **APPLICATION**, **SETUP**

  Soft buttons: In bold and italic type Example: ***TREND***, ***PRESET***

- When a series of key operations are described using a comma between two keys.

- There are various soft menus used to switch between two states such as ON/OFF and NML/HI.
  For example, when turning on the ***AVERAGE ON/OFF*** function, the annotation "***AVERAGE ON/OFF*** (ON)" is used.
  When switching the ***RESOLN NRM/HI*** function to HI, the annotation "***RESOLN NRM/HI***(HI)" is used.

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LIST OF ILLUSTRATIONS

LIST OF TABLES

1. INTRODUCTION

Includes the accessories along with information on the Q8331 operating environment, and information on how to perform a system checkout for users who operate the Q8331 for the first time.

1.1 Product Description

The Q8331 is a multi wavelength meter of high wavelength accuracy and high resolution. It is capable of analyzing multiple channels simultaneously. It handles high-speed DWDM (multiplexed high-density waveforms) mass communication.

The unit features the following:

- High wavelength accuracy: +1 ppm (1550 nm)
- High wavelength resolution: 10 GHz minimum
- Measurements of up to 300 waves are possible.
- High-speed sampling (2 times/sec)

  Mounted WDM analyzing function: Displays a total listing of the wavelength, level, and SNR.
  Displays a wavelength and power trend.
- User replaceable optical connectors (FC, SC, and ST)

1.2 Accessories

The table below lists the standard accessories shipped with the Q8331. If any of the accessories are damaged or missing, contact the nearest ADVANTEST Field Office or representative. Additional accessories should be referred to by model name when ordered.

Table 1-1 Standard Accessories List

Name	Model name	Quantity	Remarks
Power cable	A01413	1	*1
Power fuse	DFT-AA1R6A	2	1.6 A
Ferrite core	DEE-003092	1	EMI and EMS (Refer to Section 1.5.)
System Recovery Disk		1	Set of 2 floppy disks.
Q8331 Operation manual	EQ8331	1	

*1: The cable supplied with the Q8331 depends on what type (specified by model number above) was ordered when the Q8331 was purchased (see Table 1-3). When ordering power cables, refer to the model name or option No.

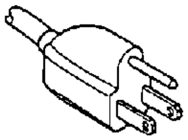
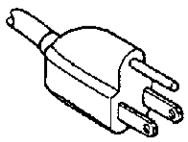
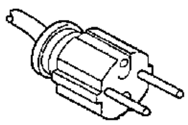
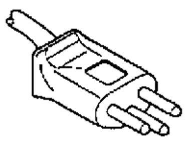
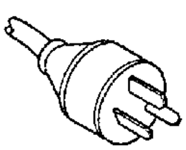
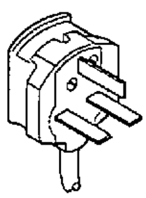
1.3 Accessories (Sold Separately)

The accessories used for the Q8331 are shown below. Accessories should be referred to by model name when ordered.

Table 1-2 Accessories

Name	Model name	Remarks
FC connector	A08161	Optical connector
SC connector	A08162	Optical connector
ST connector	A08163	Optical connector

Table 1-3 Options

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	JIS: Japan Law on Electrical Appliances	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417

1.4 Operating Environment

This section describes the environmental conditions and power requirements necessary to use the Q8331.

1.4.1 Environmental Conditions

The Q8331 should only be used in a place which satisfies the following conditions:

- Ambient temperature: +10°C to +40°C (operating temperature)
- Relative humidity: 85% or less (without condensation)
- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- A low noise area
  Although the Q8331 has been designed to withstand a certain amount of noise riding on the AC power line, it should be used in an area of low noise. Use a noise cut filter when ambient noise is unavoidable.
- An area allowing unobstructed air flow
  There is an exhaust cooling fan on the rear panel and exhaust vents on both sides and the bottom (toward the front) of the Q8331. Never block these vents. The resulting internal temperature rise will affect measurement accuracy.
  Keep the rear panel 10 centimeters away from the wall. In addition, do not attempt to use the Q8331 when it is standing on its rear panel or on either side panel.

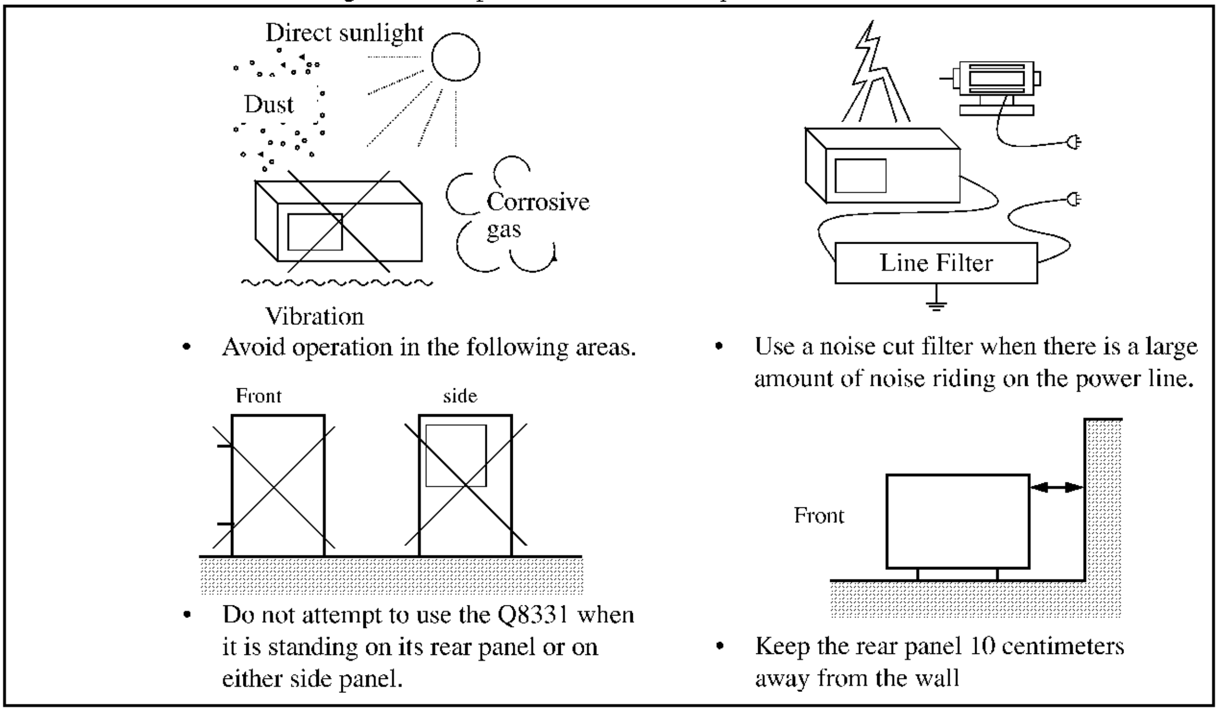


Figure 1-1 Operating Environment

1.4.2 Power Supply Specifications

The power supply specifications of the Q8331 are listed in Table 1-4.

CAUTION:

1. ***To prevent damage, operate the Q8331 within the specified input voltage and frequency ranges.***
2. ***Maximum power consumption is 120 VA. Use a suitable power supply.***
3. ***Use a power cable compatible with the supply voltage (refer to Table 1-3).***

Table 1-4 Power Supply Specifications

	100 VAC Operation	200 VAC Operation	Remarks
Input voltage range	90 V to 132 V	198 V to 250 V	Automatically switches between input levels of 100 VAC and 200 VAC.
Frequency range	48 Hz to 62 Hz		
Power consumption	120 VA or below		

1.4.3 Power Fuse

CAUTION:

1. ***When a fuse blows, there may be some problem with the Q8331. Contact a sales representative before replacing the fuse.***
2. ***For fire prevention, use only fuses with the same rating and same type.***

The power fuse is placed in the fuse holder which is mounted on the rear panel.

To check or replace the power fuse, use the following procedure:

1. Press the **POWER** switch (on the front panel) to the OFF position.
2. Disconnect the power cable from the AC power outlet.
3. Remove the rear panel fuse holder by using a screwdriver to rotate it counter clockwise (refer to Figure 1-2).
4. Check (and replace if necessary) the power fuse and put it back in the fuse holder.

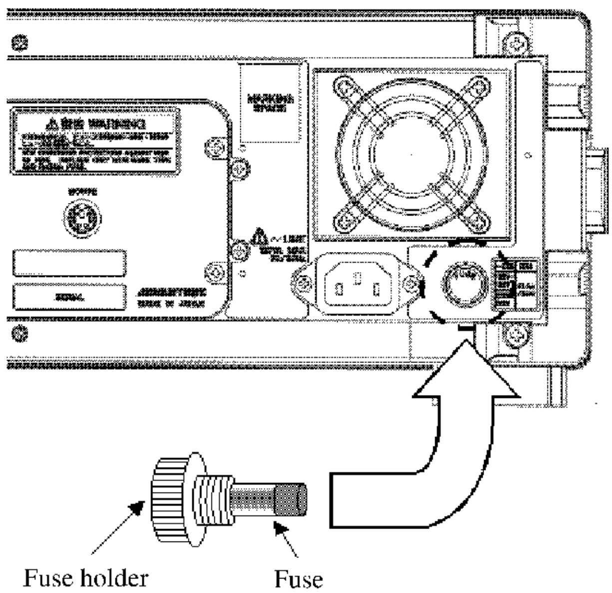


Figure 1-2 Replacing the Power Fuse

1.4.4 Power Cable

CAUTION:

1. ***Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas (See Table 1-3).***
2. ***Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which dose not include a safety ground terminal.***
3. ***Turn the POWER switch (on the front panel) off prior to connecting the power cable.***

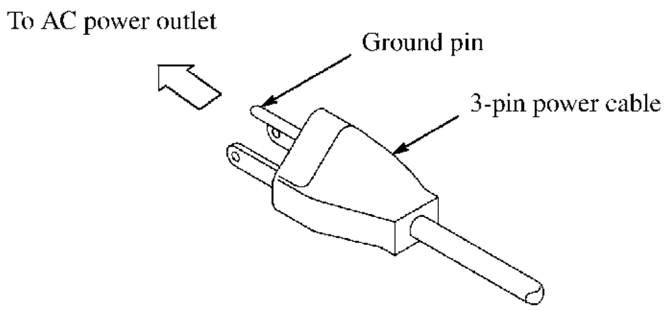


Figure 1-3 Power Cable

1.5 Safety precautions when using the Q8331

1.5.1 Before Turning the Q8331 Power On

Do not connect any device under test before the Q8331 power is turned on.

1.5.2 Opening the Chassis

The chassis of this instrument should only be opened by an authorized customer service engineer. ADVANTEST shall not be liable for any accidents which result when the chassis is opened by unauthorized personnel.

CAUTION: Opening the chassis may expose the user to electrical shocks.

1.5.3 When Abnormal Conditions Occur

If unusual sounds, smells or smoke is seen or smelt coming from the Q8331, turn the **POWER** switch off, remove the power cable from the AC power outlet and contact the nearest ADVANTEST Field Office or representative immediately.

1.5.4 Life Span of the Backup Lithium Battery

The life span of the Q8331's backup lithium battery is three years. When the service life of the battery has ended, an error message is displayed when the Q8331 power is turned on, and the startup is terminated. We recommend that the backup lithium battery be replaced early enough to prevent this situation from arising. For more information on replacing the battery, contact the nearest ADVANTEST Field Office or representative.

1.5.5 The Hard Disk Drive

The Q8331 is equipped with a hard disk drive. The following actions should not be performed.

- Shutting off the power during operation.
- Subjecting the Q8331 to excessive vibrations or shocks.

1.5.6 Front Feet

Four feet (two at the front and two at the rear) are attached to the bottom of the Q8331.
The front feet can be extended so that the front of the instrument is raised.

The extensions may wear out over time. If this occurs, contact the nearest ADVANTEST Field Office or representative for information on how to replace them.

Read the instructions below to use the Q8331 safely.

Note the following when using the extensions so that the weight of the Q8331 is evenly distributed.

- Use the Q8331 on a flat surface.
- Do not put any objects on the Q8331.
- Do not lean on the Q8331.
- Do not place anything (hands or other objects) under the Q8331.
- Do not slide the Q8331.
- Do not use excessive force when pressing keys (more than 1 kg).

Make sure the extensions are folded shut when:

- Transporting the Q8331.
- Connecting or disconnecting cables.
- Using the Q8331 on a cart.
- The Q8331 is not in use.
- The Q8331 is in storage.
- The extensions may wear out over time.

1.5.7 Notes for Safe Use of the Q8331

The Q8331 uses Windows NT. Since the measurements are enabled using Windows applications, do not modify the Windows environment unless specifically instructed to do so in this manual. The Q8331 is not a data-processing unit and can only be used as described in this manual.

In particular, the following actions should be avoided:

- Installing application programs *1
- Changing or deleting Control Panel settings
- Adding or deleting files in the C drive
- Starting up other applications or manipulating files while measurements are being performed
- Updating the Windows operating system

*1: If user installed software causes the Q8331 to cease operating correctly, a fee will be charged to re-install the system environment. Setting up the system again will delete all files that have been created or stored on the hard disk since the system was purchased. Any required files should be backed up before requesting that the system be re-install again.

1.5.8 System Recovery

The Q8331 performs measurement functions using a Windows application run on Microsoft Windows NT. The system files necessary to operate the Q8331 are stored on the C drive hard disk.

The Q8331 may not work properly if one of the system files is corrupt. If this happens, the contents of the C drive can be restored to the initial factory setup by using the System Recovery disk supplied with the Q8331.

CAUTION:

1. ***The data on the C drive is totally erased when a recovery operation is performed. As a result, the files you created or saved on the C drive after you received the Q8331 should be backed up on floppy disks or other media.***
2. ***Set the write protection tab to the write position before installing the recovery software.***
3. ***The recovery operation for the Q8331 cannot be performed if the disk partition information is corrupt or the disk drive is defective. If this happens, contact an ADVANTEST sales representative.***

NOTE: The contents of the files on the D drive, the user disk, are not changed or deleted by the recovery operation.

Starting a recovery operation

1. Confirm that the **POWER** switch on the front panel is turned off.
2. Connect the supplied power cable to the AC power supply connector on the rear panel.
3. Insert System Recovery Disk 1 into the floppy disk drive with the label facing up.
4. Turn on the **POWER** switch on the front panel.
   The drive indicator is turned on and the recovery software is loaded from the floppy disk.
   The message "Please Insert System Recovery Disk 2" is displayed.

CAUTION: ***While the drive indicator is lit, do not press the Eject button because the floppy disk is in use.***

---

5. Press the eject button on the floppy disk drive (in the transmission Q8331) to remove System Recovery Disk 1.
6. Insert System Recovery Disk 2 into the above-stated floppy disk drive, and press the **ENTER** key.
   The recovery software starts.
7. To perform the recovery operation, select the **[Continue]** button rotating the data knob and press **ENTER**.
   A dialog box used to confirm whether or not the recovery operation continues is displayed.

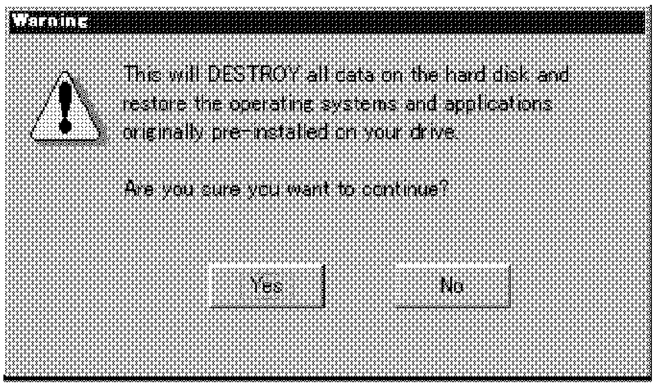


Figure 1-4 Warning Dialog Box

8. To continue the recovery operation, select the **[Yes]** button rotating the data knob and press **ENTER**.

NOTE: ***If you have selected the continuation option, copying the target files for the recovery operation will begin now.***

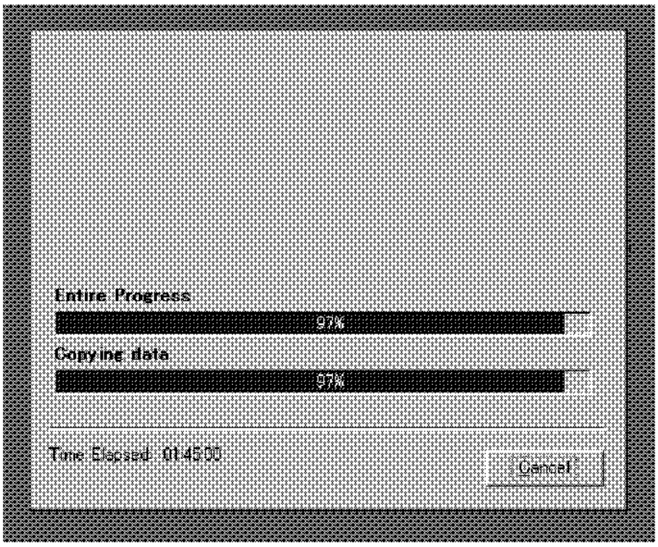


Figure 1-5 Files Are Being Copied

The Reboot dialog box is displayed after all files have been copied.

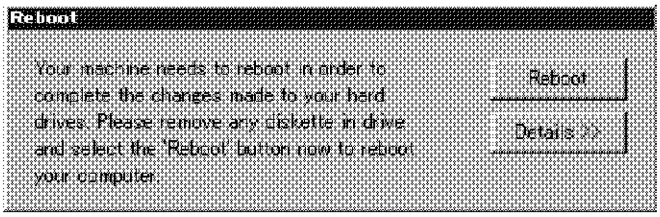


Figure 1-6 Reboot Dialog Box

9. Press the Eject button on the floppy disk drive to remove the System Recovery disk 2.

10. Select **[Reboot]** button rotating the data knob, and press **ENTER** to restart the Q8331.

    The system recovery finishes and the system application starts.

1.5.9 EMI and EMS Compliancy

To comply with EMI and EMS standards, complete the following. Attach the enclosed ferrite core (refer to Section 1.2) to the power cable near the connector (refer to Figure 1-7). If a ferrite core is already attached to the cable, it is not necessary to attach another.
Use a shielded cable for the Ethernet connector.

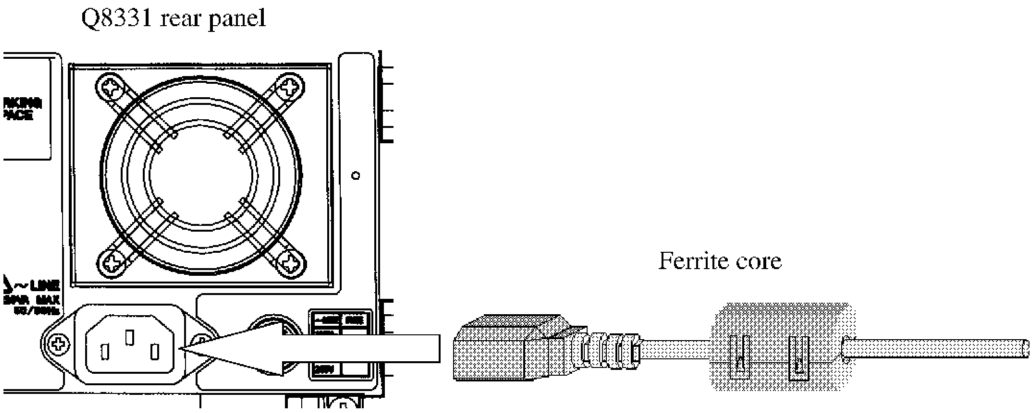


Figure 1-7 Attaching a Ferrite Core

1.5.10 Electromagnetic Interference

The Q8331 may cause electromagnetic interference and effect television and radio reception.

If the Q8331 power is turned off and the electromagnetic interference is reduced, then the Q8331 has caused the problem.

Electromagnetic interference may be prevented by doing the following:

- Change the direction of antenna of the television or the radio.
- Place the Q8331 the other side of the television or the radio.
- Place the Q8331 away from the television or the radio.
- Use another line of power source for the television or the radio than the Q8331.

1.6 Operations Check

When using the unit for the first time, confirm that the unit operates normally by completing the processes explained in this section.

1.6.1 Turning the Power On

1. Install the unit on a stable, flat surface.

CAUTION: The unit must be level at all time during operation.

2. Ensure that the **POWER** switch on the front panel is turned off.
3. Plug the supplied power cable into the AC power supply connector on the rear panel.

CAUTION:

1. To prevent damage, do not apply an input voltage or frequency exceeding the specified values (refer to Section 1.4.2).

2. Maximum power consumption is 120 VA. Use a suitable power supply.

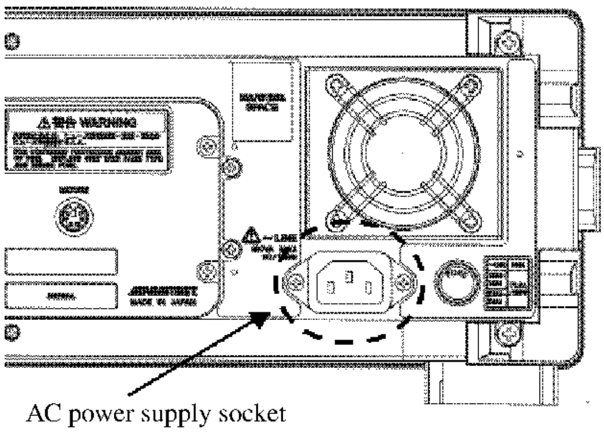


Figure 1-8 The Power Cable Connection

4. Plug the power cable into the power outlet.
5. Turn on the **POWER** switch located on the front panel.

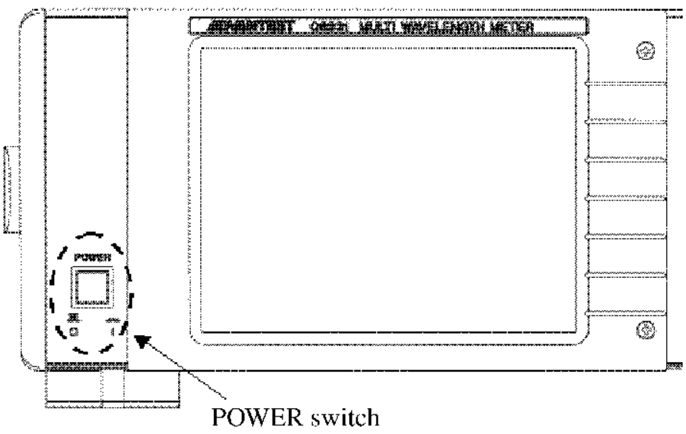


Figure 1-9 POWER Switch

When the unit is turned on, the internal memory is checked. Windows starts and then, the firmware is loaded, a self-test is executed, and the initial measurement screen is displayed.

If any problems occur during the self-test, contact the ADVANTEST Sales Office. If an error is detected during the self-test, follow the operation procedures in "2.8.3 Self Test (SELF TEST)"

CAUTION:

1. ***The initial measurement display may be different depending on the previous conditions used.***
2. ***Do not press any buttons until the measurement screen is displayed.***

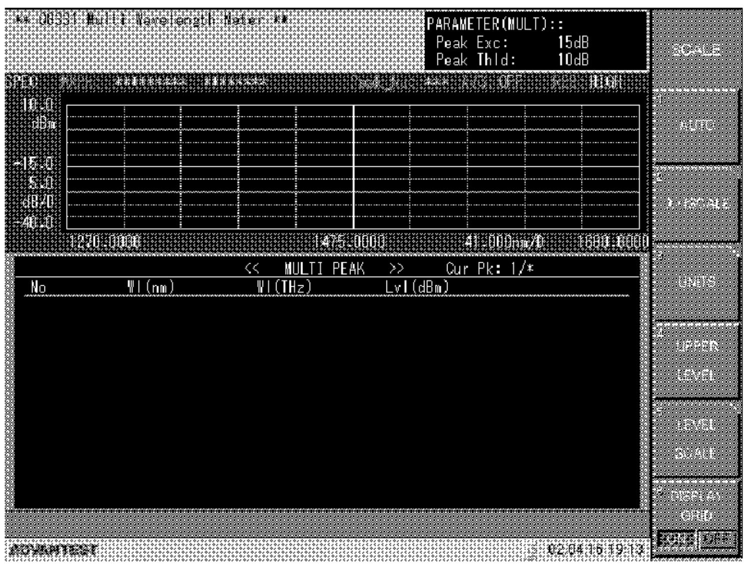


Figure 1-10 Initial Measurement Screen

1.6.2 Turning Off the Unit

Windows NT is used as the operating system of this unit. To shut down the unit, follow the procedures below and shut off the power to the unit.

1. Press **SYSTEM.**

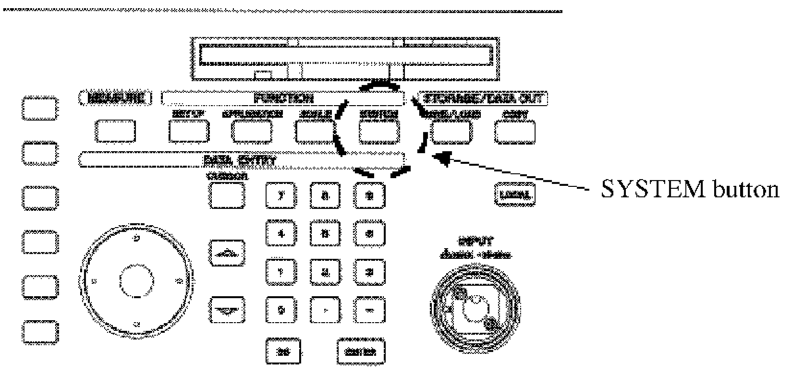


Figure 1-11 Front Panel

2. Select ***Shutdown.***

   The unit shuts down and the power turns off automatically.

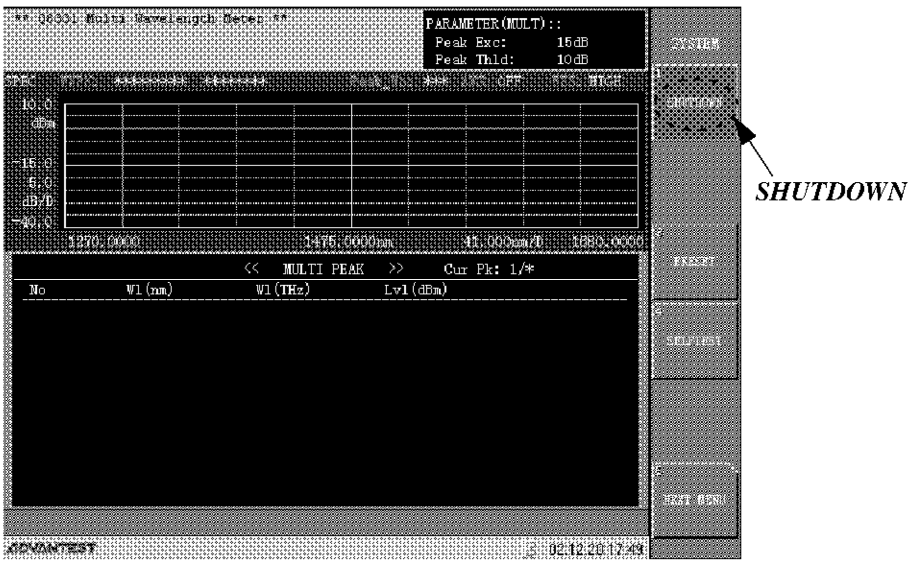


Figure 1-12 The SYSTEM Menu

CAUTION: ***Follow the procedure above to turn off the Q8331. If the unit is turned off incorrectly, a warning message is displayed the next time the unit is turned on.***

1.6.3 Drive Configuration of the Q8331

The drive configuration of the Q8331 is as follows:

A: Floppy disk drive

C: Hard disk drive for the system

D: Hard disk drive for the user

CAUTION: ***Do not modify or delete any of the files on the C drive.***

1.7 Cleaning, Storing and Transporting the Q8331

1.7.1 Cleaning

Remove dust from the outside of the Q8331 by wiping or brushing the surface with a soft cloth or small brush. Use a brush to remove dust from around the panel keys. Hardened dirt can be removed by using a cloth which has been dampened in water containing a mild detergent (except for the touch screen display).

CAUTION:

1. ***Do not allow water to get inside the Q8331.***
2. ***Do not use organic cleaning solvents, such as benzene, toluene, xylene, acetone and similar compounds, since these solvents may damage the plastic parts.***
3. ***Do not use cleanser.***

- Removing the Display Filter

  Normally cleaning the display filter from the front should be sufficient. However, if the inside of the filter or the LCD surface is dirty, you can detach the screen filter from the Q8331 by removing the two screws on the front and pulling the right-hand part of the filter forward. Clean the filter with a piece of soft close.

  CAUTION: ***Do not touch the LCD display with your finger when the filter has been removed.***

- Cleaning the optical input connectors

  The optical input section of the Q8331 is easy to clean because of the replaceable adapter used. The optical input section is accessible when you remove the adapter. Clean the tip with alcohol.

  CAUTION: ***Operating the unit without cleaning the optical input may cause an error in measuring or may damage the optical fiber. Clean the fiber tip frequently. For details on cleaning, refer to Section 1.7.4.***

1.7.2 Storing

Store the Q8331 in an area which has a temperature from -10 °C to +50 °C. If you plan to store the Q8331 for a long period (more than 90 days), put the Q8331 in a vapor-barrier bag with a drying agent and store the Q8331 in a dust-free location out of direct sunlight.

1.7.3 Description and Handling Cautions for the Light Input Part of the Q8331

The light input part is a high precision part. It must be handled with extreme caution.

1. The fiber tip of the light input part requires frequent cleaning. Dirt or dust may damage the fiber of the light input part. For the operation and cleaning method of the part, refer to section 1.7.3.1.
2. The optical connector adapter is a consumable part and has a limited life span. Under certain operational conditions, the separating sleeve inside of the optical connector adapter may become damaged. To replace of the damaged sleeves, refer to section 1.7.3.2.

1.7.3.1 Operation and Cleaning Methods for the Light Input Part

Always make sure the light input part of the analyzer is clean and the optical fiber connector is plugged in correctly.

1. Remove the adapter ring (refer to Figure 1-13).
2. Remove the optical connector adapter by pulling it out slowly.
3. Clean the fiber tip of the light input part with alcohol. Clean the fiber tip used to input the light as well.

CAUTION:

1. ***Operating the Q8331 without cleaning the optical input or incorrectly aligning the optical fiber with the optical input may cause an error in the measured result.***
2. ***Operating with a dirty light input part harms the ferrule surface.***
3. ***Not cleaning the input, attaching an adapter with an unsuitable thread, or inputting a high intensity beam with the fiber endface not flush optical input fiber may damage the optical input fiber.***

1.7.3.2 Operational Care and Replacement Methods for the Optical Connector Adapter

When inserting the light fiber connector into the light input part or taking it out, move slowly and carefully, making sure the connector is kept straight.

CAUTION: ***The separating sleeve inside of the connector is made of zirconium (fine ceramics) and may be damaged if the light fiber connector is bent and is not straightened before insertion or if the connector is twisted while it is being taken out.***

The optical connector is a consumable part and has a limited life span. If it becomes damaged, purchase an accessory kit for the optical connector adapter and replace the part by removing the optical connector adapter in the same manner used when cleaning it.

To replace the optical connector adapter only, use the following procedures.

1. Remove the screws located on the upper left and lower right (opposite corners)
2. Replace with a new optical connector adapter* (i.e. FC-FC, SC-FC, ST-FC).

   *: In order to conserve the performance of the adapter, using a optical connector adapter with the separating sleeve made of zirconium is recommended.

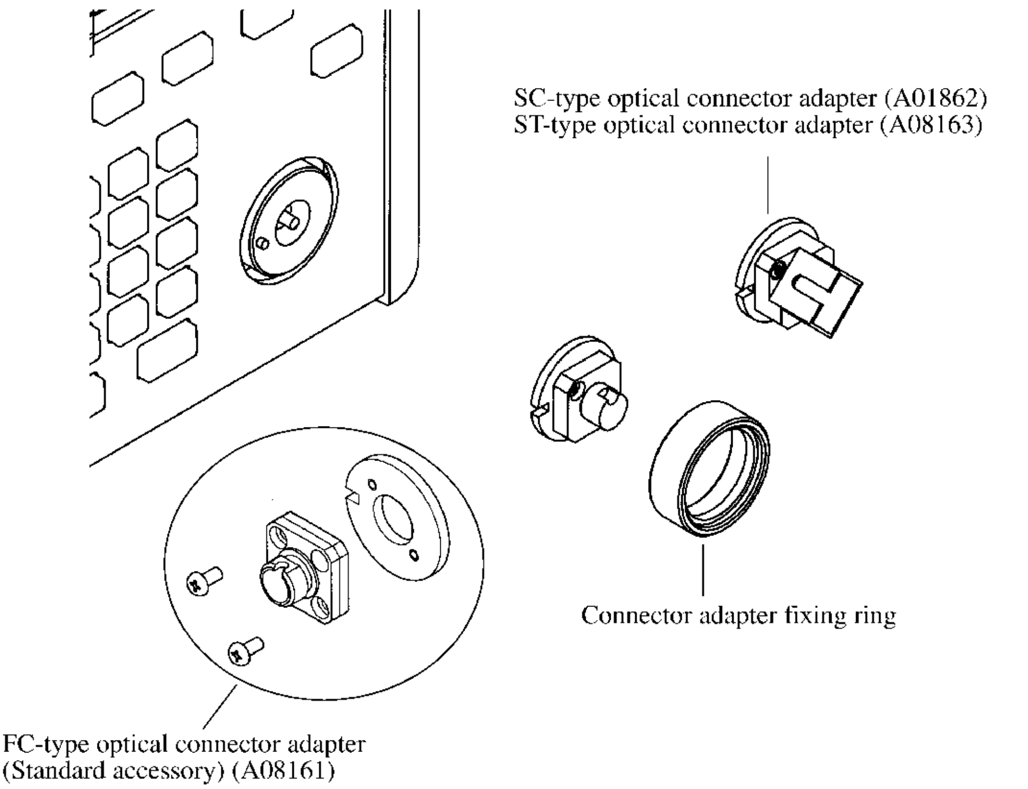


Figure 1-13 Light Input Part Structure

1.7.4 Transporting

When you ship the analyzer, use the original container and packing material. If the original packaging is not available, use the following repackaging guidelines:

Packing Procedure

1. To allow for cushioning, use a corrugated cardboard container that is at least 15 centimeters larger than those of the analyzer.
2. Surround the analyzer with protective sheeting.
3. Cushion the analyzer on all sides with packing material.
4. Seal the corrugated cardboard container with shipping tape or an industrial stapler.

If you are shipping the analyzer to a sales representative for service or repair, attach a tag to the analyzer that shows the following information:

- Owner and address
- Name of a contact person at your location
- Serial number of the analyzer (located on the rear panel)
- Description of the service requested

1.8 When Disposing the Q8331

When disposing the Q8331, make sure that the appropriate laws for the disposal of electrical instruments are obeyed.
The Q8331 uses a backlight lithium battery and parts containing gallium arsenic which contain harmful substances listed in the Safety Summary. For more information, contact the nearest ADVANTEST Field Office or representative.

1.9 Warm up

After the analyzer temperature has reached the room temperature level, turn the power switch ON and warm it up for 30 minutes.

1.10 Calibration

Calibration work should be performed at an ADVANTEST CORPORATION site.
When you want to calibrate the analyzer, please contact a sales representative.

Desirable Period	1 year

1.11 Replacing Parts with Limited Life

The analyzer uses the following parts with limited life that are not listed in Safety Summary.
Replace the parts listed below after their expected lifespan has expired.

Part Name	Lifetime
He-Ne laser tube	10 thousand hours
Back up lithium battery	3 years

2. OPERATION

This chapter describes the front and rear panel elements as well as the basic operations of the unit.

2.1 Panel Descriptions

This section describes the front and rear panel elements and screen elements.

2.1.1 The Front Panel

The following section describes the front panel elements.

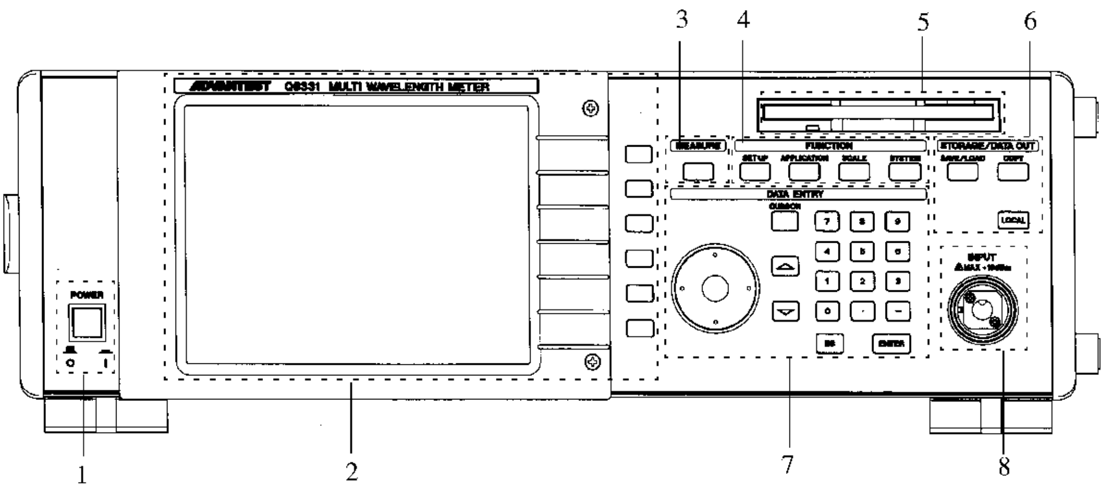


Figure 2-1 Front Panel

1. The POWER Switch
2. The Display
3. MEASURE button
4. FUNCTION buttons
5. The Floppy Disk Drive
6. The STORAGE/DATA OUT Panel
7. The DATA ENTRY Panel
8. The Connector Panel

2.1.1.1 The POWER Switch

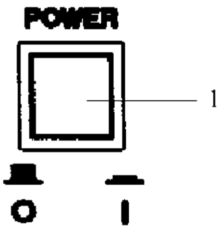


Figure 2-2 The POWER Switch

1. **POWER** switch — Used for turning the power on.

CAUTION: ***Unless in an emergency, to avoid damaging the hard disk and/or files, turn off the power after shutting down the software (refer to 1.6.2, "Turning Off the Unit").***

2.1.1.2 The Display

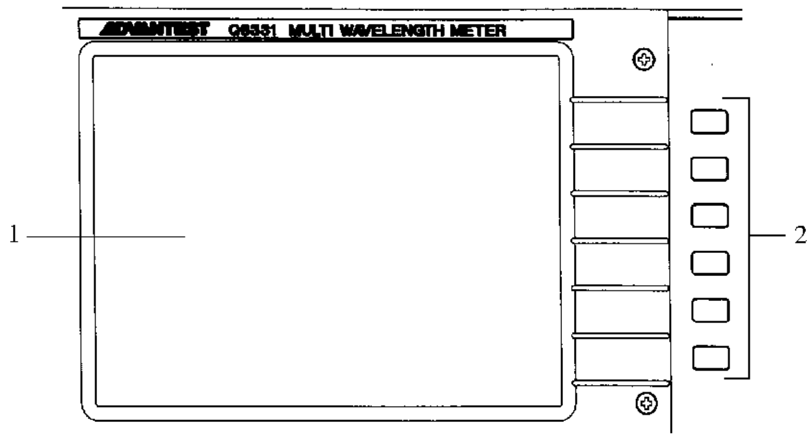


Figure 2-3 The Display

1. LCD — Displays measurement data, setting conditions, and other information. For display contents, refer to 2.1.3, "Display Contents".

2. Soft buttons — The six soft buttons correspond to the soft menus listed on the right side of the display. Pressing on (touching) a soft button selects a menu.

2.1.1.3 MEASURE Button

Figure 2-4 MEASURE Button

1. **MEASURE** button — Used for setting sweeping conditions.

2.1.1.4 FUNCTION Buttons

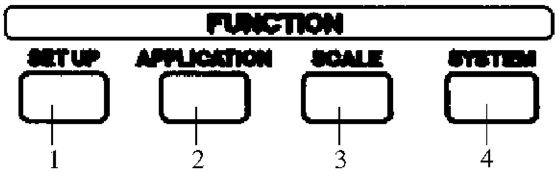


Figure 2-5 The FUNCTION Buttons

1. **SET UP** button — Used for setting measurement conditions.
2. **APPLICATION** button — Used for setting the list display, trend measurement, and bandwidth measurement.
3. **SCALE** button — Used for setting the display scale.
4. **SYSTEM** button — Used for system settings including the pre-setting, clock settings, and GPIB settings.

2.1.1.5 The Floppy Disk Drive

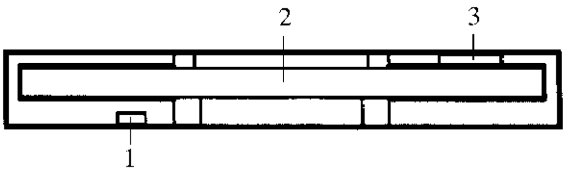


Figure 2-6 The Floppy Disk Drive

1.	Drive light	Lights up when the floppy disk is accessed.
2.	Disk drive door	Floppy disk insertion point.
3.	Eject button	Used for removing the floppy disk from the disk drive.

2.1.1.6 The STORAGE/DATA OUT Panel

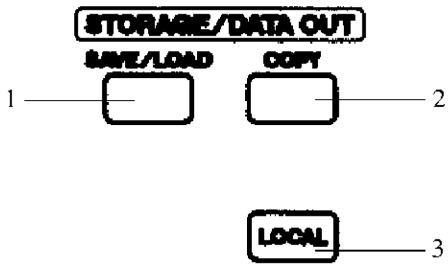


Figure 2-7 The STORAGE/DATA OUT Panel

1.	**SAVE/LOAD** button	Used for storing and reading the measurement data.
2.	**COPY** button	Used for printing hard copies.
3.	**LOCAL** button	Used for switching to local mode (validates the panel buttons and keys).

2.1.1.7 The DATA ENTRY Panel

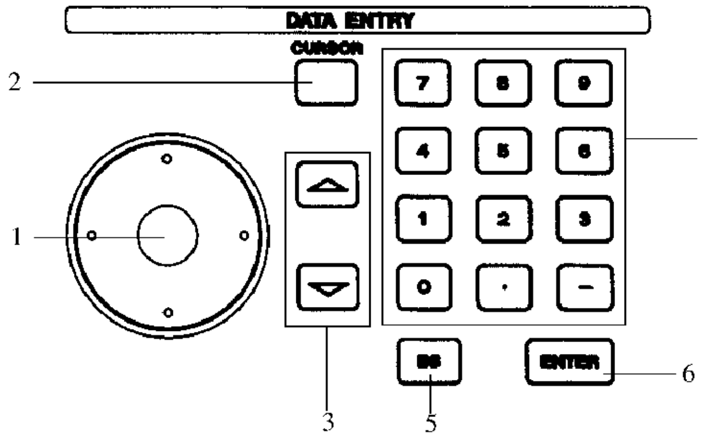


Figure 2-8 The DATA ENTRY Panel

1.	Data knob	Used for repetitive data entries, moving the cursor, or selecting dialog box option buttons.
2.	**CURSOR** button	Used for turning the cursor display on and off.
3.	Step buttons	Used for inputting data in increments, moving the cursor, and selecting dialog box items.
4.	Numerical keypad	Used to inputting numerical values or data. The numeric keypad includes numeric keys (0 through 9), decimal point (.), and negative sign (-).
5.	**BACK SPACE** button	Used for clearing one character of input data.
6.	**ENTER** button	Used for a data input or operation confirmation.

2.1.1.8 The Connector Panel

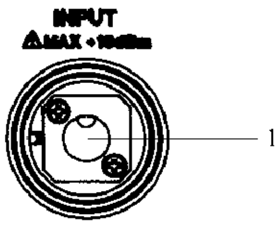


Figure 2-9 The Connector Panel

1. **INPUT** connector

Inputs an optical signal for measuring.
The maximum total power which can be measured is +10 dBm.
The maximum total power which can be input is +18 dBm.

CAUTION:

1. ***If the input signal total power exceeds +18 dBm, the unit may be damaged.***
2. ***To obtain accurate measurement results, clean the optical input frequently. For details on the optical input handling and cleaning, refer to 1.7.3, "Description and Handling Cautions for the Light Input Part of the Q8331".***

2.1.2 The Rear Panel

The following section describes the rear panel and elements.

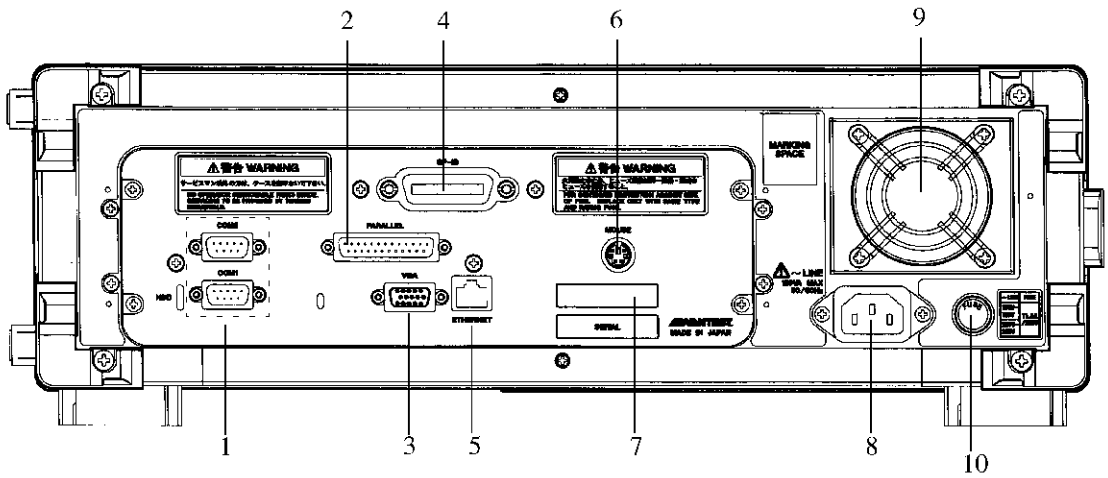


Figure 2-10 The Rear Panel

1. **COM1**, **COM2** connectors	Not used.
2. **PARALLEL** connector	Not used.
3. **VGA** connector	Used for connecting an external VGA monitor.
4. **GP-IB** connector	Used for connecting an external controller when using a remote control with the GPIB interface.
5. **ETHERNET** connector	Used to connect the Ethernet cable when using the remote control function or sharing files from the network.
6. **MOUSE** connector	Used for connecting a PS/2 interface mouse.
7. Serial number	A serial number sticker attached to the unit.
8. AC power supply socket	Power supply cable insertion point.
9. Fan	The ventilation fan for the unit
10. Power supply fuse holder	Fuse holder. Includes a spare fuse.

2.1.3 Display Contents

This section explains the contents of the graph list display and trend display examples.

1. Graph list display

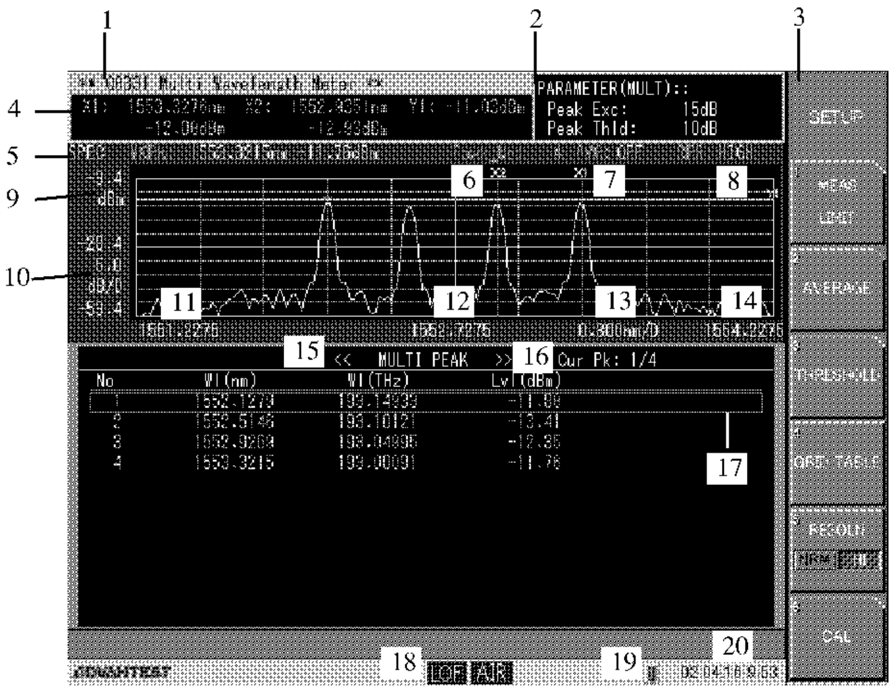


Figure 2-11 List Display Contents

1. Instrument model name display
2. Parameter display
3. Soft menu display
4. Cursor display
5. Peak wavelength (average wavelength), and peak level (total level) display
6. Number of the peak wavelengths to be displayed
7. Averaging count setting display
8. Resolution setting display
9. Display range upper limit
10. Y-axis interval
11. START wavelength (frequency)
12. Wavelength center (frequency)
13. X-axis interval
14. STOP wavelength (frequency)
15. List mode display
16. Number of the peak wavelength displayed
17. Current data cursor
18. Status display
19. Remote control ON/OFF display (example is set to ON)
20. Clock

2. Trend display

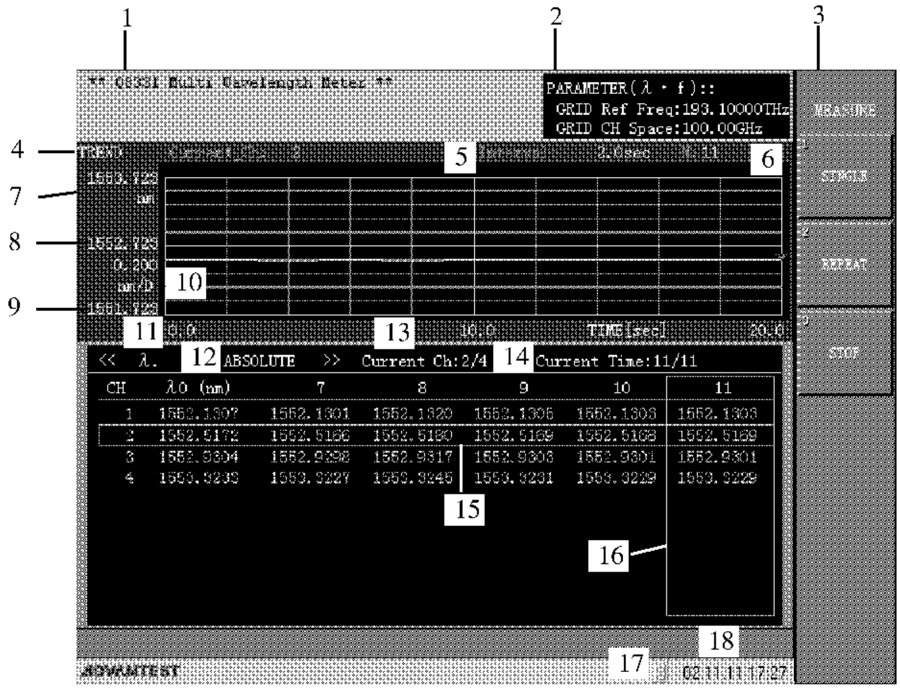


Figure 2-12 Trend Display

1. Instrument model name display
2. Parameter display
3. Soft menu display
4. Current channel display
5. Time interval
6. Number of measurements setting display
7. STOP wavelength (frequency)
8. Wavelength center (frequency)
9. START wavelength (frequency)
10. Y-axis interval
11. Trend list data type display
12. Trend list data mode display
13. Current channel setting display
14. Current measurement number display
15. Current channel cursor
16. Current measurement cursor
17. Remote control ON/OFF display (example displays OFF)
18. Clock

2.2 Basic Operations

This section explains the basic operations of the Q8331.

2.2.1 Operation Device

The unit is operated by using the panel buttons and keys. A PS/2 mouse can also be used for soft menu selections, dialog box settings, and software keyboard operations.

2.2.2 Menu Operation Methods

1. Menu selection

   Press a button on the front panel. The soft menu is displayed.

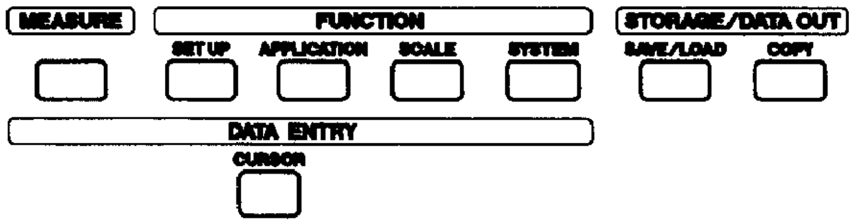


Figure 2-13   The Panel Buttons and Keys

2. Soft menu selection

   Select a soft menu by selecting the corresponding soft button. Depending on the conditions set, some soft menus cannot be selected. For the non-selectable soft menus, the corresponding soft buttons are inactive (see Figure 2-14).
   The soft menu contains a main menu and sub menus. The sub menus are accessed from the main menu.To return to a main menu from a sub menu, press a panel button or select ***PREV MENU***.

   If a function menu is closed while a sub menu is displayed, the same sub menu is displayed automatically when the function is selected the next time. This eliminates the selecting process from the main menu.

   To return to the main menu, press the same panel button again or select ***PREV MENU***.

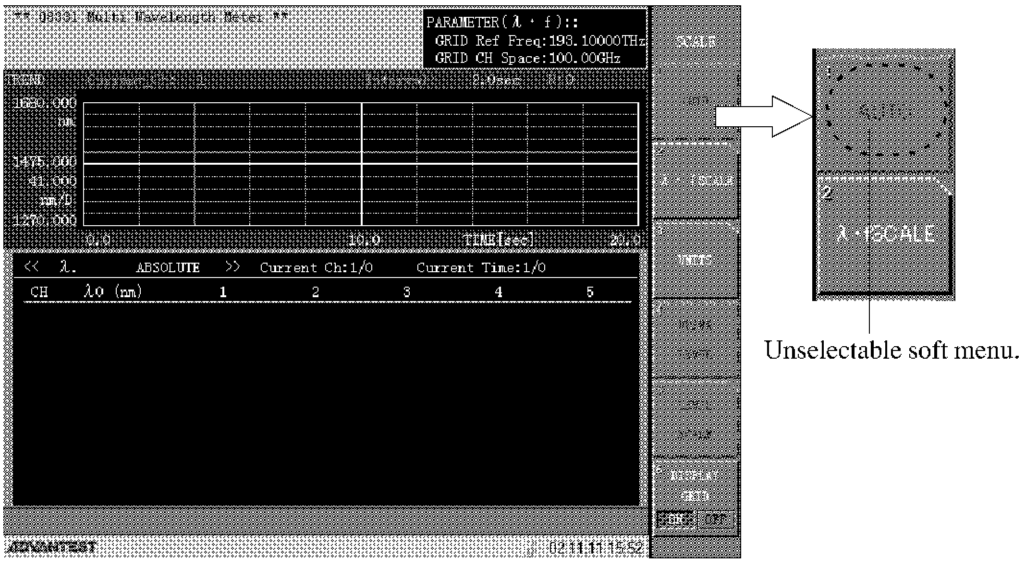


Figure 2-14 The Appearance of an Unselectable Soft Button

The following five operations are possible after selecting a soft menu.

a. Settings are applied.

b. ON/OFF or LIN/LOG setting is selected.

c. A sub menu is displayed.

d. A numeric value input is requested.

e. A dialog box is displayed.

a. A setting is executed.

Pressing a soft button applies setting.

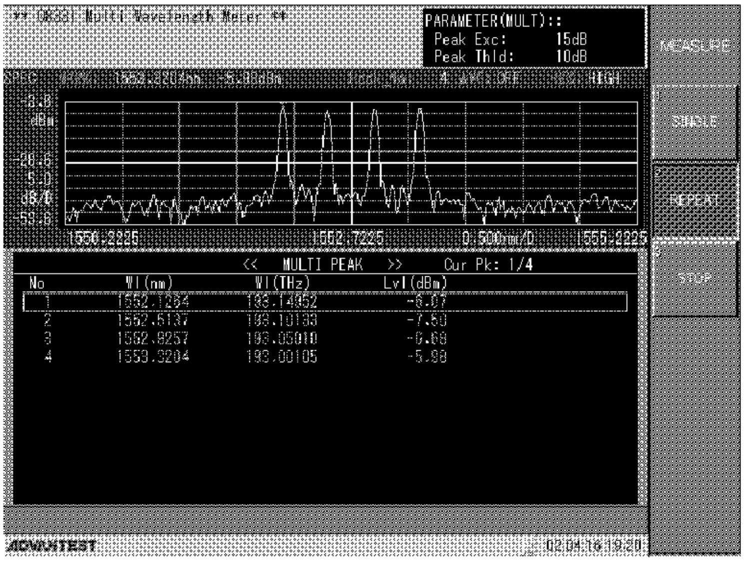


Figure 2-15 Soft Menu 1

b. Selects between ON/OFF or LIN/LOG.

Displays the button with the selected side depressed.

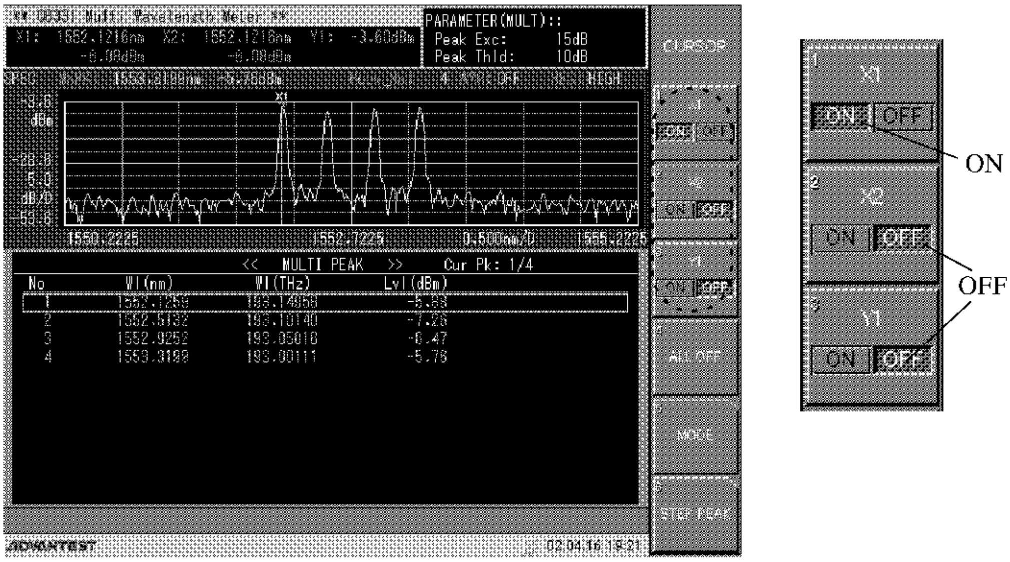


Figure 2-16 Soft Menu 2

c. A sub menu is displayed.

If a soft button has its right upper corner trimmed, the soft button menu has a sub menu. Selecting one of these keys displays the relevant sub menu. Selecting ***PREV MENU*** returns to the main menu.

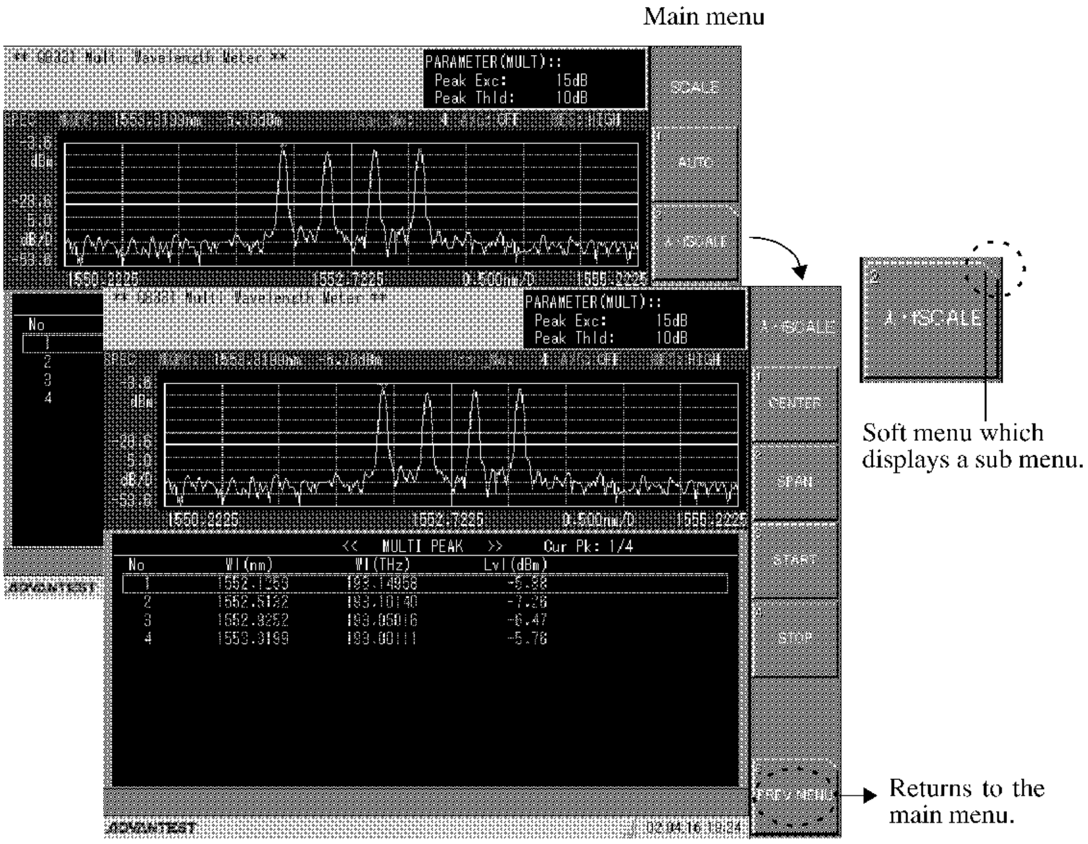


Figure 2-17 Soft Menu 3

d. A numeric value input is requested.

When a selected soft menu requires a numeric value input, the soft button display color is changes and the soft menu becomes active. The input window is displayed to input a numeric value.

For details on data input, refer to 2.2.3.1, “Inputting Data Into the Input Window”.

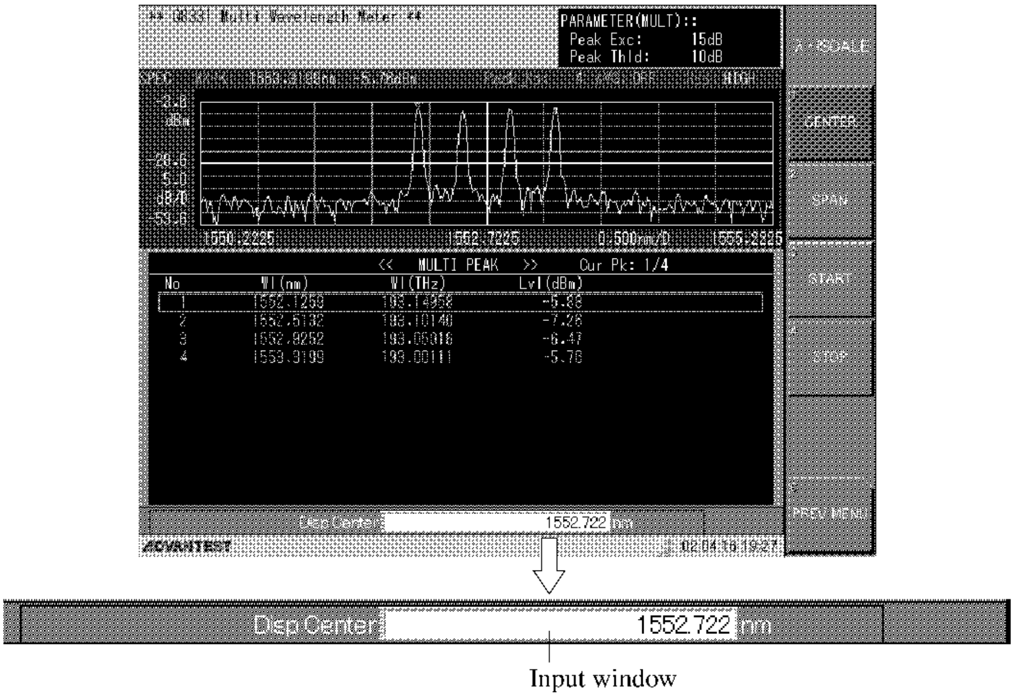


Figure 2-18 Soft Menu 4

e. A dialog box is displayed.

For details on dialog box settings, refer to 2.2.3.2, “Inputting data into a dialog box”.

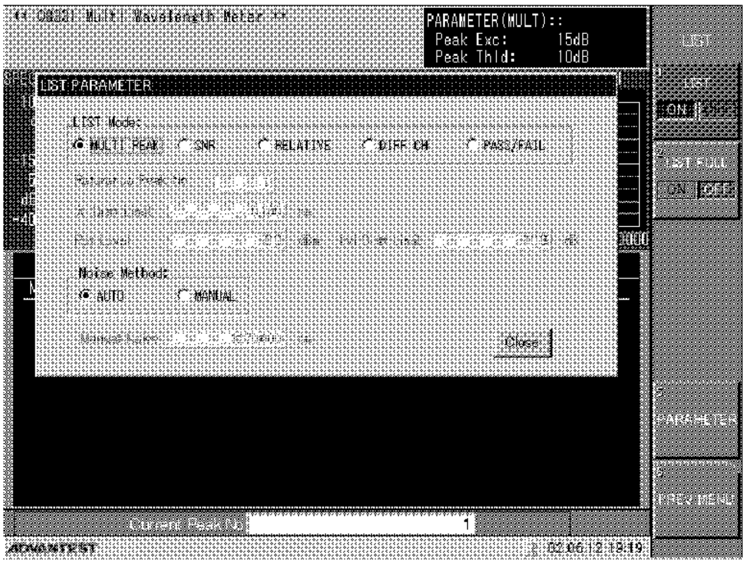


Figure 2-19 Soft Menu 5

2.2.3 Inputting Data

2.2.3.1 Inputting Data Into the Input Window

Data is input using the numeric keypad, step buttons, and data knob. The input window is displayed when a menu becomes active.

1. Inputting Data by Using the Numeric Keypad.

   Input numeric values using the numeric keypad. Data correction, confirmation, and cancellation are made in the following ways.

   - Correcting data values during input:

     Delete characters to the left, individually, using the **BS** button.

   - Confirm the data input:

     Press the **ENTER** button.

   CAUTION: ***If an input value is outside of the setting range, the setting limit value replaces the input value. For details on limit value, refer to 4.5, "Settings List".***

2. Inputting Data by Using the Step Buttons.

   Data increments can be predefined as the step button step size.

   Pressing the △ button increases the data value in pre-defined step size increments. Pressing the ▽ button decreases the data value in pre-defined size increments.

3. Inputting Data by Using the Data Knob.

   Using the data knob, continuous inputs of data are possible. The knob is convenient for fine-tuning the input data.
   Turning the knob clockwise increases the data size and turning it counterclockwise decreases.

2.2.3.2 Inputting data into a dialog box

When a dialog box is displayed, the data value can be changed using the numeric keypad, step keys, or data knob. Except for numeric value input, the mouse can be used for setting dialog box operations.

1. Moving to a different parameter setting.

   To move to another parameter setting, use the step buttons.

   - Press △: Move to a parameter item above.
   - Press ▽: Move to a parameter item below.

2. Selecting a setting

   The data knob is used to select the setting item.

   - Turning the knob clockwise: Moves between the options from left to right.
   - Turning the knob counterclockwise: Moves between the options from right to left.

3. Numeric value input

   Input a numeric value using the numeric keypad. Data correction, confirmation, and cancellation are made in the following ways.

   - Correcting the data value during input.

     Delete characters to the left, individually, using the **BS** button.
   - Confirm the data input:

     Press the **ENTER** button.
   - Cancel the data input:

     Using the **ENTER** button to close the dialog box will cancel the data input and leave the value unchanged.

4. Closing a dialog box

   There are 3 methods for closing a dialog box.

   - Select ***CLOSE*** in the dialog box by using the step buttons (△ , ▽) and then, pressing **ENTER**.
   - Click ***CLOSE*** in the dialog box by using the right mouse button.
   - Press **MEASURE** button, **FUNCTION** button, or select a soft button.

2.2.3.3 Inputting Data by Using the Software Keyboard

The software keyboard is used for letter inputs. Letter inputs are necessary in saving and loading of labels and data. The step buttons, data knob, and **ENTER** button operate the software keyboard. A mouse can also be used to operate the software keyboard.

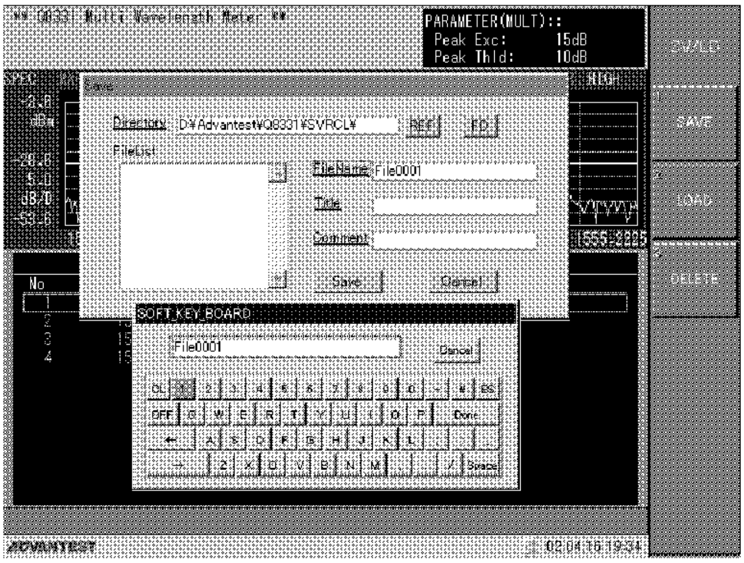


Figure 2-20 Software Keyboard

1. Using the software keyboard.

   Select an item requiring a letter input. Then, press **ENTER**. The software keyboard is displayed.

2. Moving the cursor in vertical directions.

   The step buttons are used. Pressing the △ step button moves the cursor upward. Pressing the ▽ step button moves the cursor downward.

3. Moving the cursor in horizontal directions.

   The data knob is used. Rotating the data knob clockwise moves the cursor to right. Rotating the data knob counterclockwise moves the cursor to left.

4. Confirming the letter input.

   Press **ENTER**.

   To enter uppercase letters, press ***OFF*** on the software keyboard to enable uppercase entry. OFF changes to ON.

5. Turning off the software keyboard.

   Selecting ***Done*** or ***Cancel*** on the software keyboard closes the software keyboard display.

   Done: Confirms the letter input and closes the software keyboard.

   Cancel: Cancels the letter input and closes the software keyboard.

2.3 Condition settings (SET UP)

This section explains how to set up conditions necessary for measuring. Keys operations are explained assuming keys have been preset. To preset the keys, refer to 2.8.2, "Initializing the Setting Conditions (PRESET)".

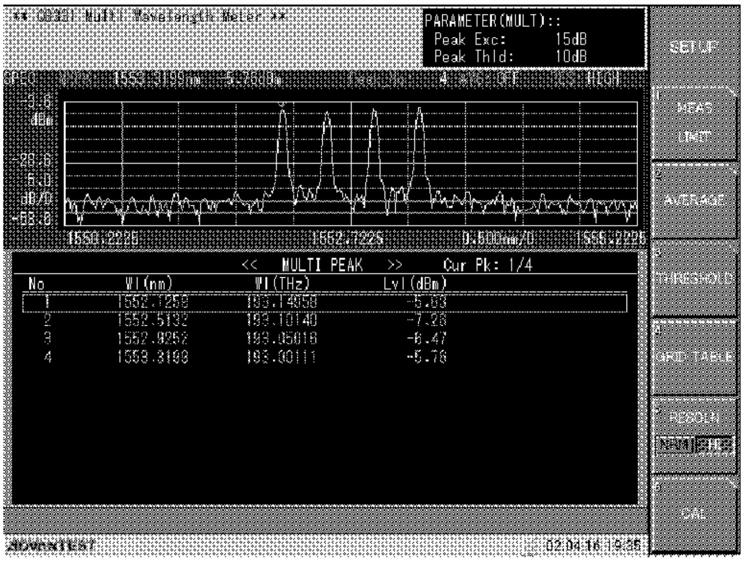


Figure 2-21 The SET UP Screen

2.3.1 Setting the Measurement Calculation Process Range (MEAS LIMITS)

This section explains how to set, measure and analyze wavelengths. Depending on this setting, analyzing processes such as lists display signals which are within the specified range.

Measurement range: 1270 nm to 1680 nm

Setting the measurement calculation process range.

1. Press **SET UP** and select ***MEAS LIMIT.***
   The MEAS LIMIT menu is displayed.

Setting the measurement range lower limit.

This example sets the lower limit to 1300 nm.

2. Select ***LOWER LIMIT.***
   The input window is displayed.
3. Press **1**, **3**, **0**, **0**, and **ENTER.**
   The measuring range lower limit is set to 1300 nm.

Setting the measurement range upper limit.

In the same manner, set the measuring range upper limit.This example sets the upper limit to 1620 nm.

4. Select ***UPPER LIMIT***.

   The input window is displayed.

5. Press **1**, **6**, **2**, **0**, and **ENTER.**

   The upper limit of the measurement range is set to 1620 nm.

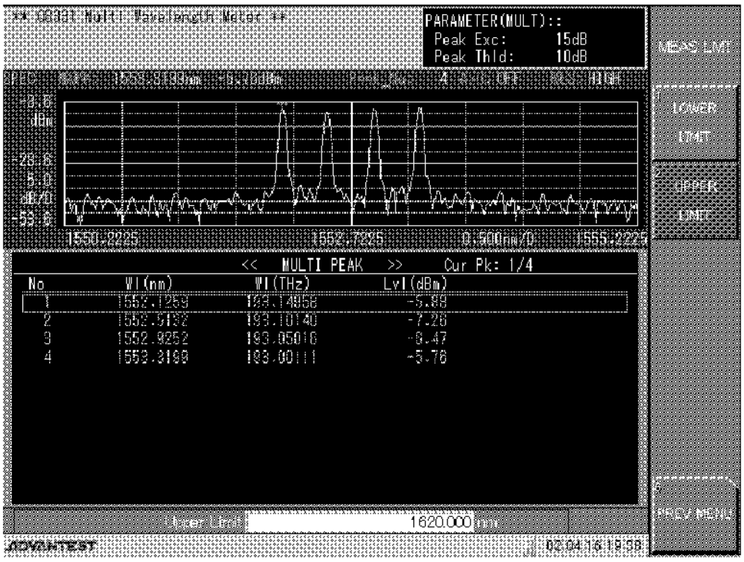


Figure 2-22 Setting a Upper Limit

2.3.2 Setting the Averaging Count (AVERAGE)

This section explains how to set an averaging count. The ON or OFF status of the averaging process and averaging count appear on the screen.

Setting range: 2 to 64 times

Setting the averaging count to ON or OFF.

1. Press **SET UP** and select ***AVERAGE***.

   The AVERAGE menu is displayed.

2. Select ***AVERAGE ON/OFF***(ON).

   The averaging count display is set to ON. The current averaging count setting is displayed on the screen.

The following parameter is switched.

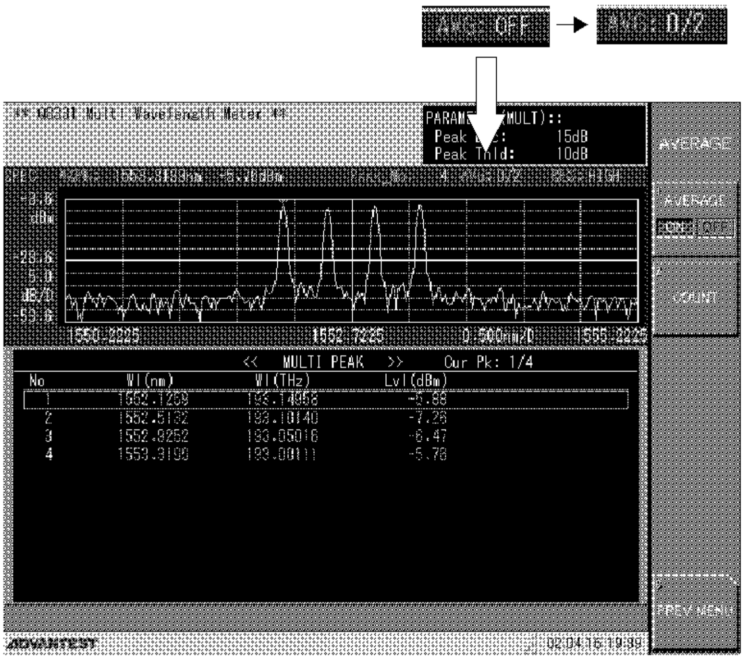


Figure 2-23 The Display of AVERAGE ON

Setting the averaging count

In this example, the averaging count is set to 5.

3. Select ***COUNT.***
   The input window appears.
4. Press **5**, and **ENTER**
   The average count is set to 5.

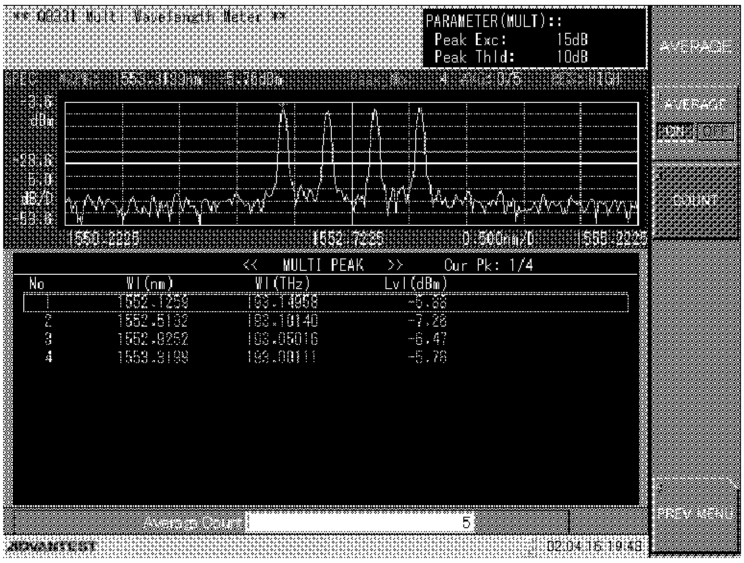


Figure 2-24 Average Count Setting

2.3.3 Setting the Signal Threshold (THRESHOLD)

Sets conditions for selecting input signals to be listed as peak wavelengths.
The two conditions are set as follow:

- PEAK EXCURSION: The difference between each wavelength peak and the base.
- PEAK THRESHOLD: The differences between the highest peak and each signal wavelength peak.

Signals which have larger wavelength peak and base differences than the PEAK EXCURSION and smaller maximum peak and base difference than the PEAK THRESHOLD are displayed in the list.

Setting range: PEAK EXCURSION 1 to 30 dB
PEAK THRESHOLD 0 to 40 dB

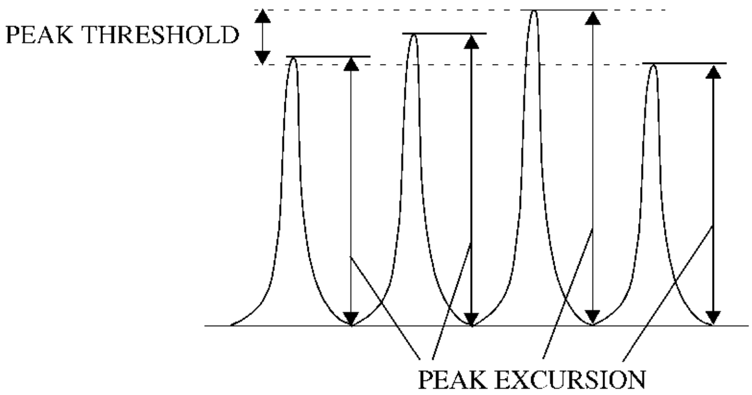


Figure 2-25 The Peak Wavelength Condition

Setting a signal threshold.

In this example, the PEAK EXCURSION is set to 20 dB and PEAK THRESHOLD is set to 5dB.

Setting a PEAK EXCURSION.

1. Press **SET UP** and select ***THRESHOLD***.
   The THRESHOLD menu is displayed.
2. Select ***PEAK EXCURSION***.
   The input window is displayed.
3. Press **2**, **0**, and **ENTER**.
   The PEAK EXCURSION is set to 20 dB.

Setting a PEAK THRESHOLD.

4. Select ***PEAK THRESHOLD.***

   The input window is displayed.

5. Press **5**, and **ENTER**.

   The PEAK THRESHOLD is set to 5 dB.

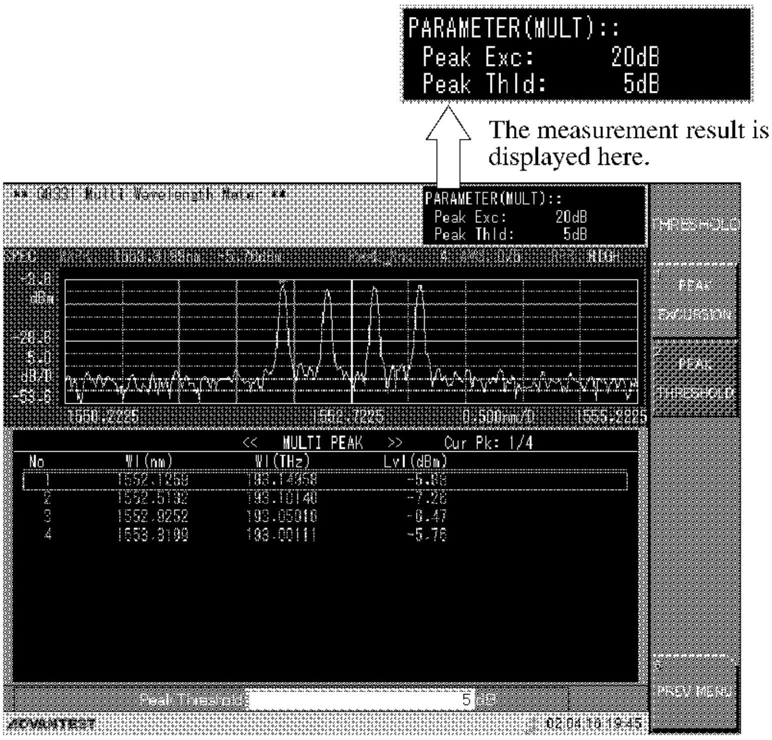


Figure 2-26 The THRESHOLD Setting

2.3.4 Creating the Grid Table (GRID TABLE)

This section explains how to create a reference grid table. To create one, input a reference frequency and channel space size.

Setting an ITU grid.

1. Press **SET UP** and select ***GRID TABLE.***

   The GRID TABLE menu is displayed.

2. Using the step buttons (△ , ▽), select ***GRID ITU*** and press **ENTER**.

   The reference frequency is set to 193.1 THz and channel spacing is set 100 GHz.

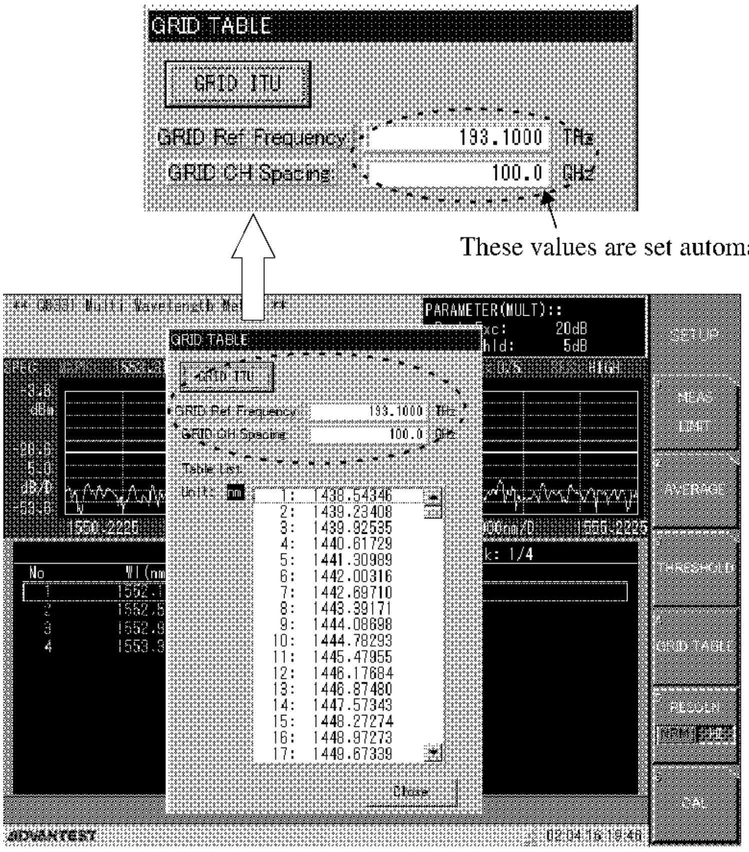


Figure 2-27 A Grid Table Creation (ITU GRID)

Scrolling the list

3. Select ***TABLE LIST*** by using the step buttons (△ , ▽).
4. Rotate the data knob.
   The table list can be scrolled.
5. Select ***CLOSE*** by using the step buttons (△ , ▽). Press **ENTER.**
   The dialog box closes.

Creating a sample grid table.

Setting range: GRID Ref Frequency 178.4479 to 236.0571 THz
GRID CH Spacing 10 to 10000 GHz

In this example, the reference frequency of 193.4 THz and channel spacing of 50 GHz are set.

1. Press **SET UP** and select ***GRID TABLE***.
   The GRID TABLE menu is displayed.

Setting a reference frequency.

2. Using the step buttons (△ , ▽), select ***GRID Ref Frequency.***
3. Press **1**, **9**, **3**, **.**, **4**, and **ENTER**.
   The reference frequency is set to 193.4 THz.

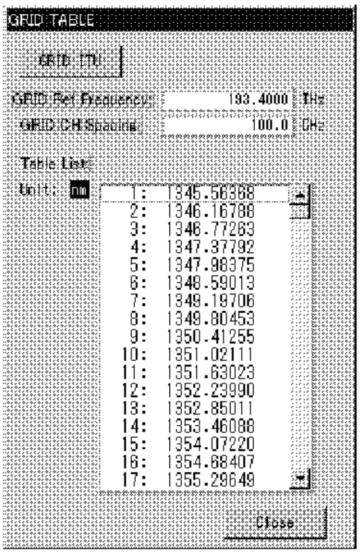


Figure 2-28 The GRID Ref Frequency Setting

Setting channel spacing.

4. 5. Using the step buttons (△ , ▽), select ***GRID RCH Spacing.***
5. Press **5**, **0**, and **ENTER**.
   The channel spacing is set to 50 GHz.

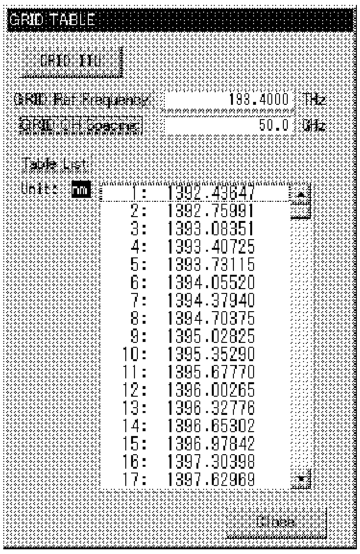


Figure 2-29 The GRID CH Spacing Setting

Scrolling the list

6. Select ***TABLE LIST*** by using the step buttons (△ , ▽).
7. Rotate the data knob.
   The table list can be scrolled.
8. Select ***CLOSE*** by using the step buttons (△ , ▽). Press **ENTER.**
   The dialog box closes.

NOTE: ***Other methods can be used to close the dialog box. For more details, refer to 2.2.3.2, "Inputting data into a dialog box".***

2.3.5 Setting the Resolution (RESOLN)

This section explains how to set the resolution. The possible selection settings are HI and NRM. Selecting HI sets the resolution to 10 GHz and the NRM sets it to 20 GHz.

Setting a resolution.

1. Press **SET UP**.

   The SET UP main menu is displayed.

2. Select ***RESOLN NRM/HI***(HI).

   The resolution is set to HI.

NOTE: Pressing RESOLN NRM/HI alternates the setting between the NRM and HI.

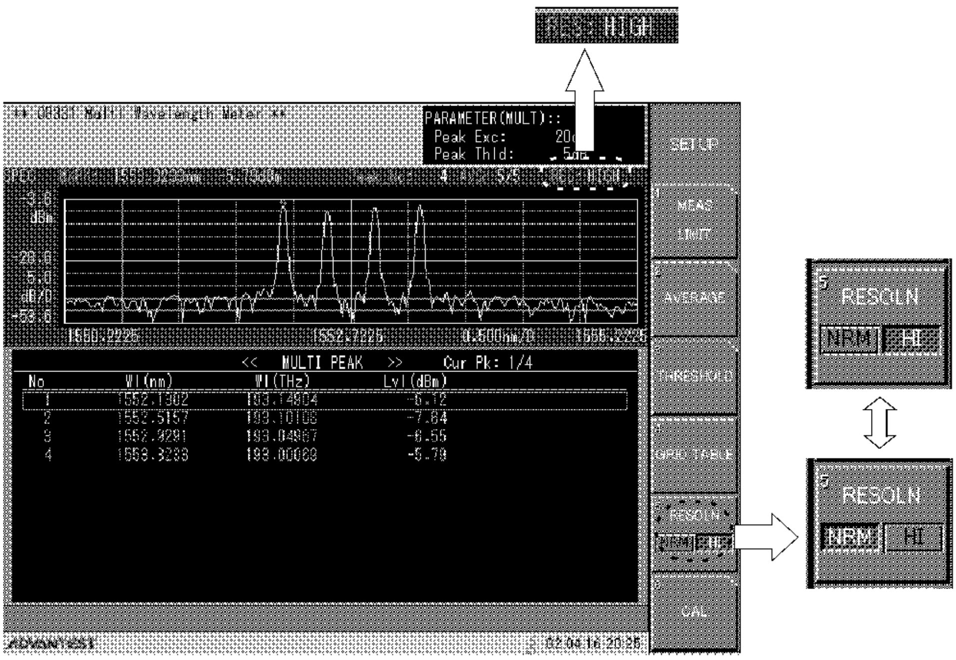


Figure 2-30 The Resolution Setting (HI)

2.3.6 Switching the Wavelength Display (ATM)

This section explains how to switch the wavelength display. The condition is set to determine whether the measured wavelength is displayed as a wavelength in a vacuum(VAC) or in air(AIR).

NOTE: ***If the wavelength display is set to AIR (the wavelength in air), AIR is displayed in the status area.***

1. Press **SET UP** and select ***CAL***.

   The CAL menu is displayed.

2. Select ***ATM AIR/VAC***(AIR).

   The measured wavelength is displayed as a wavelength in air.

   NOTE: ***Pressing ATM AIR/VAC alternates the setting between the AIR and VAC.***

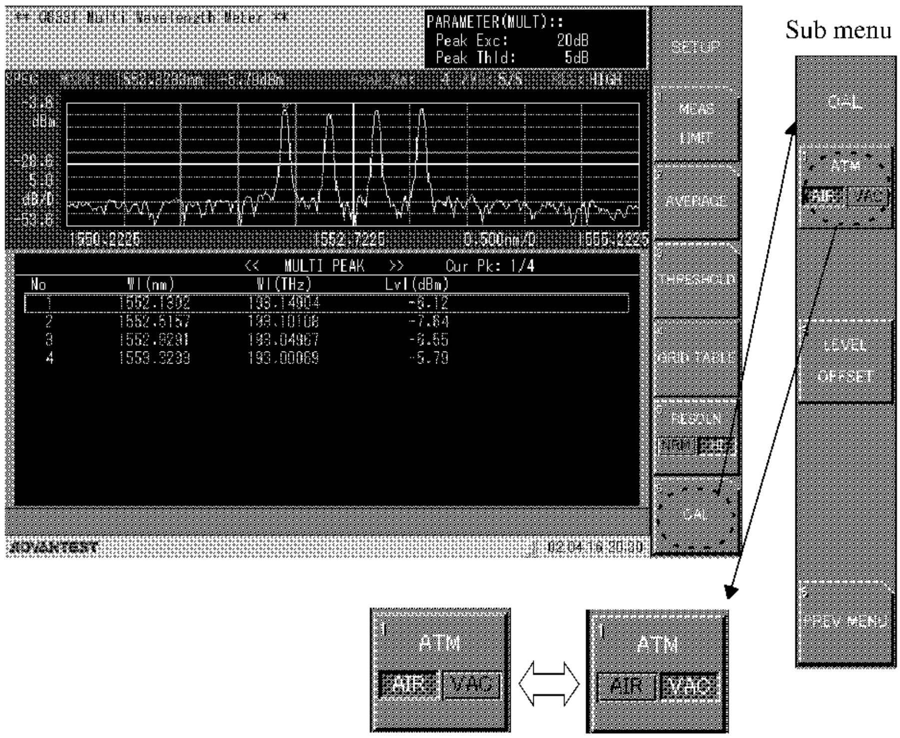


Figure 2-31 The Wavelength Display Setting (AIR)

2.3.7 Setting the Offset Level (LEVEL OFFSET)

This section explains how to offset an input signal level.

Setting range: -20 dB to 20 dB

NOTE: ***If an offset value other than zero (0) is set, LOF is displayed in the status area.***

Setting an offset level.

In this example, the level offset is set to 10 dB.

1. Press **SET UP** and select ***CAL***.
   The CAL menu is displayed.
2. Select ***LEVEL OFFSET***.
   The input window is displayed.
3. Press **1**, **0**, **ENTER**.
   The offset level is set to 10 dB.

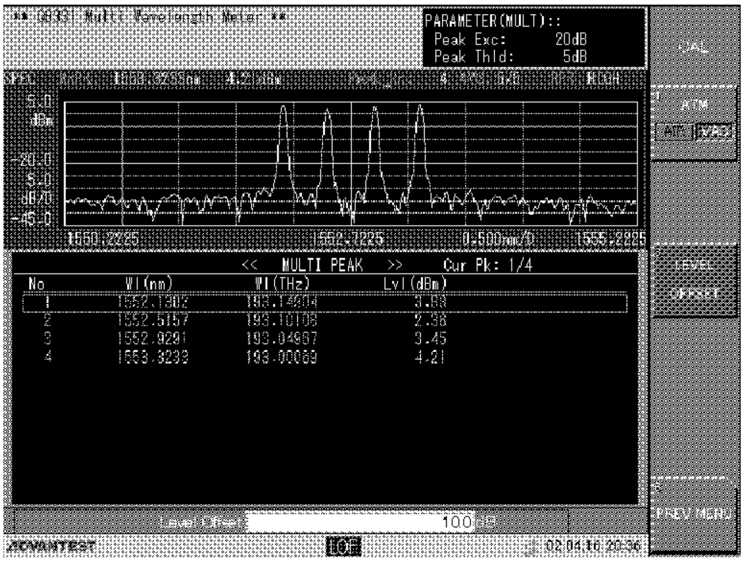


Figure 2-32 The Offset Level Setting

2.4 Selecting a Sweep (MEASURE)

In this section, a sweep method is selected. The unit can be set to perform single sweeps (single) or multiple sweeps (repeat).

Setting single sweeps

1. Press **MEASURE**.
   The main MEASURE menu is displayed.
2. Select ***SINGLE***.
   A single sweep is performed and the result is displayed.

NOTE: When a single sweep is specified while AVERAGE is ON, the sweeping process stops after averaging the specified times (counts) has completed.

Setting multiple sweeps

1. Press **MEASURE**.
   The main MEASURE menu is displayed.
2. Select ***REPEAT***.
   Multiple sweeps are performed and the result is displayed after each sweep.

Canceling the sweep

1. Press **MEASURE**.
   The main MEASURE menu is displayed.
2. Select ***STOP***.
   Sweeping stops. The result of the last sweep is displayed.

2.5 Application Settings (APPLICATION)

The following applications are preinstalled in the Q8331. This section describes how to operate these applications. Button and key operations are explained assuming preset conditions. For presetting buttons and keys, refer to 2.8.2, "Initializing the Setting Conditions (PRESET)".

- List display function
- Trend measurement function
- Bandwidth measurement function
- Average wavelength and total power display function

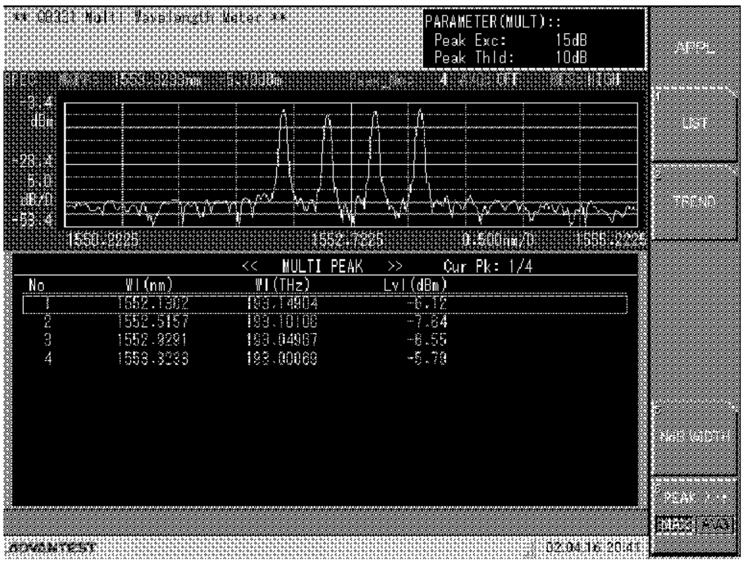


Figure 2-33 APPLICATION Main Menu

2.5.1 List Display Function (LIST)

This section describes how to set the list display function (LIST). LIST displays a list of signals which satisfy the wavelength peak conditions described in 2.3.1 and 2.3.3. The list display function is used to list or analyze signals.

2.5.1.1 Setting the List Display (LIST ON/OFF)

In the following example, the list display is set to OFF.

The list display in the Q8331 is initially set to ON.

1. Press **APPLICATION** and select ***LIST***.
   The LIST menu is displayed.
2. Select ***LIST ON/OFF***(OFF).
   Only a spectrum waveform is displayed.

CAUTION: ***Selecting LIST ON/OFF alternates between a spectrum waveform only display (LIST set to OFF) and spectrum waveform wand list display (LIST set to ON).***

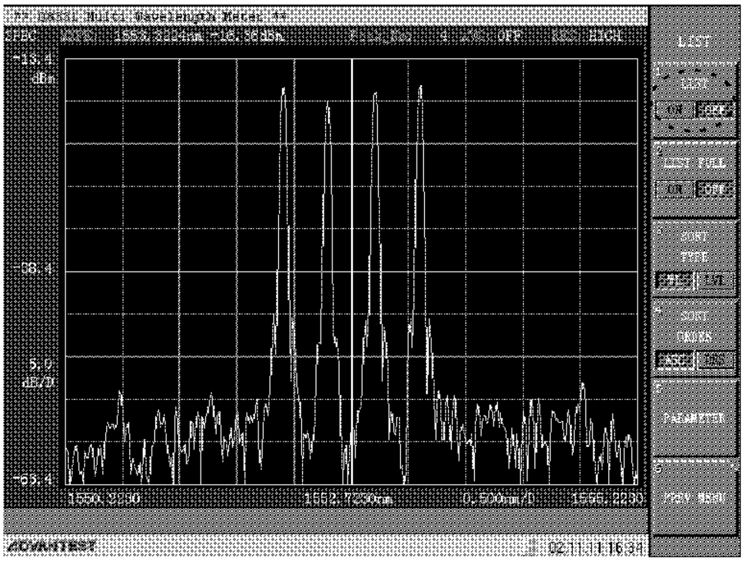
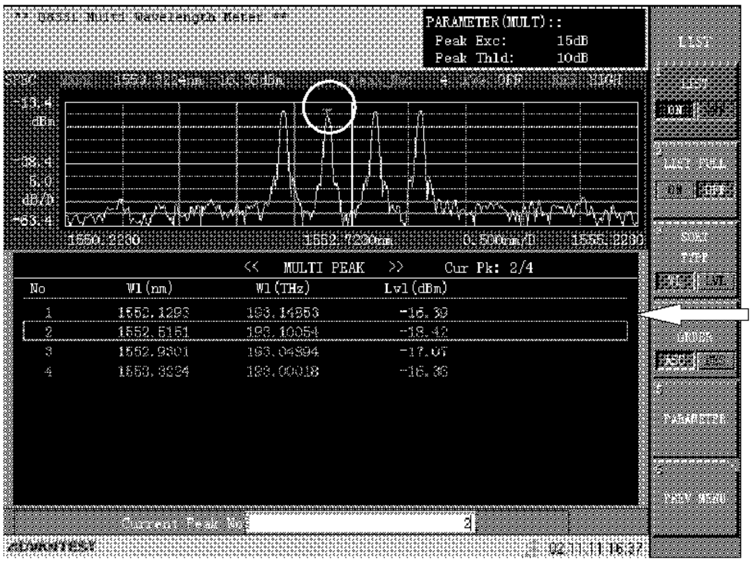


Figure 2-34 List Display ON/OFF Setting (LIST set to OFF)

2.5.1.2 Scrolling the List

This section describes how to set the channel to be displayed. The data for 10 channels is displayed in a spectrum waveform and list display, and in case of the LIST FULL setting, data for 20 channels is displayed (refer to 2.5.1.3, "Displaying the Full List (LIST FULL)").

To display a channel in the list, select the channel as the current channel. The current channel has its spectrum peak wavelength marked with ▼ and is displayed in the list with a cursor (yellow frame).



Cursor indicating the current peak

Figure 2-35 Scrolling the List

Setting a current channel

1. Select ***LIST ON/OFF***(ON) to activate the menu.

   The input window is displayed.

- Using the numeric keypad

  Input a number to specify a channel by using the numeric keypad and press **ENTER**. The cursor moves to the specified channel.

- Using the step buttons (△, ▽)

  Use the Up and Down step buttons to scroll through the pages, one at a time.

- Using the data knob.

  Use the data knob to scroll through the channel list.

2.5.1.3 Displaying the Full List (LIST FULL)

The example in this section sets the display switching function. The spectrum waveform and list display includes data for 10 channels and the channel full list display includes data for 20 channels.
For how to scroll the list up or down, refer to 2.5.1.2, "Scrolling the List".

1. Press **APPLICATION** and select ***LIST***.
   The LIST menu is displayed.
2. Select ***LIST FULL ON/OFF***(ON).
   The list is displayed on the full screen.

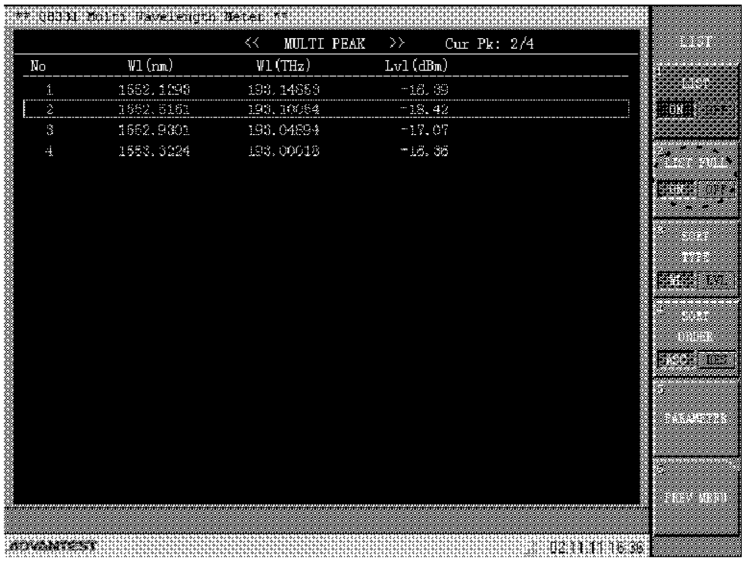


Figure 2-36 Full Screen List Display

2.5.1.4 List Data Sorting Function

This section describes how to sort list data.
The data is sorted based on the peak wavelength (frequency) (Wl) or level data (Lvl).

1. Press **APPLICATION** and select ***LIST.***

   The LIST menu is displayed.

Selecting list data for sorting.

2. Select list data for sorting.

   When other data is selected or when measurements are updated, the list data is sorted according to the specified conditions.

3. Select ***SORT TYPE WL/LVL***(LVL).

   Data selected in ***SORT ORDER ASC/DES*** is sorted according to the Lvl data in the list.

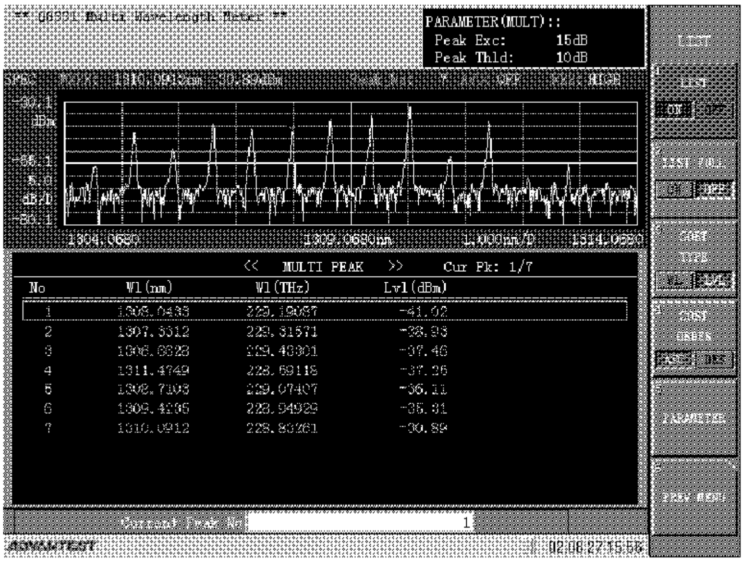


Figure 2-37 Sorted List Data by the LVL Sorting (Ascending Order)

Selecting a list data sorting order.

4. Select a list data sorting order.

   When other data is selected or when the measurement is updated, the list data is sorted according to specified conditions.

5. Select ***SORT ORDER ASC/DES***(DES).

   The data is sorted in descending order according to the ***SORT TYPE WL/LVL*** setting.

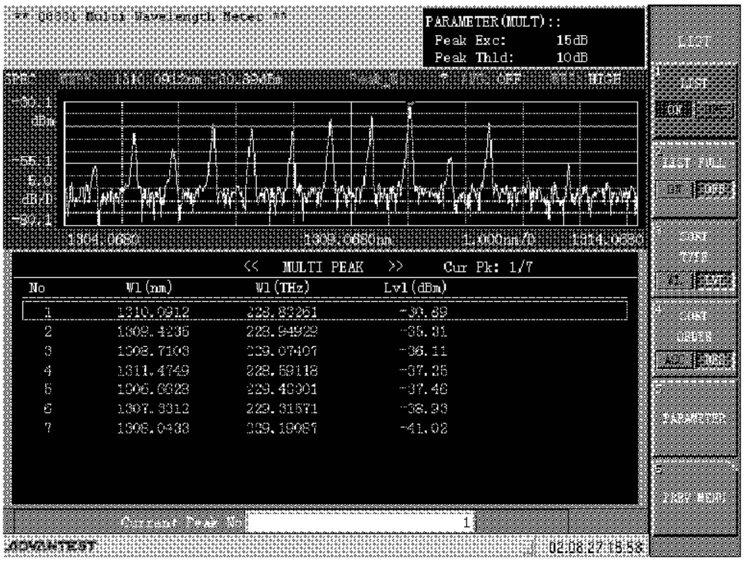


Figure 2-38 Sorted List Data by the LVL Sorting (Descending Order)

<List modes and sorting types>

	Sorting according to the wavelength or level	Sorting in ascending or descending order
MULTI PEAK	Possible	Possible
SNR	Possible	Possible
RELATIVE	Possible	Possible
DIFF CH	Wavelength only	Possible
PASS/FAIL	Possible	Possible
BAND WIDTH	Wavelength only	Possible

CAUTION: ***When SORT TYPE WL is selected, if SCALE, UNITS, and WAVELEN nm are selected, the wavelength data is sorted. If WAVELEN THz is selected, the frequency data is sorted.***

2.5.1.5 Setting the List Parameter (PARAMETER)

The example in this section sets the parameters necessary for the list display. The parameters to set include displaying items and analyzing conditions.

Setting the list parameter.

1. Press **APPLICATION** and select ***LIST***.
   The LIST menu is displayed.
2. Select ***PARAMETER***.
   The LIST PARAMETER dialog box is displayed.

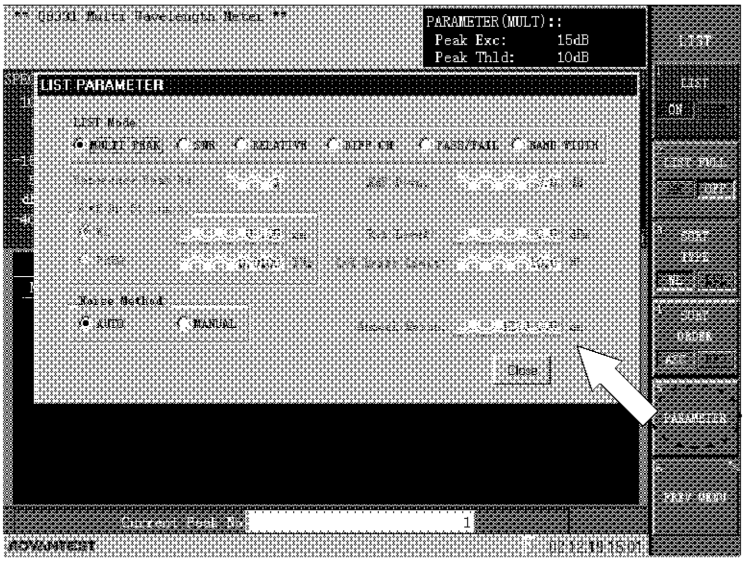


Figure 2-39 LIST PARAMETER Dialog Box

The following items can be set in the LIST PARAMETER dialog box.

- Setting the List mode (LIST Mode).
- Selecting a reference peak channel number (Reference Peak No).
- Setting the NdB Down (NdB Down).
- Selecting the parameters for the Pass/Fail evaluation (λ•f Drift Limit WL/FREQ).
- Setting the wavelength drift limit (WL).
- Setting the frequency drift limit (FREQ).
- Setting the reference level (Ref Level).
- Setting the level drift limit (Lvl Drift Limit).
- Setting the Noise (Noise Method).

1. Setting the List mode (LIST Mode).
   In the following example, the list displaying data mode is set.
   For details on different modes, refer to 4.3.1, "APPLICATION Button".

   1. Select ***LIST Mode*** by using the step buttons (△, ▽).
   2. Select a mode by rotating the data knob.

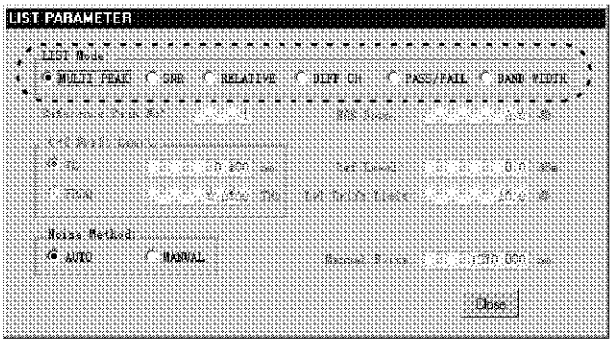


Figure 2-40 LIST Mode Setting (Set to DIFF CH)

2. Selecting a reference peak channel number (Reference Peak No).
   Select a reference peak channel number to compare with when the LIST mode is set to RELATIVE.
   Setting range: 1 to 300*

   *: If the number of wavelength peaks is less than 300, the available number of peaks becomes the upper limit.

   In the following example, the peak number is set to 3.

   1. Select ***Select Channel*** by using the step buttons (△, ▽).
   2. Press **3** and **ENTER**.
      The reference channel is set to 3.

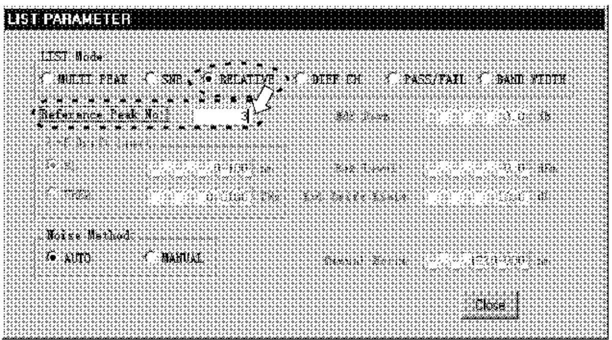


Figure 2-41 Reference Peak Channel Selection

3. Setting the NdB Down (NdB Down).

   Set the NdB Down value when the LIST mode is set to BAND WIDTH.

   Setting range: 0 dB to 40 dB

   In the following example, the NdB Down is set to 0.5 dB.

   1. Select ***NdB Down*** by using the step buttons (△, ▽).
   2. Press **0**, **.**, **5**, and **ENTER**.

      The NdB Down is set to 0.5 dB.

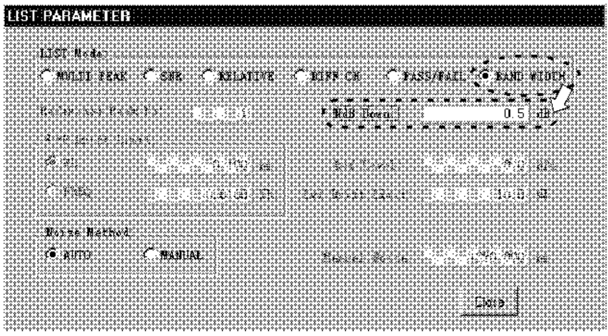


Figure 2-42   NdB Down Value Setting

4. Selecting the parameters for the Pass/Fail evaluation (λ•f Drift Limit WL/FREQ).

   Selects whether the wavelength drift limit or the frequency drift limit is used for the Pass/Fail evaluation.

   The setting can be changed in the PASS/FAIL list mode.

   1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
   2. Select the desired mode by rotating the data knob.

5. Setting the wavelength drift limit (WL).

   The permissible wavelength peak range is set.

   The wavelength drift limit can be set only when the list mode is set to PASS/FAIL and the λ•f Drift Limit mode is set to WL.

   Setting range: 0 nm to 10 nm

   In the following example, the limit is set to 0.5 nm.

   1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
   2. Move the cursor to the ***WL*** mode by rotating the data knob.
   3. Select the WL input area by using the step buttons (△, ▽).
   4. Press **0**, **.**, **5**, and **ENTER.**

      The wavelength drift limit is set to 0.5 nm.

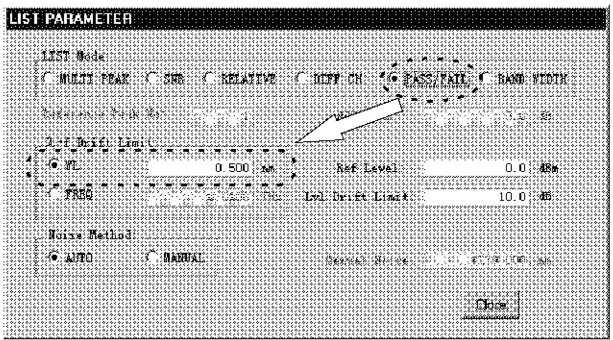


Figure 2-43 Wavelength Drift Limit Setting

6. Setting the frequency drift limit (FREQ).

   The permissible frequency peak range is set.

   The frequency drift limit can be set only when the list mode is set to PASS/FAIL and the λ•f Drift Limit mode is set to FREQ.

   Setting range: 0.0 THz to 1.0 THz

   In the following example, the limit is set to 0.05 THz (50 GHz).

   1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
   2. Move the cursor to the **FREQ** mode by rotating the data knob.
   3. Select the FREQ input area by using the step buttons (△, ▽).
   4. Press **0**, **.**, **0**, **5**, and **ENTER.**

      The frequency drift limit is set to 0.05 THz.

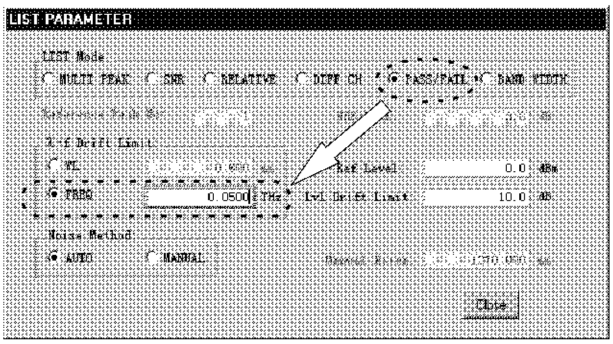


Figure 2-44 Frequency Drift Limit Setting

7. Setting the reference level (Ref Level).
   The reference wavelength peak power value (reference level) is set.
   This setting is possible in the PASS/FAIL list mode only.
   Setting range: -30 dBm to 13 dBm

   In the following example, the reference level is set to -10 dBm.

   1. Select ***Ref Level*** by using the step buttons (△, ▽).
   2. Press **-**, **1**, **0**, and **ENTER**.
      The reference level is set to -10 dBm.

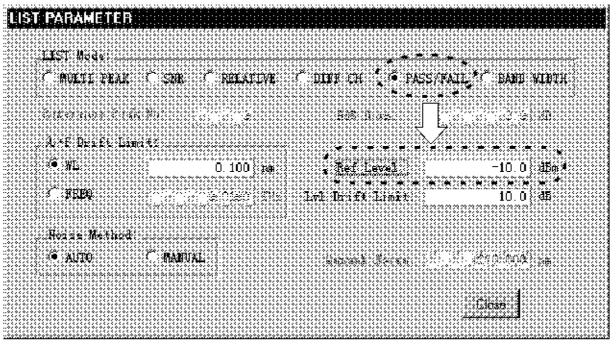


Figure 2-45 Reference Level Setting

8. Setting the level drift limit (Lvl Drift Limit).
   The wavelength peak level drift limit is set.
   This setting is possible in the PASS/FAIL list mode only.
   Setting range: 0 dB to 40 dB

   In the following example, the level drift limit is set to 1.5 dB.

   1. Select ***Lvl Drift Limit*** by using the step buttons (△, ▽).
   2. Press **1**, **.**, **5**, and **ENTER.**
      The level drift limit is set to 1.5 dB.

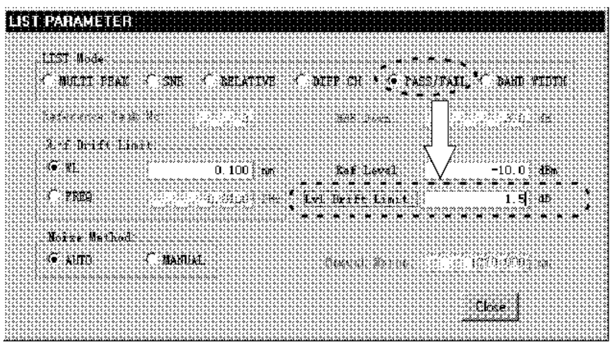


Figure 2-46 Level Drift Limit Setting

9. Setting the Noise (Noise Method).
   The Noise condition necessary for finding the SNR is set.
   For calculating the noise level, refer to 6.2.2, "Noise Level Calculation".

   1. Select ***Noise Method*** by using the step buttons (△, ▽).
   2. Rotating the data knob, select ***AUTO*** or ***MANUAL***.

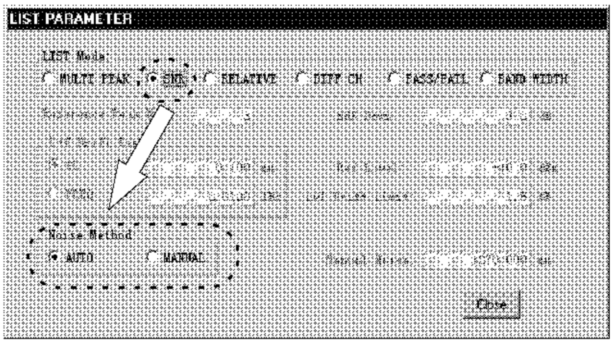


Figure 2-47 Noise Method Setting

When MANUAL is selected:

Setting range: 1270 nm to 1680 nm

In the following example, the noise level is set to 1545 nm wavelength.

3. Select ***Manual Noise*** by using the step buttons (△, ▽).
4. Press **1**, **5**, **4**, **5**, and **ENTER**.
   The noise level is set to 1545 nm.

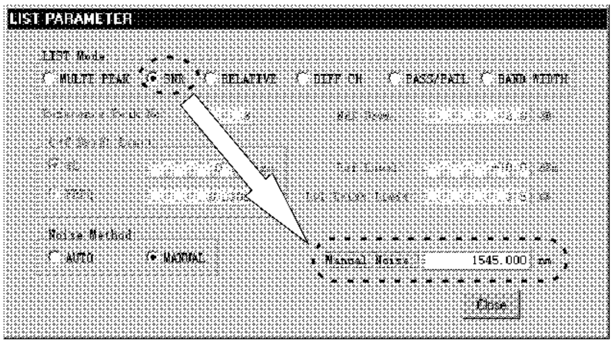


Figure 2-48 Noise Level Manual Setting

2.5.2 Setting the Trend Measurement Function (TREND)

This section describes how to set the trend measurement function (TREND). TREND is a monitoring function which measures the input signal in the specific time interval for the specified number of times automatically.

2.5.2.1 Setting TREND to ON or OFF

Activating the trend measurement function.

1. Press **APPLICATION**.
   The APPLICATION main menu is displayed.

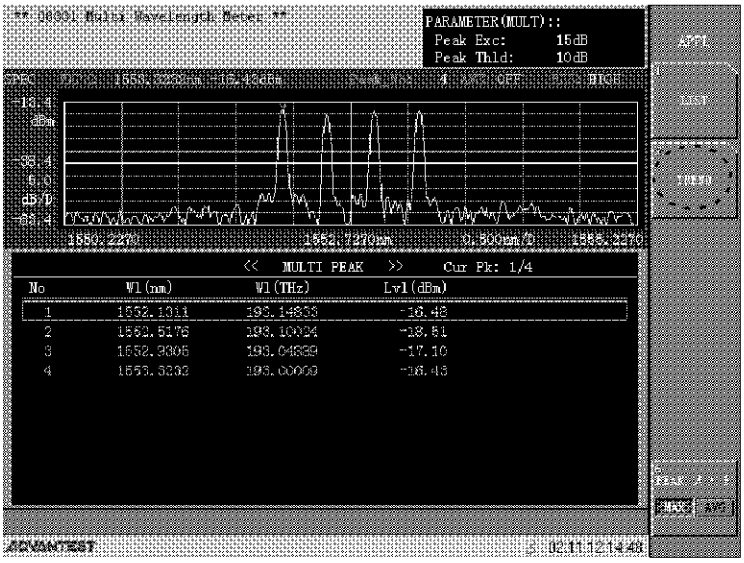


Figure 2-49 Activating the Trend Measurement Function

2. Select ***TREND***.

   The trend measurement function is activated and the sub menu is displayed in the trend measurement screen.

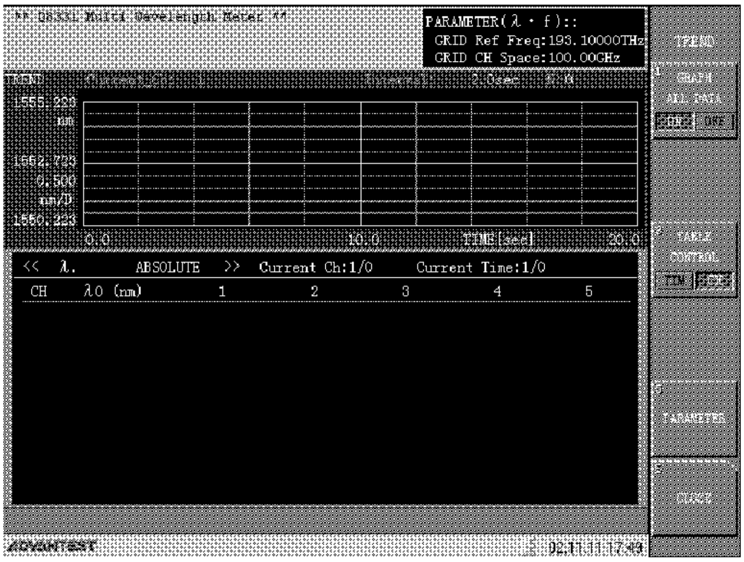


Figure 2-50 TREND Measurement Display

Deactivating the trend measurement function.

3. Select ***CLOSE***.

   Returns to the main menu and the trend measurement function is deactivated.

2.5.2.2 Setting the Trend Data Display Switch (GRAPH ALL DATA ON/OFF)

The trend data display is set.

The display switches between the following 2 display settings.

- Graph and list display (see Figure 2-51)
- Specifying channel graph, list and updated measurement data display

For the channel specification, refer to 2.5.2.3, "Scrolling the Trend List (TABLE CONTROL TIM/CH)".

Activating the trend measurement function.

1. Press **APPLICATION** and select ***TREND***.

   The trend measurement screen and the sub menu are displayed.

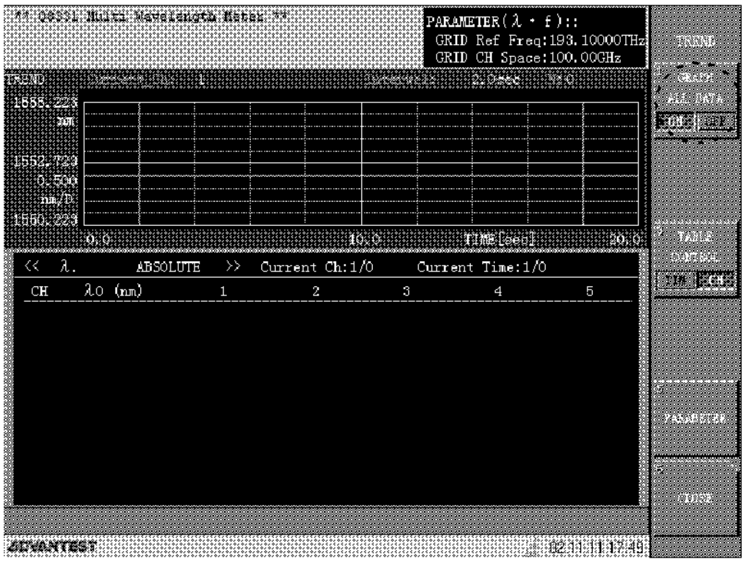


Figure 2-51 TREND Measurement Screen (GRAPH ALL DATA ON)

Switching the data display.

2. Select ***GRAPH ALL DATA ON/OFF***(OFF).
   A graph list and the specified channel data are displayed.

NOTE: ***Selecting GRAPH ALL DATA ON/OFF alternates between ON and OFF.***

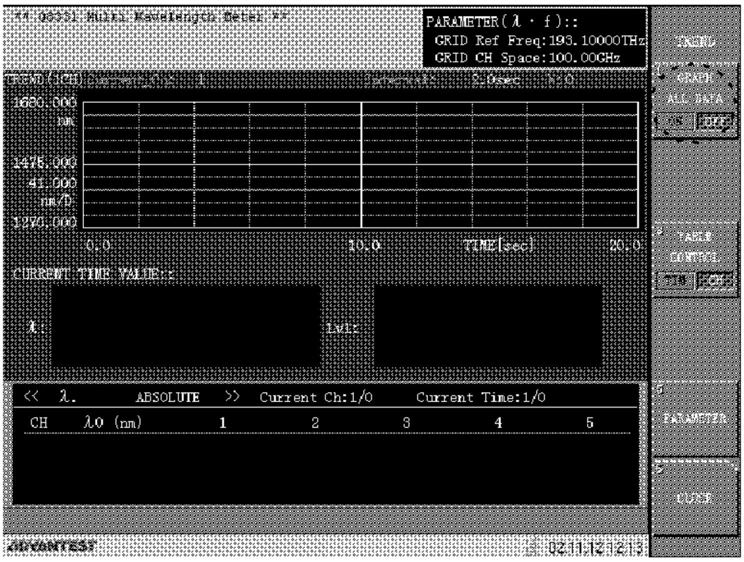


Figure 2-52 TREND Measurement Screen (GRAPH ALL DATA OFF)

2.5.2.3 Scrolling the Trend List (TABLE CONTROL TIM/CH)

The mode can be switched to select the current data for the TREND list display. data is selected. The current data changes when the cursor (yellow frame) in the list moves to another channel.

The specified channel data (current data) is also displayed on a graph in yellow with other channel data displayed in green. Setting the ***GRAPH ALL DATA*** to OFF, displays the current data as the updated measurement data.

For details on how to set the display to ON or OFF, refer to 2.5.2.2, "Setting the Trend Data Display Switch (GRAPH ALL DATA ON/OFF)".

1. Press **APPLICATION** and select ***TREND***.
   The TREND menu is displayed.
2. Select ***TABLE CONTROL TIM/CH***(TIM).
   TIM is selected. The input window is displayed and the Current Time can be set.

NOTE: ***Selecting TABLE CONTROL TIM/CH alternates between TIM and CH.***

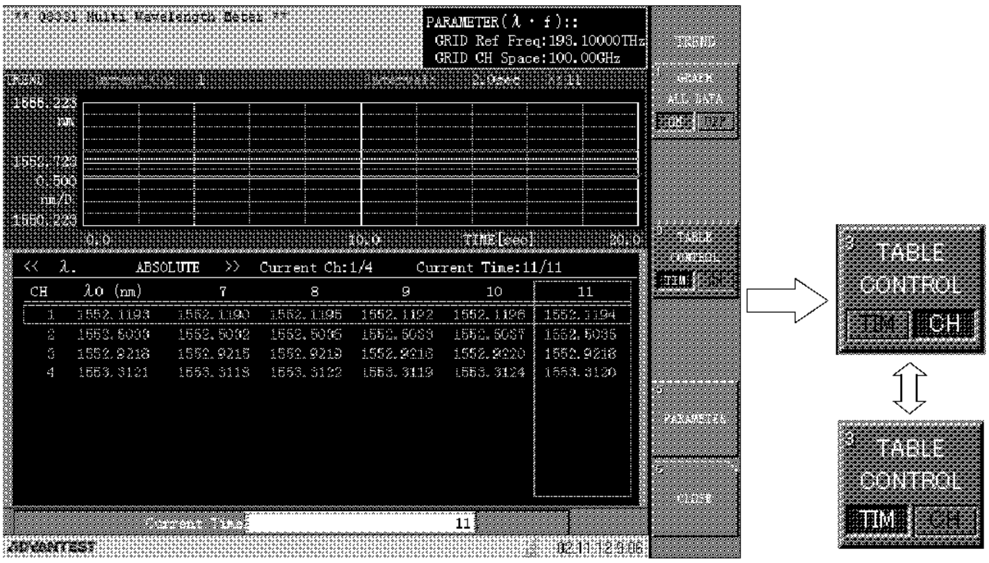


Figure 2-53 TABLE CONTROL Setting

When TIM is selected:

Listed data in the time-axis direction can be viewed.
The cursor can be moved by using the numeric keypad, step buttons (△, ▽), or data knob.

Selecting an item by using the numeric keypad (to view the 5th data in the list).

3. Press **5** and **ENTER**.

   The cursor moves to the 5th data. The data can be viewed.

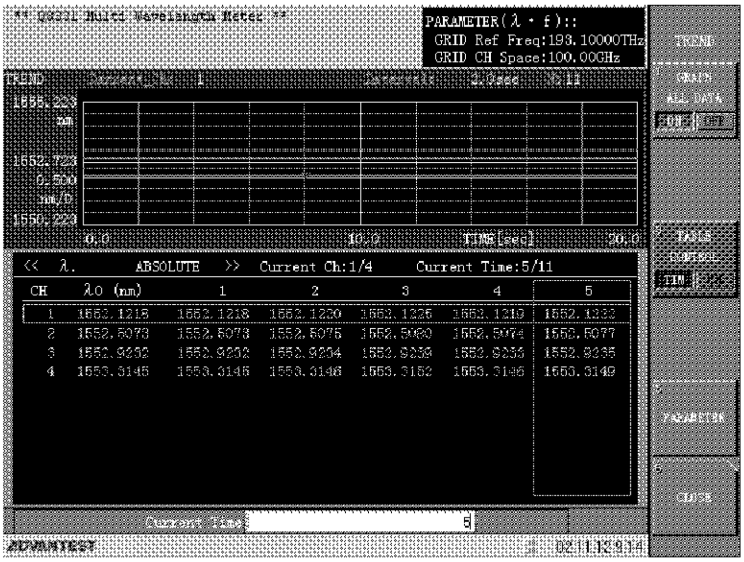


Figure 2-54 TABLE CONTROL TIM

When CH is selected:

Listed data in the channel-direction (vertical direction) can be viewed.
The cursor can be moved by using the numeric keypad, step buttons (△, ▽), or data knob.

Selecting an item by using the numeric keypad (to view the channel 4 data).

4. Press **4** and **ENTER**.
   The cursor moves to the channel 4 data. The data can be viewed.

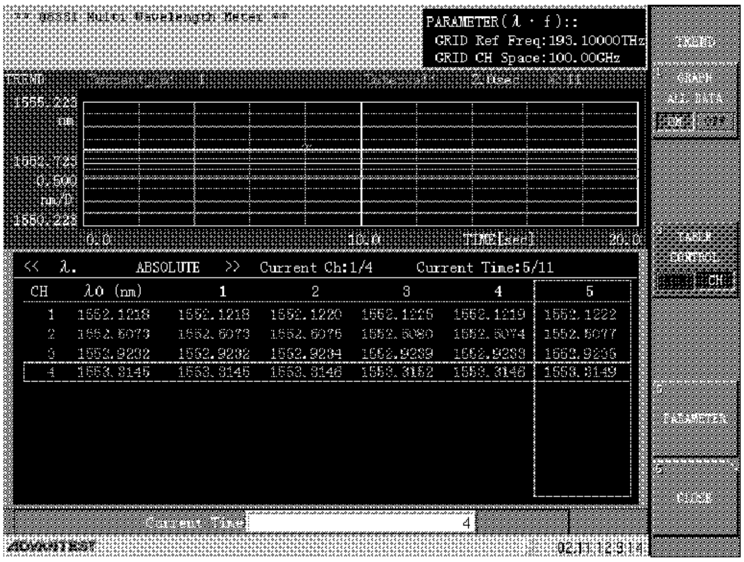


Figure 2-55 TABLE CONTROL CH

2.5.2.4 Setting the Trend Parameter (PARAMETER)

Items to display and measurement conditions are set. For details, refer to 4.3.1, "APPLICATION Button".

Displaying the parameter setting dialog box.

1. Press **APPLICATION** and select ***TREND***.
   The TREND menu is displayed.

2. Select ***PARAMETER***.
   The TREND PARAMETER dialog box is displayed.

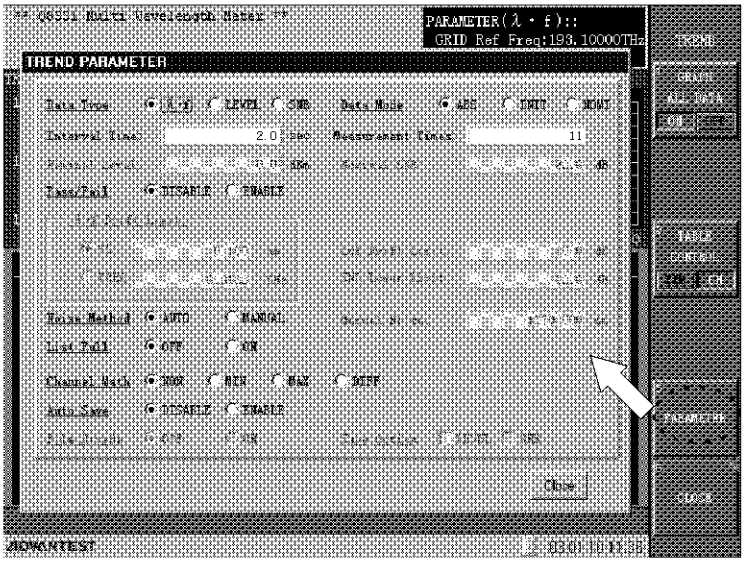


Figure 2-56 TREND Parameter setting

The following 18 items can be set in the dialog box.

- Setting the display data type (Data Type).
- Setting the display data calculation mode (Data Mode).
- Setting the measurement time interval (Interval Time).
- Setting the number of measurements (Measurement Times).
- Setting the nominal level (Nominal Level).
- Setting the nominal SNR (Nominal SNR).
- Setting the Pass/Fail function (Pass/Fail).
- Selecting the parameters for the Pass/Fail evaluation (λ•f Drift Limit WL/FREQ).
- Setting the wavelength drift limit (WL).
- Setting the frequency drift limit (FREQ).
- Setting the level drift limit (Lvl Drift Limit).
- Setting the SNR lower limit (SNR Lower Limit).
- Setting the noise conditions (Noise Method).
- Setting the trend list full display (List Full).
- Setting the trend data calculation for each channel (Channel Math).
- Setting the trend data logging function (Auto Save).
- Setting whether or not the trend data is saved in separate files (File Divide).
- Selecting the trend data to be saved (Save Option).

1. Setting the display data type (Data Type).
   The displayed data type is selected.

   1. Select ***Data Type*** by using the step buttons (△, ▽).
   2. Specify a data type by rotating the data knob.

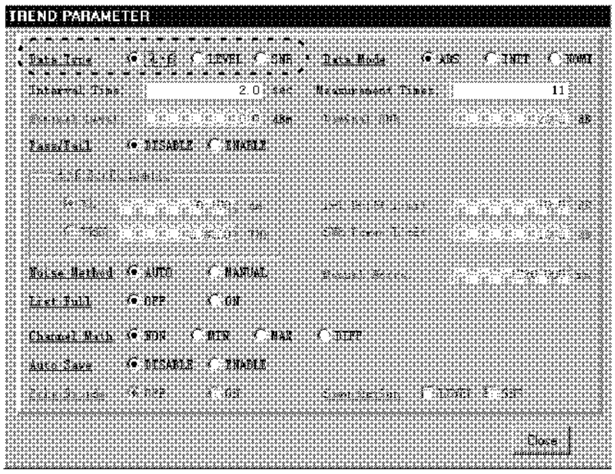


Figure 2-57 Data Type Setting

2. Setting the display data calculation mode (Data Mode).
   The displayed data calculation mode is selected.

   1. Select ***Data Mode*** by using the step buttons (△, ▽).
   2. Specify a data type by rotating the data knob.

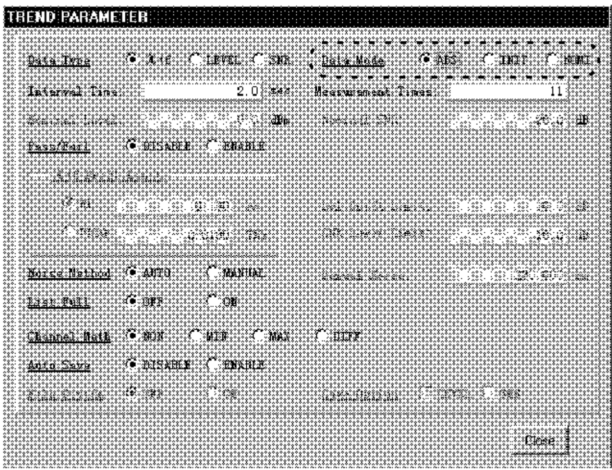


Figure 2-58 Data Calculation Mode Setting

3. Setting the measurement time interval (Interval Time).
   The time interval for a repeated measurement is set.
   Setting range: 1 to 86400 seconds

   In the following example, the time interval is set to 5 seconds.

   1. Select ***Interval Time*** by using the step buttons (△, ▽).
   2. Press **5** and **ENTER**.
      The measurement time interval is set to 5 seconds.

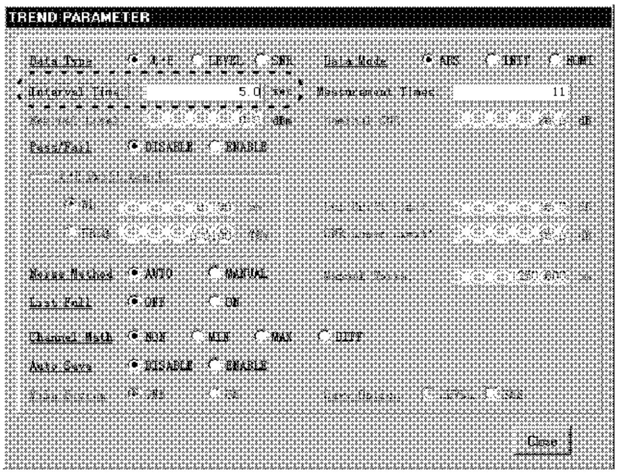


Figure 2-59 Measurement Time Interval Setting

4. Setting the number of measurements (Measurement Times).
   The number to repeat the measurement is set.
   Setting range: 11 to 500 times

   In the following example, the number of measurements to take is set to 20 times.

   1. Select ***Measurement Times*** by using the step buttons (△, ▽).
   2. Press **2**, **0**, and **ENTER**.

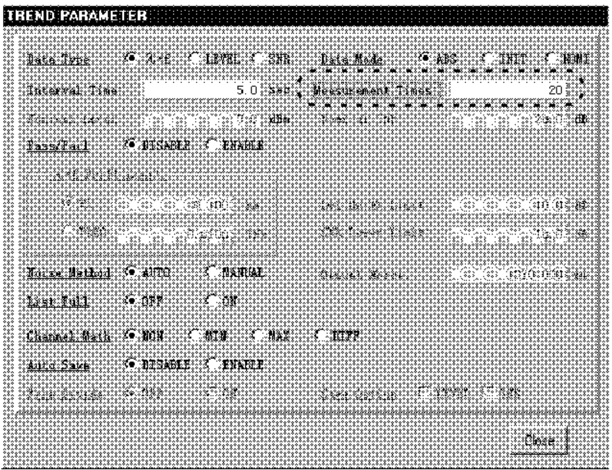


Figure 2-60 Measurement Times Setting

5. Setting the nominal level (Nominal Level).

   The nominal level is set. The nominal level is used when the data calculation mode is set to NOMINAL and the Pass/Fail data calculation mode is set to Enable.

   Setting range: -30 dBm to 13 dBm

   In the following example, the nominal level is set to -7 dBm.

   1. Select ***Nominal Level*** by using the step buttons (△, ▽).
   2. Press **-**, **7**, and **ENTER**.

      The nominal level is set to -7 dBm.

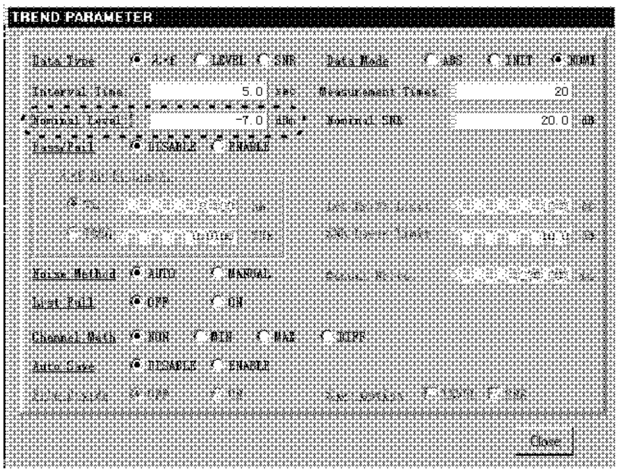


Figure 2-61 Nominal Level Setting

6. Setting the nominal SNR (Nominal SNR).

   The nominal SNR is set. The nominal SNR is used when the data calculation mode is set to NOMINAL and the Pass/Fail data calculation mode is set to Enable.

   Setting range: 0 dB to 40 dB

   In the following example, the nominal SNR is set to 12 dB.

   1. Select ***Nominal SNR*** by using the step buttons (△, ▽).
   2. Press **1**, **2**, and **ENTER**.
      The nominal SNR is set to 12 dB.

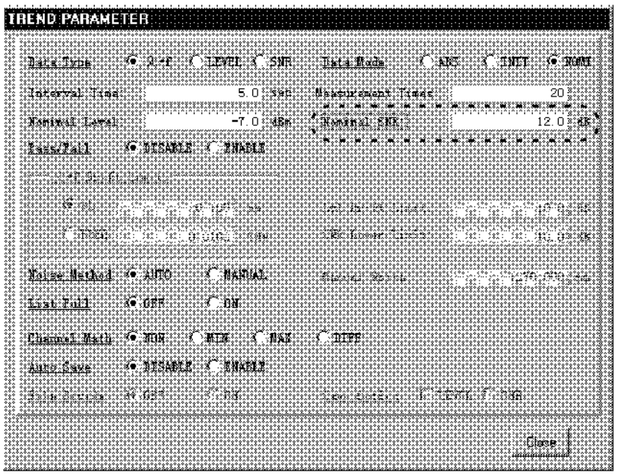


Figure 2-62 Nominal SNR Setting

7. Setting the Pass/Fail function (Pass/Fail).

   The Pass/Fail function is set.

Activating the Pass/Fail function.

1. Select ***Pass/Fail*** by using the step buttons (△, ▽).
2. Rotating the data knob, select ***Enable***.
   The Pass/Fail function is activated.
3. Pass/Fail evaluation limits are set.
   Refer to sections 8 through 12.

8. Selecting the parameters for the Pass/Fail evaluation (λ•f Drift Limit WL/FREQ).

   Selects whether the wavelength drift limit or the frequency drift limit is used for the Pass/Fail evaluation.

   The setting can be changed when the Pass/Fail is set to ENABLE.

   1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
   2. Select the desired mode by rotating the data knob.

9. Setting the wavelength drift limit (WL).

   The permissible wavelength peak range is set.

   The wavelength drift limit can be set only when the Pass/Fail is set to ENABLE and the λ•f Drift Limit mode is set to WL.

   Setting range: 0 nm to 10 nm

   In the following example, the limit is set to 0.5 nm.

   1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
   2. Move the cursor to the ***WL*** mode by rotating the data knob.
   3. Select the WL input area by using the step buttons (△, ▽).
   4. Press **0**, **.**, **5**, and **ENTER**.

      The wavelength drift limit is set to 0.5 nm.

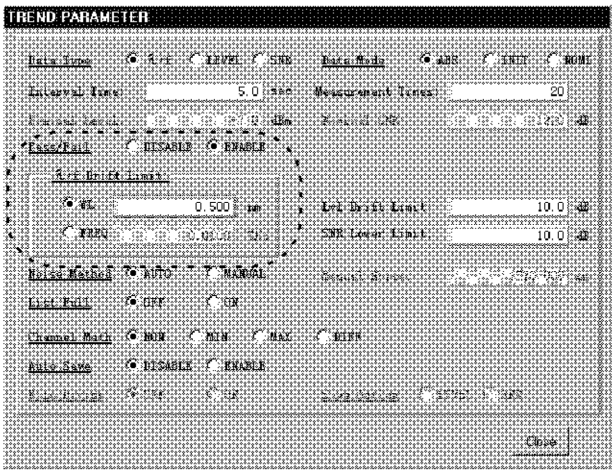


Figure 2-63 Wavelength Drift Limit Setting

10. Setting the frequency drift limit (FREQ).

    The permissible frequency peak range is set.

    The frequency drift limit can be set only when the Pass/Fail is set to ENABLE and the λ•f Drift Limit mode is set to FREQ.

    Setting range: 0.0 THz to 1.0 THz

    In the following example, the limit is set to 0.05 THz (50 GHz).

    1. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
    2. Move the cursor to the ***FREQ*** mode by rotating the data knob.
    3. Select the FREQ input area by using the step buttons (△, ▽).
    4. Press **0**, **.**, **0**, **5**, and **ENTER**.

       The frequency drift limit is set to 0.05 THz.

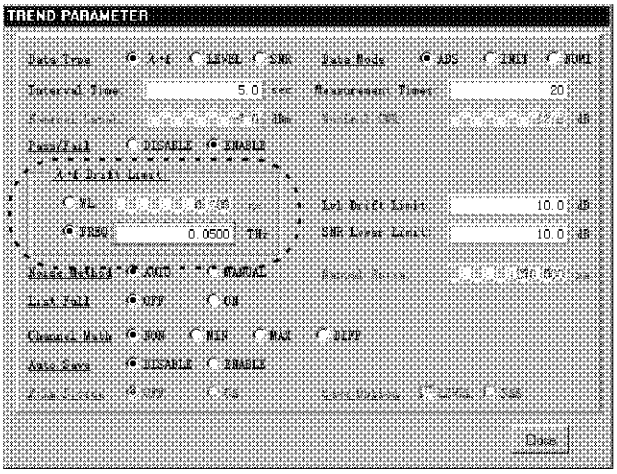


Figure 2-64 Frequency Drift Limit Setting

11. Setting the level drift limit (Lvl Drift Limit).

    The wavelength peak level drift limit is set. This setting is possible when the Pass/Fail is set to ENABLE only.

    Setting range: 0 dB to 40 dB

    In the following example, the level drift limit is set to 1.5 dB.

    1. Select ***Lvl Drift Limit*** by using the step buttons (△, ▽).
    2. Press **1**, **.**, **5**, and **ENTER**.

       The level drift limit is set to 1.5 dB.

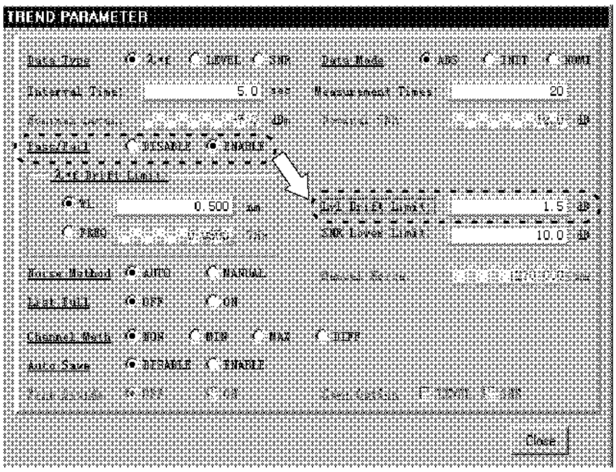


Figure 2-65 Level Drift Limit Setting

12. Setting the SNR lower limit (SNR Lower Limit).

    The SNR lower limit is set. The setting can be changed when the Pass/Fail is set to ENABLE.

    Setting range: 0 dB to 40 dB

    In the following example, the SNR lower limit is set to 7 dB.

    1. Select ***SNR Lower Limit*** by using the step buttons (△, ▽).
    2. Press **7** and **ENTER**.

       The SNR lower limit is set to 7 dB.

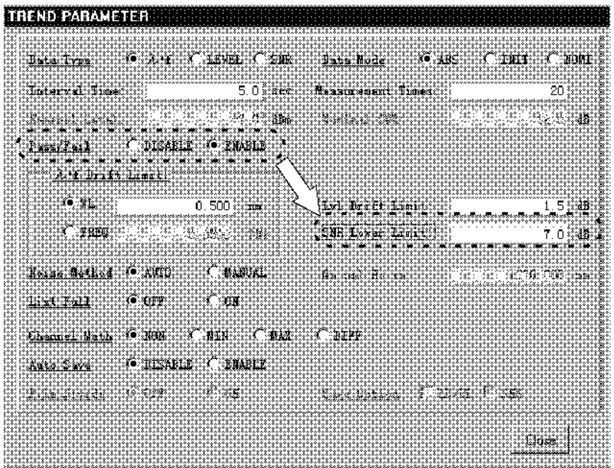


Figure 2-66 SNR Lower Limit Setting

13. Setting the noise conditions (Noise Method).
    The Noise condition necessary in finding the SNR is set.
    For calculating the noise level, refer to 6.2.2, "Noise Level Calculation".

    1. Select ***Noise Method*** using the step buttons (△, ▽).
    2. Rotating the data knob, select ***AUTO*** or ***MANUAL***.

    When MANUAL is selected:

    Setting range: 1270 nm to 1680 nm

    In the following example, the noise level is set to 1545 nm wavelength.

    3. Select ***Manual Noise*** by using the step buttons (△, ▽).
    4. Press **1**, **5**, **4**, **5**, and **ENTER**.
       The noise level is set to 1545 nm.

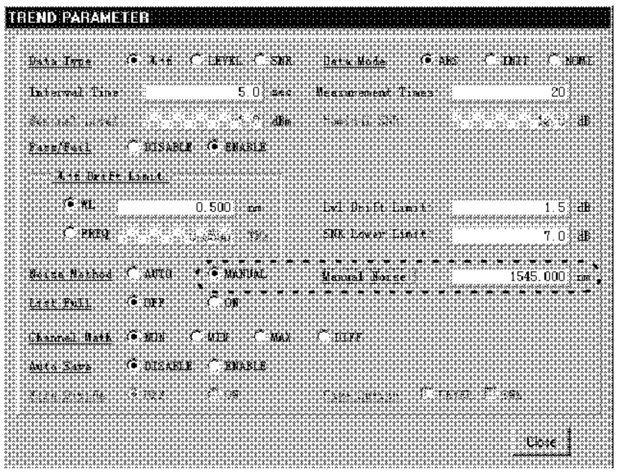


Figure 2-67 Noise Level Setting

14. Setting the trend list full display (List Full).
    The display switching function is set.

    1. Select ***List Full*** by using the step buttons (△, ▽).
    2. Rotating the data knob, select ***ON***.
       The trend list is displayed on the full screen.

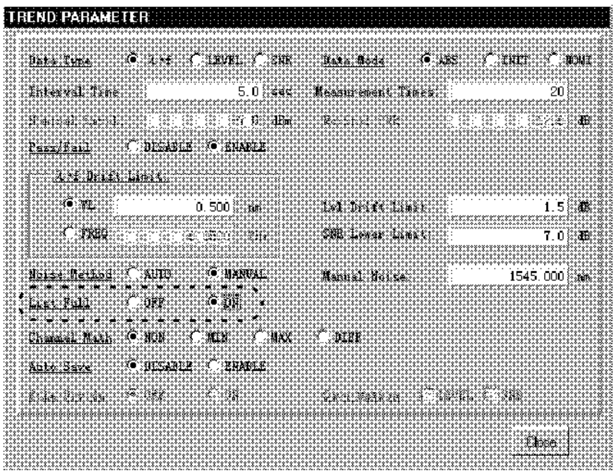


Figure 2-68 TREND List Display Setting

15. Setting the trend data calculation for each channel (Channel Math).
    Set the trend data calculation for each channel.

    1. Select ***Channel Math*** by using the step buttons (△, ▽).
    2. Select the desired mode by rotating the data knob.

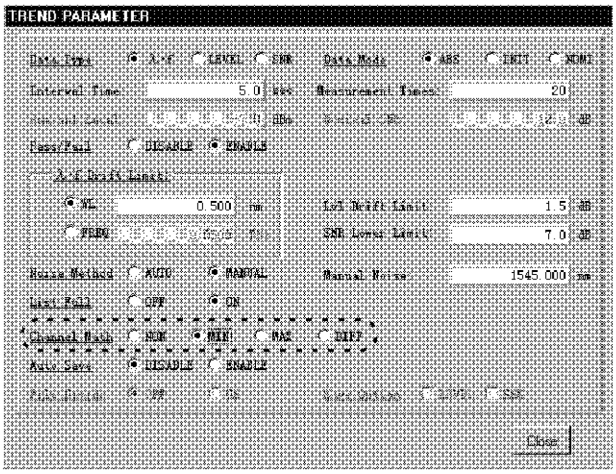


Figure 2-69 Trend Data Calculation Setting for Each Channel

Calculation results are displayed on the right side of the trend list.

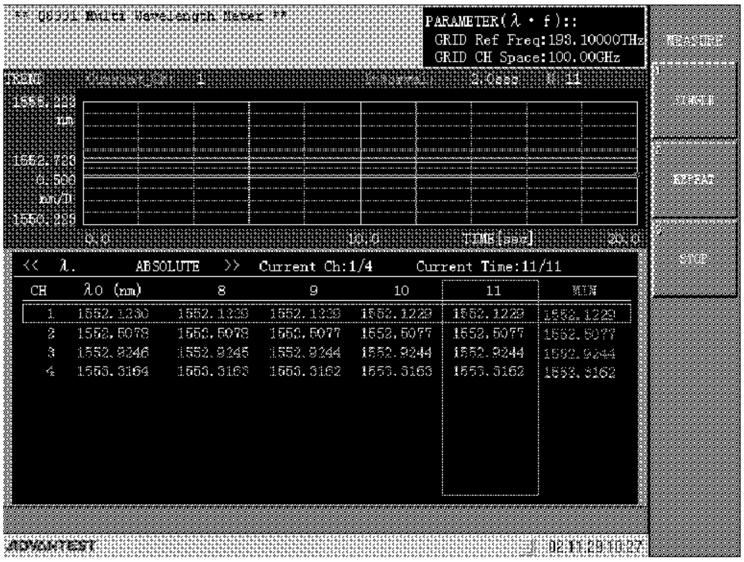


Figure 2-70 Trend Data Calculation Results for Each Channel

CAUTION: ***The Channel Math results are rounded when displayed. For this reason, values calculated from the MAX and MIN results may be different from the displayed DIFF results of the Q8331.***

16. Setting the trend data logging function (Auto Save).

    When the number of measurements is twice the number set in the Measurement Times during the trend data measurement, the measurement data file is automatically saved under the D:\MyData\ directory.

    1. Select ***Auto Save*** by using the step buttons (△, ▽).
    2. Select ***Enable*** or ***Disable*** by rotating the data knob.

       When ***Enable*** is selected, the ***File Divide*** and ***Save Option*** settings can be changed.

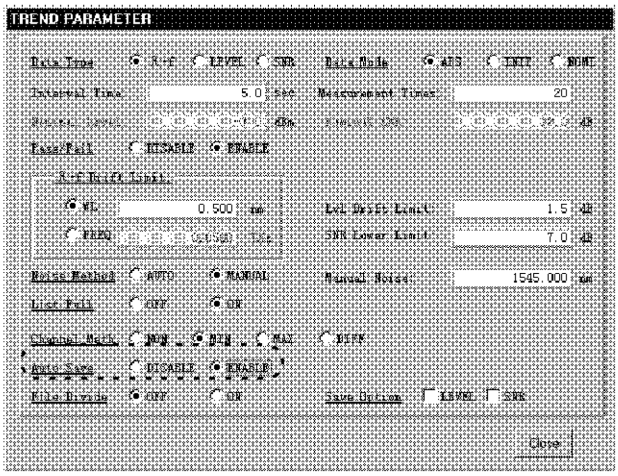


Figure 2-71   Trend Data Logging Function Setting

17. Setting whether or not the trend data is saved in separate files (File Divide).

    Selects whether or not to save the trend data in separate files when the trend data logging function (Auto Save) is enabled.

    The setting can be changed when the trend data logging function (Auto Save) is enabled.

    1. Select ***File Divide*** by using the step buttons (△, ▽).

    2. Select ***ON*** or ***OFF*** by rotating the data knob.

       When ***ON*** is selected, the trend data is saved in separate files.

       When ***OFF*** is selected, trend data file size within the 500 Mbyte limit is saved as one file.
       For more information on file types and contents, refer to A.3, "Files Saved by Using the Trend Data Logging Function."

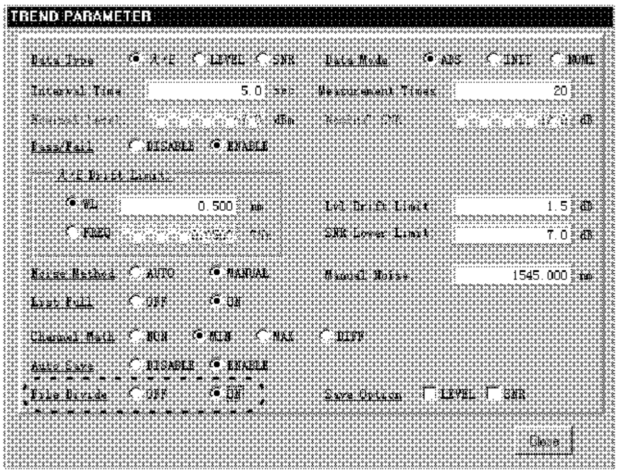


Figure 2-72 Setting whether or not the Trend Data is Saved in Separate Files

18. Selecting the trend data to be saved (Save Option).

    Selects the trend data to be saved when the trend data logging function (Auto Save) is enabled. The trend data logging function saves the wavelength (frequency) data.

    The setting can be changed when the trend data logging function (Auto Save) is enabled.

Saving the trend data level value.

1. Select ***Save Option, LEVEL*** by using the step buttons (△, ▽).
2. Select ON by pressing **ENTER.**

Saving the trend data SNR value.

3. Select ***Save Option, SNR*** by using the step buttons (△, ▽).
4. Select ***ON*** or ***OFF*** by pressing **ENTER.**

   For more information on files, refer to A.3, "Files Saved by Using the Trend Data Logging Function."

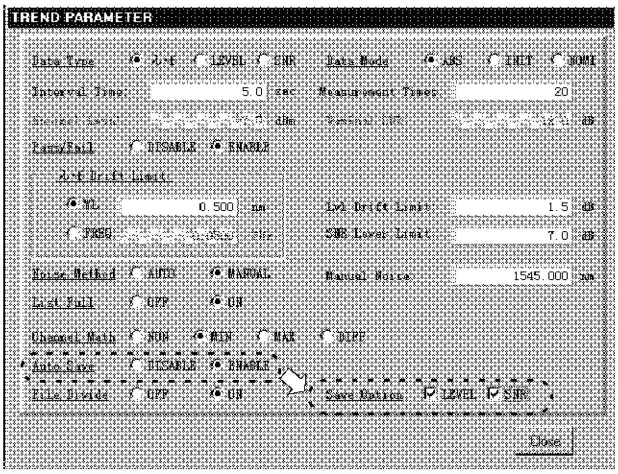


Figure 2-73 Save Option Setting

2.5.3 Setting the Peak Power Display Conditions (PEAK MAX/AVG)

The peak value display condition is set.

The MAX display condition displays the maximum power and the wavelength, which has the maximum power in the measurement calculation process range. The AVG display condition displays the total peak power and weighted average power.

1. Press **APPLICATION.**

   The APPLICATION main menu is displayed.

2. Select ***PEAK MAX/AVG***(AVG).

   The total power and the wavelength peak weighted average are displayed.

NOTE: Selecting PEAK MAX/AVG alternates between MAX and AVG.

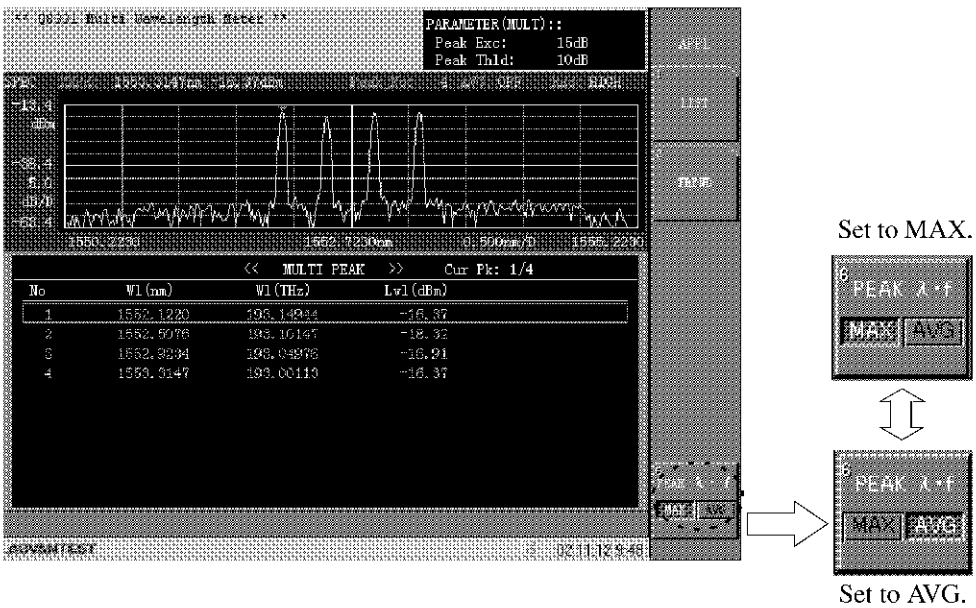


Figure 2-74 Peak Power Display Condition Setting

2.6 Setting the Spectrum Display Conditions (SCALE)

This section describes how to set the spectrum display conditions. Button and key operations are explained assuming preset conditions. For button and key presetting methods, refer to 2.8.2, "Initializing the Setting Conditions (PRESET)".

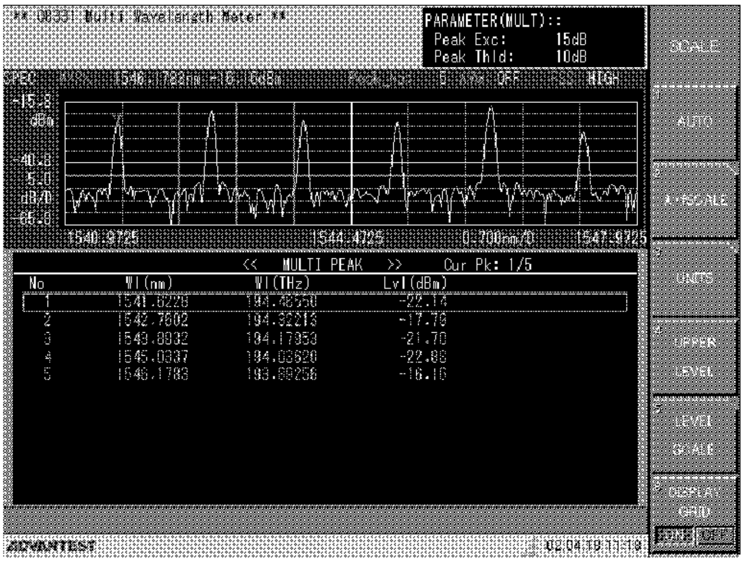


Figure 2-75 SCALE Main Menu

2.6.1 Setting the Display Scale Automatically (AUTO)

The optimum display conditions for the input signal are set automatically.

1. Press **SCALE**.

   The SCALE main menu is displayed.

2. Select ***AUTO***.

   The optimum center wavelength and analyzing span display conditions are set for the input signal.

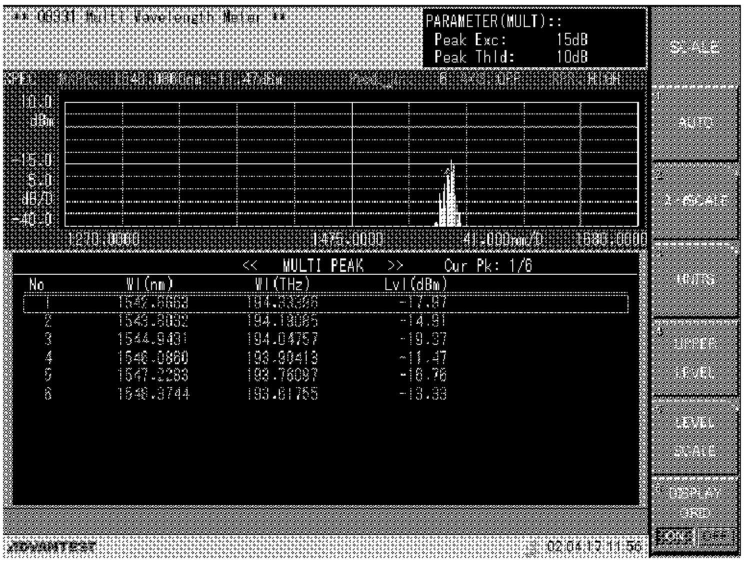


Figure 2-76 Display Scale Change (Before the Change)

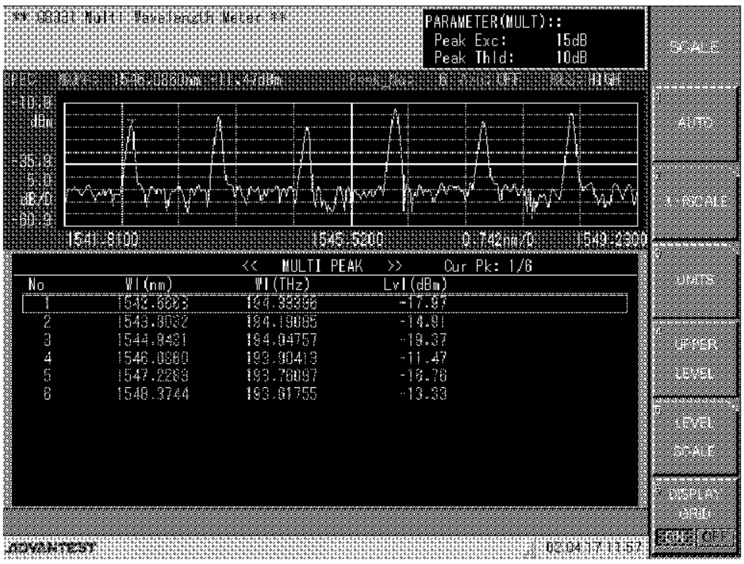


Figure 2-77 Display Scale Change (After Selecting the AUTO Setting)

2.6.2 Setting the X-axis

This section describes how to set the x-axis. For the setting range, refer to 4.5, "Settings List".

2.6.2.1 Setting the Center Wavelength (CENTER)

The center wavelength is set.

In the following example, the center wavelength is set to 1545.52 nm.

Setting the center wavelength.

1. Press **SCALE** and select ***λ•f SCALE***.
   The λ•f SCALE menu is displayed.
2. Select ***CENTER***.
   The input window is displayed.
3. Press **1**, **5**, **4**, **5**, **.**, **5**, **2**, and **ENTER**.
   The center wavelength is set to 1545.52 nm.

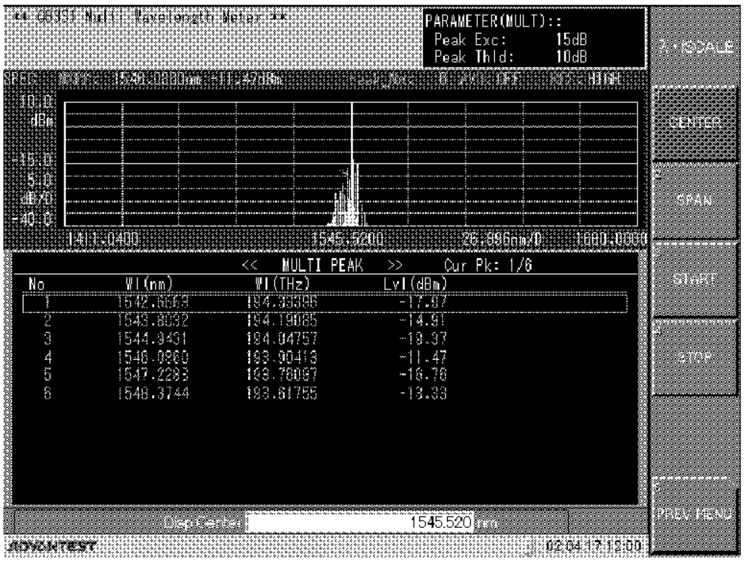


Figure 2-78 Center Wavelength Change

2.6.2.2 Setting the Display Span (SPAN, START/STOP)

The display span is set. Following two methods are used to set the display span.

The first method is SPAN. This method sets the display span by specifying the display range with the center wavelength being the display center.

In the following example, the display range is set to 7.6 nm.

1. Press **SCALE** and select ***λ•f SCALE***.
   The λ•f SCALE menu is displayed.
2. Select ***SPAN***.
   The input window is displayed.
3. Press **7**, **.**, **6** and **ENTER**.
   The display range is set to 7.6 nm.

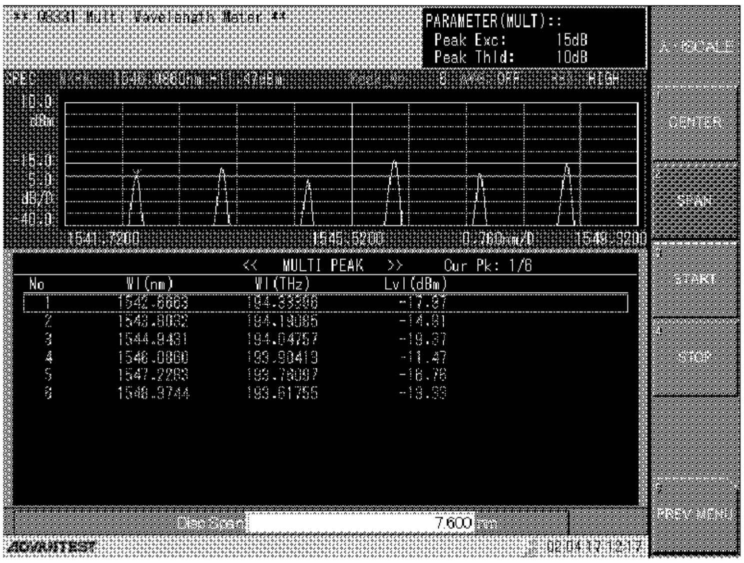


Figure 2-79 Display Span Setting With Range Specification (SPAN Method)

The second method is START/STOP. This method sets the display span by specifying the display start and stop points.

In the following example, the display starting and stopping points are set. These points are specified in wavelengths or frequencies.
First, set the display starting point to 1543 nm.

1. Select ***START***.
   The input window is displayed.

2. Press **1**, **5**, **4**, **3**, and **ENTER**.
   The far left display value is set to 1543 nm.

Next, set the display stopping point to 1548 nm.

3. Select ***STOP***.
   The input window is displayed.
4. Press **1**, **5**, **4**, **8**, and **ENTER**.
   The far right display value is set to 1548 nm.

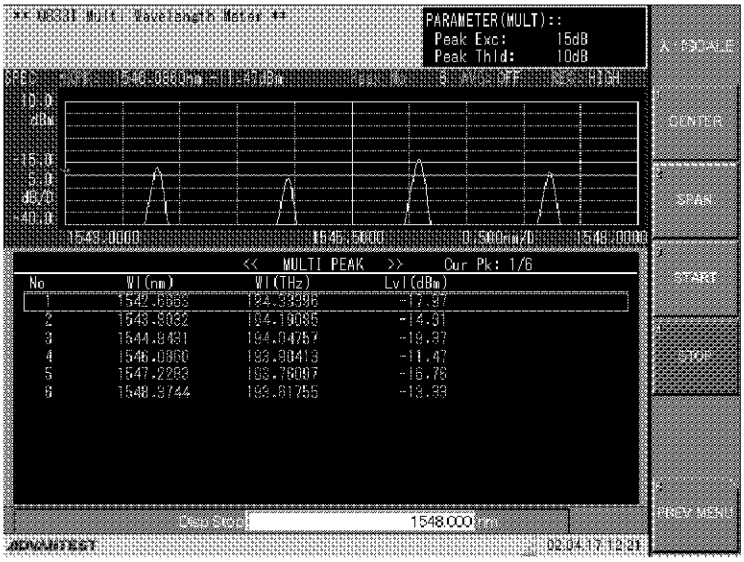


Figure 2-80 Stop Wavelength Setting

2.6.3 Setting the Unit (UNIT)

The X-axis and Y-axis display units are set.

2.6.3.1 Setting to Switch the Wavelength and Frequency Displays (WAVELEN nm/THz)

In the following example, the X-axis display is switched to the frequency unit.

1. Press **SCALE** and select ***UNITS***.
   The UNIT menu is displayed
2. Select ***WAVELEN nm/THz***(THz).
   The X-axis display is switched to the frequency unit.

NOTE: Selecting WAVELEN nm/THz alternates between nm and THz.

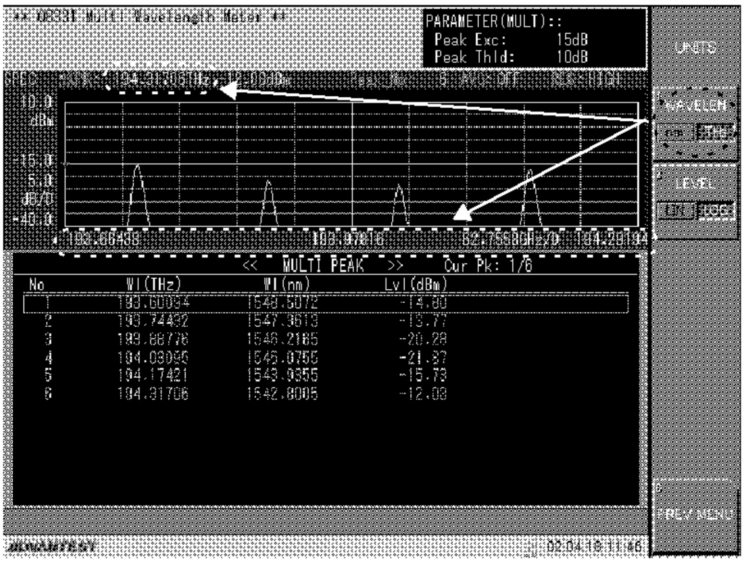


Figure 2-81 Spectrum and List Frequencies Display

2.6.3.2 Setting to Switch Between the Level LINEAR and LOG Displays (LEVEL LIN/LOG)

In the following example, the level log display is switched to the linear display.

1. Press **SCALE** and select ***UNITS***.
   The UNIT menu is displayed.
2. Select ***LEVEL LIN/LOG***(LIN).
   The Y-axis scale display is switched to the linear (LIN) display.

NOTE: Selecting LEVEL LIN/LOG alternates between LIN and LOG.

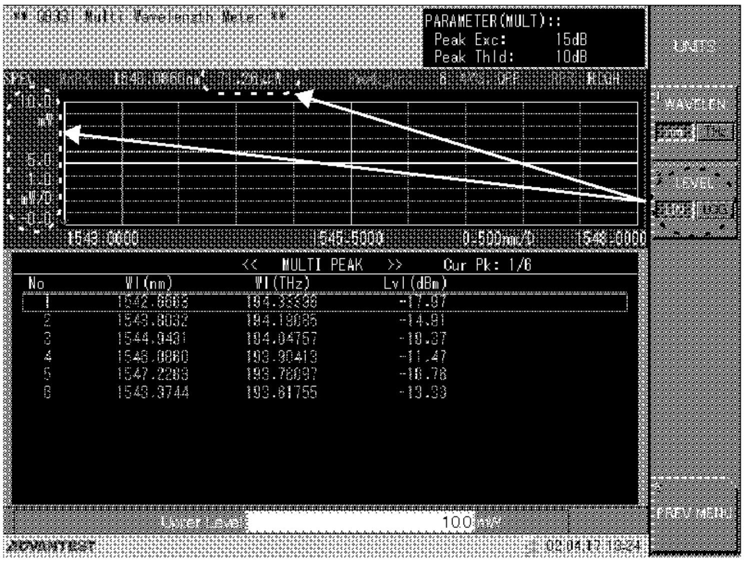


Figure 2-82 Level Linear Display

2.6.4 Setting the Y-axis

2.6.4.1 Setting the Display Level Upper Limit (UPPER LEVEL)

An upper limit is set for the spectrum display level.

Setting range: -50 dB to 30 dB

In the following example, the upper limit is set to -10 dB.

1. Press **SCALE** and select ***UPPER LEVEL***.
   The input window is displayed.
2. Press **-**, **1**, **0**, and **ENTER**.
   The upper limit is set to -10 dBm.

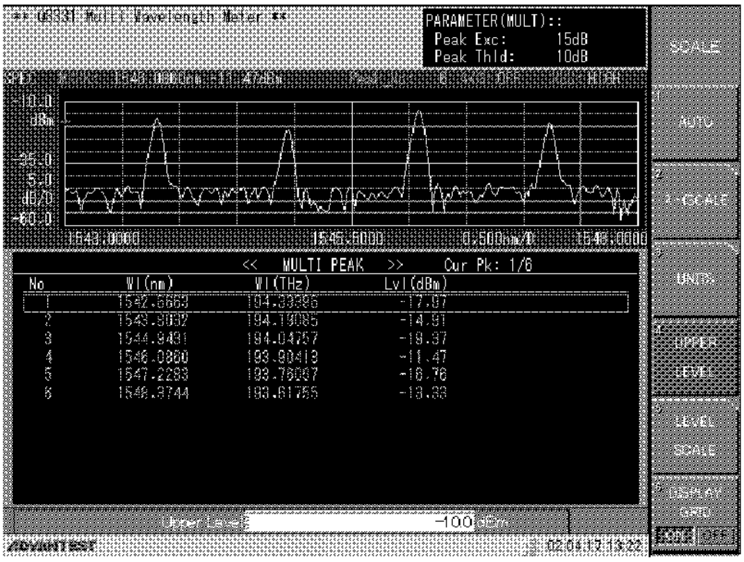


Figure 2-83 Display Level Upper Limit Setting

2.6.4.2 Setting the Level Scale (LEVEL SCALE)

In the following example, the level scale is set to 2 dB/D.

1. Press **SCALE** and select ***LEVEL SCALE***.
   The LEVEL SCALE menu is displayed.
2. Select ***2 dB/D***.
   The level scale is set to 2 dB/D.

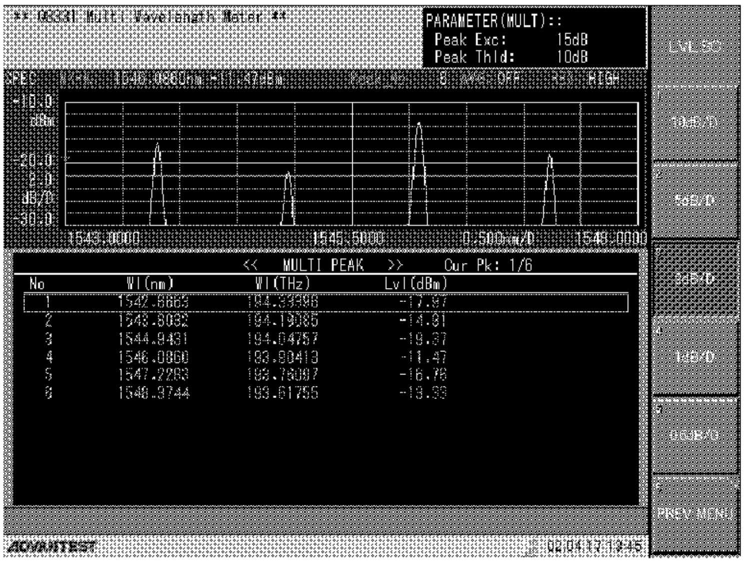


Figure 2-84 Level Scale Setting

2.6.5 Turning the Grid Display ON or OFF (DISPLAY GRID ON/OFF)

In the following example, the spectrum grid display grid is turned off.

1. Press **SCALE**.
   The SCALE main menu is displayed.
2. Select ***DISPLAY GRID ON/OFF***(OFF).
   The grid display disappears.

NOTE: Selecting DISPLAY GRID ON/OFF alternates between ON and OFF.

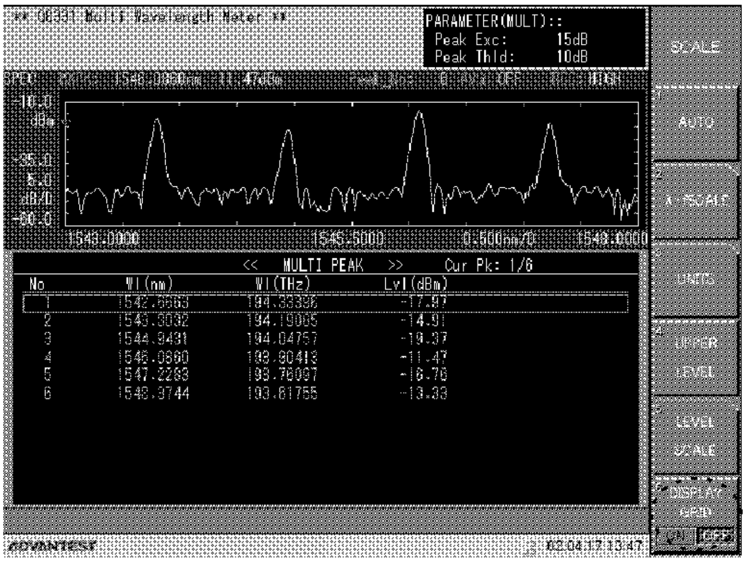


Figure 2-85 Grid Display (set to OFF)

2.7 Cursor Operations (CURSOR)

This section describes cursor operations. There are two cursors (X1 and X2) perpendicular to the x-axis and a cursor (Y1) perpendicular to the Y-axis.

2.7.1 Turning the Cursor Displays ON/OFF

The cursor displays are set to ON or OFF.

When a cursor display is set to on, the cursor appears by the wavelength which was set in the last setting. If the last set wavelength is located outside of the display area, the cursor appears at the edge of the display area.

Turning ON the cursor displays.

1. Press **CURSOR**.
   The CURSOR main menu is displayed.

Turning the X1 cursor on/off.

2. Select ***X1 ON/OFF***(ON).
   The line cursor X1 is displayed in the spectrum display.

Turning the X2 cursor on/off.

3. Select ***X2 ON/OFF***(ON).
   The line cursor X2 is displayed in the spectrum display.

Turning the Y1 cursor on/off.

4. Select ***Y1 ON/OFF***(ON).
   The line cursor Y1 is displayed in the spectrum display.

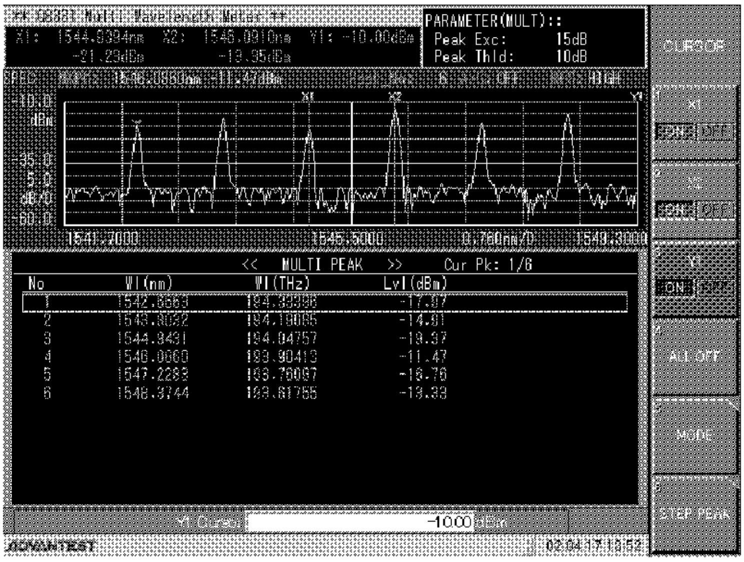


Figure 2-86 Cursor ON (Y1 Cursor)

Turning cursor displays off.

Following 2 methods can be used to turn cursor displays off.

- Turn all cursor displays off at once.
- Turn one cursor display off at a time.

Turn all cursor displays off.

1. Press **CURSOR.**
   The CURSOR main menu is displayed.
2. Select ***ALL OFF.***
   All cursors displayed on the spectrum display disappear.

Turn one cursor off.

1. Press **CURSOR.**
   The CURSOR main menu is displayed.

Turning X1 off.

2. Select ***X1 ON/OFF***(OFF).
   The line cursor X1 disappears from the spectrum display.

Turning X2 off.

3. Select ***X2 ON/OFF***(OFF).
   The line cursor X2 disappears from the spectrum display.

Turning Y1 off.

4. Select ***Y1 ON/OFF***(OFF).
   The line cursor Y1 disappears from the spectrum display.

2.7.2 Moving the Cursors

Following 3 methods are used for moving cursors.

- Moving a cursor by using the step buttons.
- Moving a cursor by using the data knob.
- Moving a cursor by specifying a location in number.

1. Moving a cursor by using the step buttons.
   Select ***CURSOR ON/OFF***(ON).
   Pressing a step button moves the cursor in the preset step size. Repeat pressing the buttons until the cursor moves to the specified location.
2. Moving a cursor by using the data knob.
   Select ***CURSOR ON/OFF***(ON).
   Rotating the data knob, move the cursor to the specified location.
3. Moving a cursor by specifying a location number.
   Select ***CURSOR ON/OFF***(ON).
   Using the numeric keypad, specify the location to move the cursor in the input window.

2.7.3 Setting the Cursor Operation Mode (MODE)

This section describes the normal and delta cursor operation modes. For more details on cursor operation modes, refer to 4.3.3, "CURSOR Button".

Normal mode.

1. Press **CURSOR** and select ***MODE***.
   The MODE menu is displayed.
2. Select ***NORMAL***.
   The cursor operation is set to the normal mode.

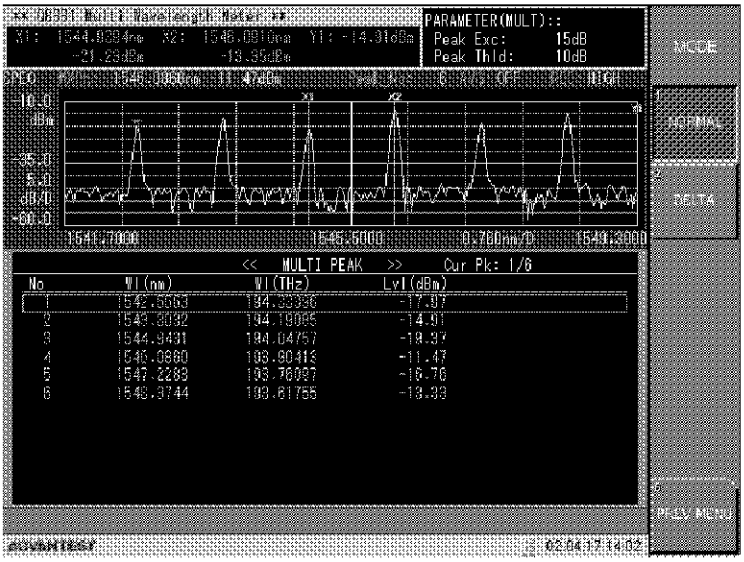


Figure 2-87 Cursor Mode Setting (NORMAL Mode)

Delta mode.

3. Select ***DELTA***.

   The cursor operation is set to the delta mode.
   In the DELTA mode, the wavelength (Frequency), and the level difference between X1 and X2 cursors are displayed as ΔX.

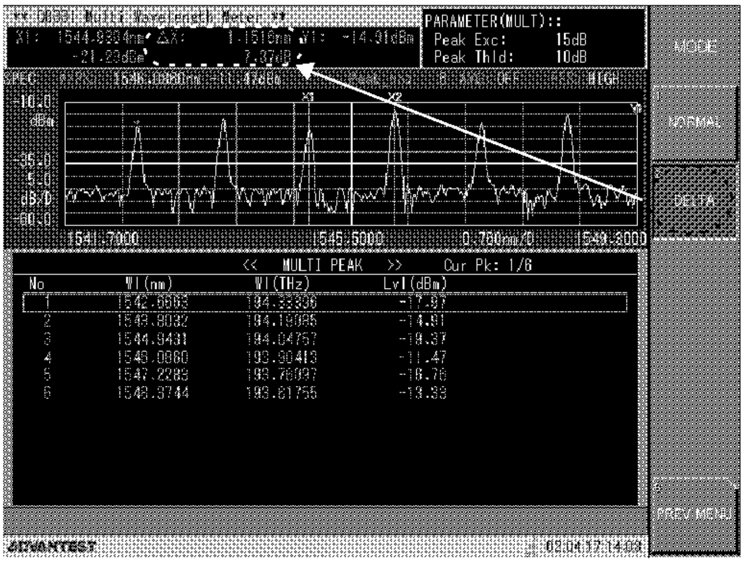


Figure 2-88 Cursor Mode Setting (DELTA Mode)

2.7.4 Moving the Cursors Between Peaks (STEP PEAK)

The X1 or X2 cursor moves under the predefined conditions.

1. Press **CURSOR**.

   The CURSOR main menu is displayed.

2. Select ***STEP PEAK***.

   The sub menu is displayed.

   Select one of the 5 items in the soft menu. The XI cursor moves with the condition predefined for each soft menu item.

CAUTION:

The X2 cursor moves only under either of the following conditions:

- ***The X1 cursor display is OFF and the X2 cursor display is ON before STEP PEAK is pressed.***
- ***The X2 cursor is active before STEP PEAK is pressed.***

Moving to the maximum wavelength in the display.

3. Select ***MAX PEAK***.

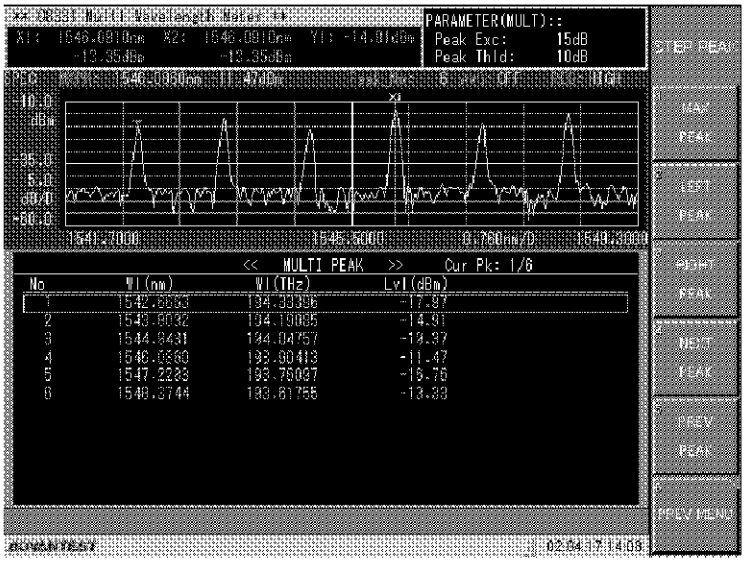


Figure 2-89 STEP PEAK (MAX PEAK)

Moving to a peak on the left side of the current position.

4. Select ***LEFT PEAK.***

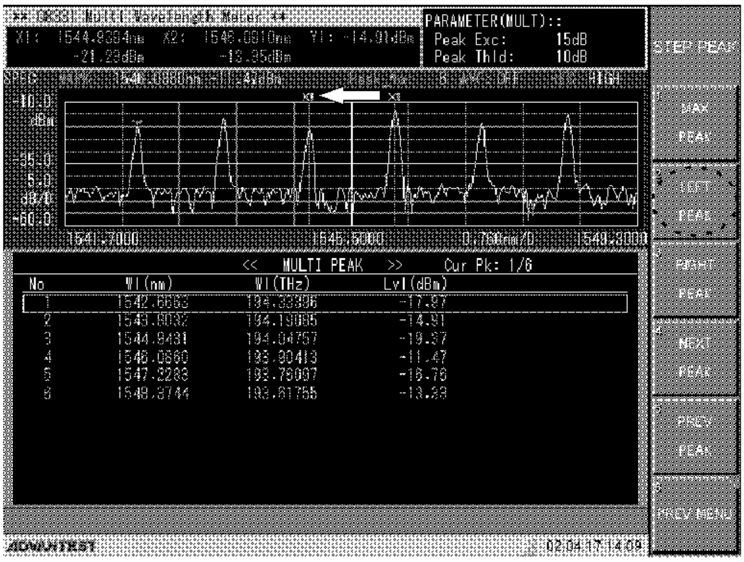


Figure 2-90 STEP PEAK (LEFT PEAK)

Moving to a peak on the right side of the current position.

5. Select ***RIGHT PEAK.***

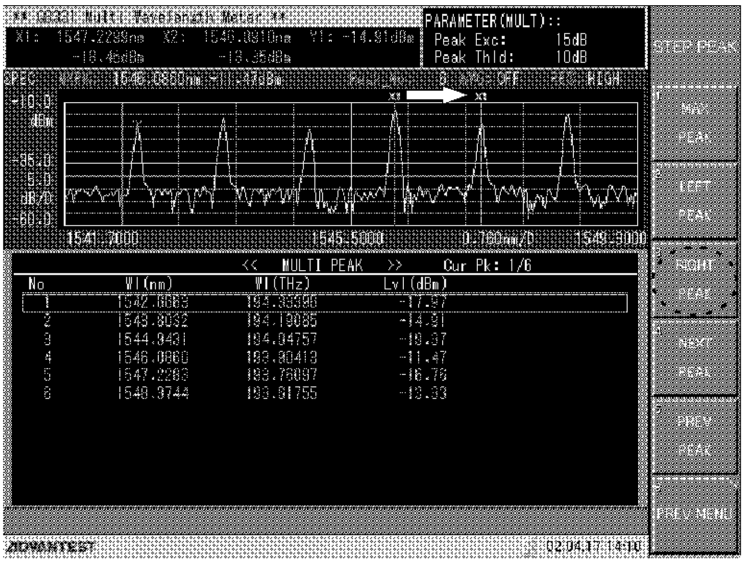


Figure 2-91 STEP PEAK (RIGHT PEAK)

Moving to a smaller level wavelength peak.

6. Select ***NEXT PEAK.***

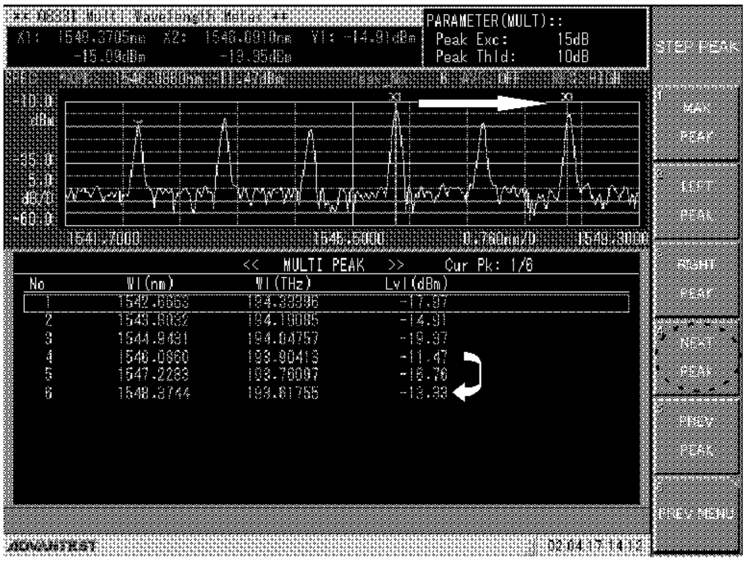


Figure 2-92 STEP PEAK (NEXT PEAK)

Moving to a wavelength peak in a higher level.

7. Select ***PREV PEAK.***

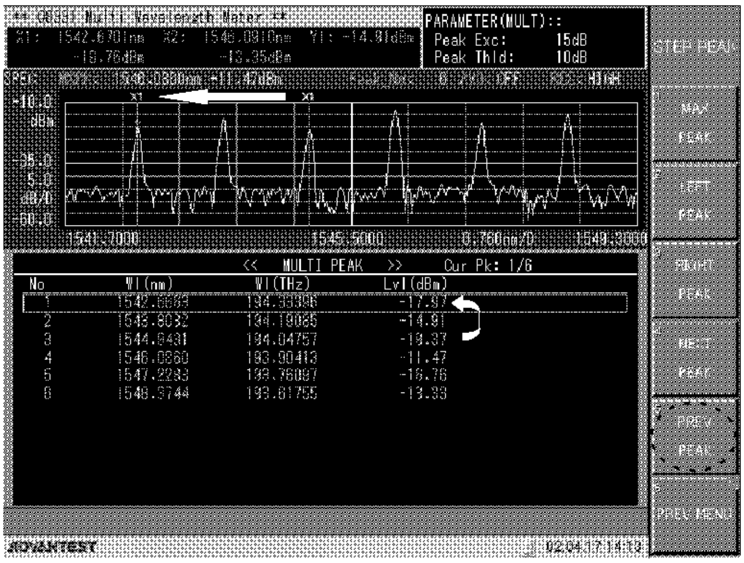


Figure 2-93 STEP PEAK (PREV PEAK)

2.8 How to Use the Expansion Function

This section describes how to use the expansion function. Button and key operations are explained from the preset conditions. For button and key presetting methods, refer to 2.8.2, "Initializing the Setting Conditions (PRESET)".

2.8.1 Turning the System Power Off (SHUT DOWN)

This section describes how to turn the Q8331 system power off.

CAUTION: ***Follow the procedures below when turning off the system.***

Turning the system off.

1. Press **SYSTEM.**
   The SYSTEM main menu is displayed.
2. Select ***SHUT DOWN.***
   Windows shuts down and the system power is turned off.

2.8.2 Initializing the Setting Conditions (PRESET)

The setting conditions are initialized.

1. Press **SYSTEM.**
   The SYSTEM main menu is displayed.
2. Select ***PRESET.***
   Setting conditions are initialized.
   For initial setting values, refer to 4.5, "Settings List".

2.8.3 Self Test (SELF TEST)

Executing the self-test.

1. Press **SYSTEM**.

   The SYSTEM main menu is displayed.

2. Select ***SELF TEST.***

   The self-test starts. When the test is complete, the results are displayed in the dialog box.

1. The test is completed normally.

   If the self-test is completed normally, ***PASS*** is displayed for each test item. Press **ENTER** to close the dialog box.

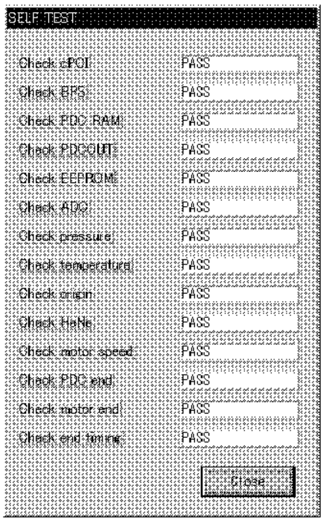


Figure 2-94 Normal Completion of the Self-test

2. An error is detected in the test.

   If an error is found during the self-test, ***FAIL*** is displayed. Depending on the error cause, the system may shut down automatically. If an error is found, stop the system operation and follow the procedures below.

   1. Note the error message.

      The information is necessary for the manufacturer to find the cause.

   2. Press **ENTER**.

      The dialog box closes and the measurement screen is displayed.

   3. Turn the system off. For details on how to turn the system power off, refer to 2.8.1, "Turning the System Power Off (SHUT DOWN)".

CAUTION: ***If an error is found during the self-test, contact the ADVANTEST sales office. Attach the error information when requesting a repair.***

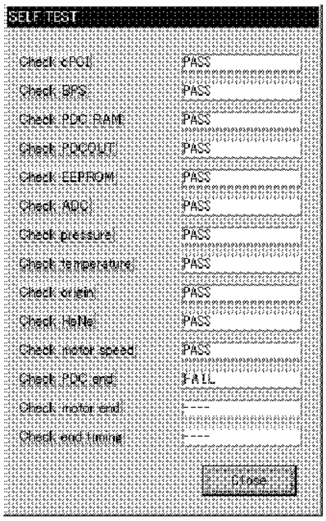


Figure 2-95 Error Completion of the Self -test

2.8.4 Setting the Label Display (LABEL)

A user specified message is displayed at the top of the screen. A message such as a measurement data comment can be displayed. The message, "**Q8331 Multi Wavelength Meter" is initially displayed.

Setting the label display.

1. Press **SYSTEM**. Select ***NEXT MENU*** and ***CONFIG***.
   The CONFIG menu is displayed.
2. Select ***LABEL***.
   A keyboard (software keyboard) is displayed.

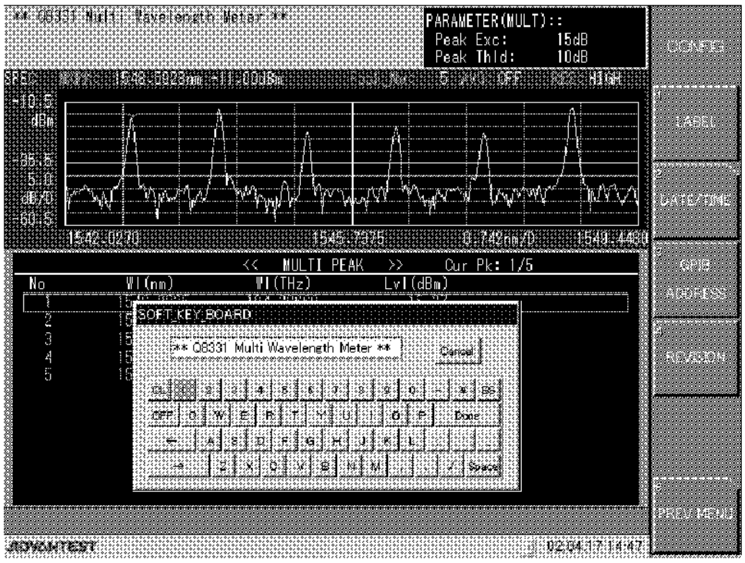


Figure 2-96 LABEL Setting

3. Input a message to display. A mouse can also be used to input a message. For details on how to input a message by using the software keyboard, refer to 2.2.3.3, "Inputting Data by Using the Software Keyboard".

2.8.5 Setting the Date and Time (DATE/TIME)

In the example below, the following date and time are set.

Date: March 20, 2002

Time: 14:53

Setting the date and time.

Enter Year, Month, Date, Hour, and Minutes in order.

1. Press **SYSTEM**. Select ***NEXT MENU***, ***CONFIG***, and ***DATE/TIME***.
   The sub menu is displayed.
2. Select ***YEAR***.
   The input window is displayed.
3. Press **2**, **0**, **0**, **2**, and **ENTER**.
   The year is set to 2002.
4. Select ***MONTH***.
   The input window is displayed.
5. Press **3** and **ENTER**.
   The month is set to March.
6. Select ***Day***.
   The input window is displayed.
7. Press **2**, **0**, and **ENTER**.
   The day is set to 20.
8. Select ***HOUR***.
   The input window is displayed.
9. Press **1**, **4**, and **ENTER**.
   The hour is set to 10.
10. Select ***MINUTE***.
    The input window is displayed.
11. Press **5**, **3** and **ENTER**.
    The minute is set to 53.

NOTE: When the minute is set, the second is reset to 0.

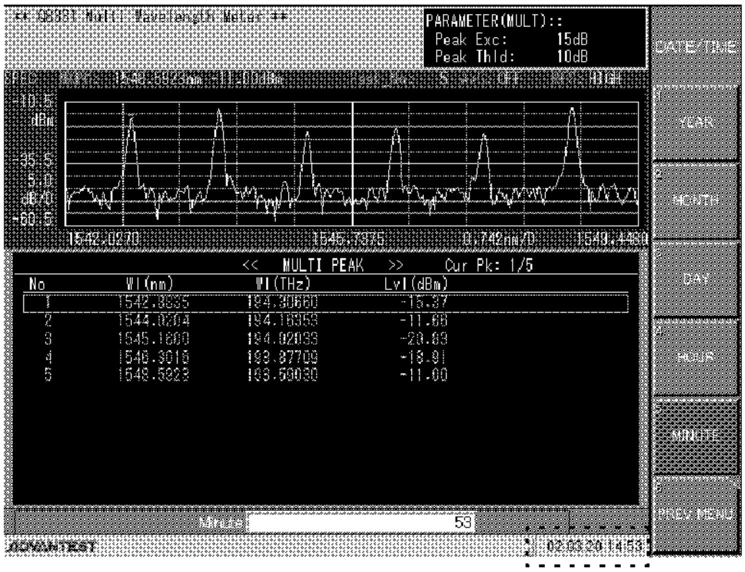


Figure 2-97 Setting the Date and Time (MINUTE)

2.8.6 Setting the GPIB Address (GPIB ADDRESS)

In the following example, the GPIB address is set to 12.

Setting the GPIB address.

1. Press **SYTEM**. Select ***NEXT MENU***, and ***CONFIG.***
   The CONFIG menu is displayed.
2. Select ***GPIB ADDRESS.***
   The input window is displayed.
3. Press **1**, **2**, and **ENTER**.
   The address is set to 12.

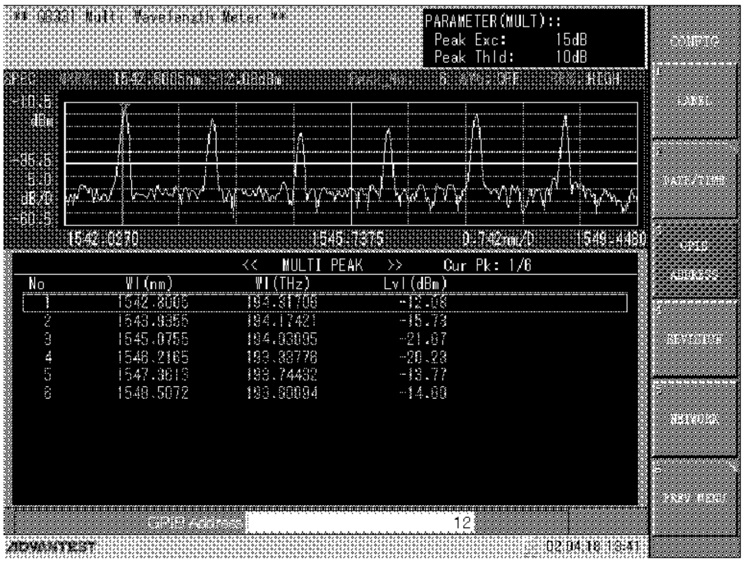


Figure 2-98 Setting the GPIB Address (GPIB ADDRESS)

2.8.7 Displaying the System Information (REVISION)

Follow the procedure below to display the system information.

Displaying the system information.

1. Press **SYSTEM**. Select ***NEXT MENU*** and ***CONFIG***.
   The CONFIG menu is displayed.
2. Select ***REVISION***.
   The software version and serial number are displayed in the dialog box.

NOTE: ***Write down the software version and serial number in the performance test result record sheet described in Chapter 7.***

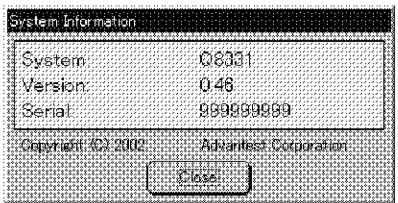


Figure 2-99 System Information

2.8.8 Network Settings

Connecting this analyzer to a network allows sharing of files and folders with computers on the network. This appendix explains the method for setting up a network.

Set up procedure.

1. Stop the measurement by pressing ***MEASURE*** and selecting ***STOP.***
2. Press ***SYSTEM.*** Select ***NEXT MENU*** and ***CONFIG.***
   The CONFIG menu is displayed.
3. Press ***NETWORK.***
   The Network dialog box is displayed.

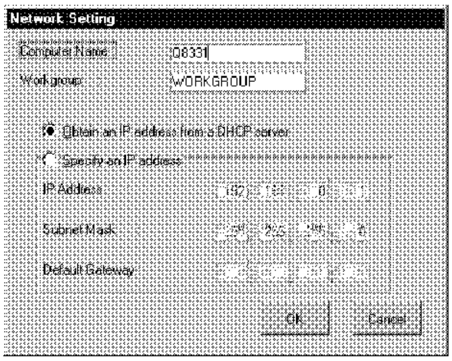


Figure 2-100 Network Dialog Box

4. The ***Computer Name*** setting can be changed. Press **ENTER.**
   The soft keyboard is displayed.

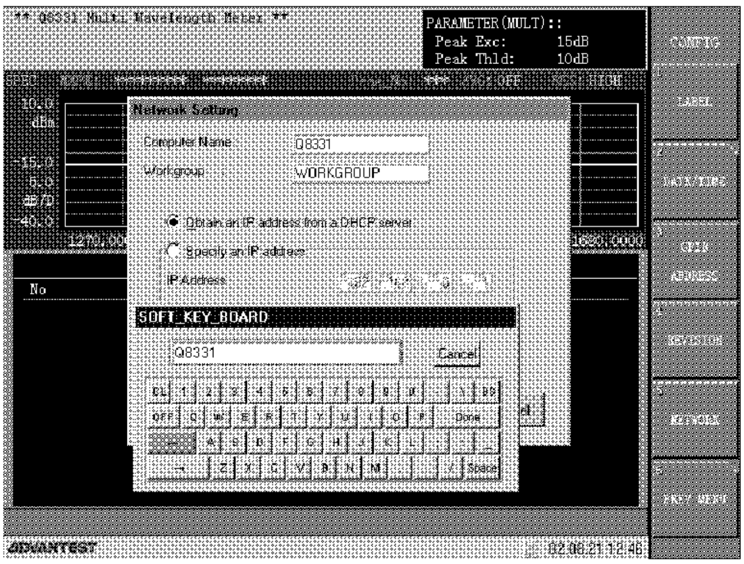


Figure 2-101 Changing Computer Name

5. Enter the ***Computer Name*** by using the soft keyboard.

   Workgroups can be entered by using the same procedure. Select ***Workgroup*** by using the step buttons (△, ▽) and enter all necessary information. For information on how to use the soft keyboard, refer to Section 2.2.3.3, "Inputting Data by Using the Software Keyboard.

When specifying an IP address.

6. After pressing the step buttons (△, ▽), select ***Specify an IP address*** by rotating the data knob.

   Selecting ***Specify an IP address*** enables ***IP Address***, ***Subnet Mask***, and ***Default Gateway*** settings to be changed.

7. Select ***IP Address*** by using the step buttons (△, ▽). Enter a number into the far left box by using the numeric keypad. Rotate the data knob to the right to select another box. Enter numbers in other boxes by using the same method.

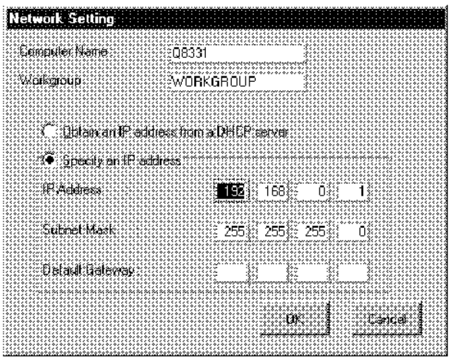


Figure 2-102 Selecting IP Address

8. Select ***Subnet Mask*** and ***Default Gateway*** settings by using the step buttons (△, ▽) to enter similar information as IP Address.

When using the DHCP server.

9. After pressing the step buttons (△, ▽), select ***Obtain an IP address from a DHCP server*** by rotating the data knob.

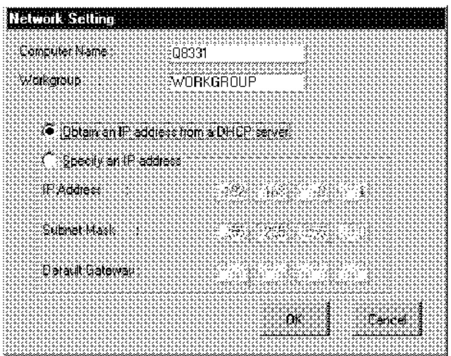


Figure 2-103 Selecting Obtain an IP address from a DHCP server

10. Select ***OK*** by using the step buttons (△, ▽). Press the **ENTER** key to display a message which recommends restarting the system to update the settings. To restart, press **ENTER.** To update the new settings later and not restart the system, select ***No*** by rotating the data knob and press **ENTER.** The new settings are saved and the dialog box closed.

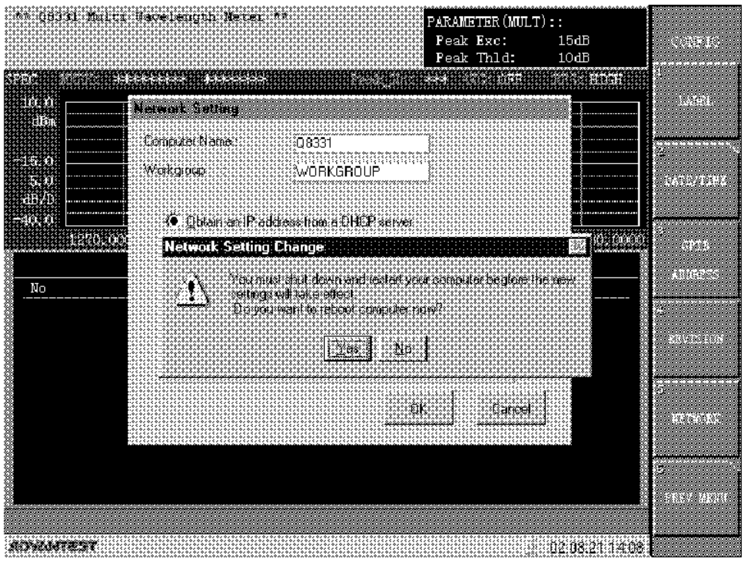


Figure 2-104 Selecting OK

Selecting ***Cancel*** and pressing **ENTER** closes the dialog box and returns all settings to original values.

CAUTION:

1. If "Obtain an IP address from a DHCP server" is selected in a network system where the DHCP server is unavailable, an error occurs when the Q8331 starts.

2. If the IP address is the same as the IP address of another computer in the same network, an error also occurs and the Q8331 does not start correctly. However, if the error message is cleared (not including network error messages), the Q8331 runs correctly.

To avoid the above errors, when connecting the Q8331 to the network, ensure that a mouse is connected before turning the power on.

2.9 Saving or Loading Data (SAVE/LOAD)

This section describes how to save the data into or load data from the system hard disk or floppy disks.

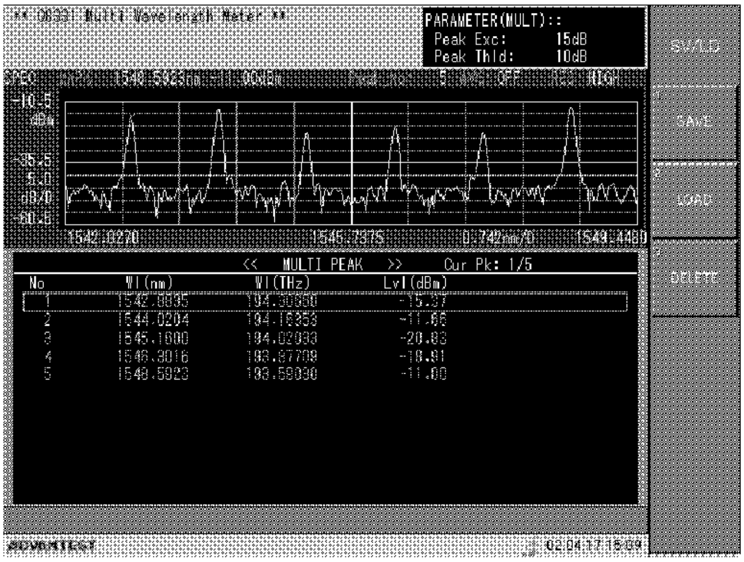


Figure 2-105 SAVE/LOAD Main Menu

2.9.1 Saving Data (SAVE)

The Q8331 stores the following data in the system hard disk and floppy disks. For more details on the data, refer to A.2, "SAVE Data Contents".

- Spectrum waveform data
- List data
- Trend data
- Setting conditions

CAUTION:

1. ***Use D drive when storing data in the system hard disk.***
2. ***Use preformatted floppy disks.***
3. ***A setting condition file (.SAV) is necessary when loading data. Do not delete this file from the system.***
4. ***The trend data can only be saved when the trend measurement function is set to ON. The trend data cannot be loaded from the system.***
5. ***When re-naming a saved file, rename all the saved files. If a data file and the corresponding condition settings file have different file names, the data cannot be loaded correctly.***

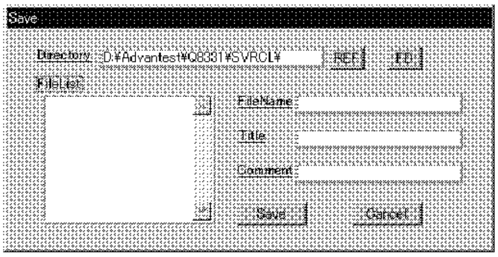


Figure 2-106 Save Dialog Box

Saving data into a floppy disk.

1. Press **SAVE/LOAD** and select ***SAVE***.

   The Save dialog box is displayed.

2. Insert the floppy disk in the disk drive with the label side facing up.

3. Using the step buttons, select ***FD***. Then, press **ENTER**.

   The files stored in the floppy disk are displayed.

4. Using the step buttons, select ***File Name*** and press **ENTER**.

   The software keyboard is displayed.

5. Input a file name by using the software keyboard.

   A title and comment can also be input by using the same process. For the software keyboard operations, refer to 2.2.3.3, "Inputting Data by Using the Software Keyboard".

6. Using the step buttons, select ***Save***. Then, press **ENTER**.

   The data is stored in the floppy disk.

Saving data into the hard disk.

1. Press **SAVE/LOAD** and select ***SAVE***.

2. Using the step buttons, select ***REF***. Then press **ENTER**.

   The data saving default directory D:\Advantest\Q8331\SVRCL\ is selected.

3. Using the step buttons, select ***File Name*** and press **ENTER.**

   The software keyboard is displayed.

4. Input a file name by using the software keyboard.

   A title and comment can also be input by using the same process. For the software keyboard operations, refer to 2.2.3.3, "Inputting Data by Using the Software Keyboard".

5. Using the step buttons, select ***Save.*** Then, press **ENTER.**

   The Data is stored in the hard disk under the specified directory.

2.9.2 Loading Data (LOAD)

The following describes how to load the Q8331 system data from the hard disk and floppy disks.

CAUTION:

1. ***Place the setting condition file and data files under the same directory when loading the data. Data cannot be loaded without the data setting condition file.***
2. ***The trend data file cannot be loaded.***

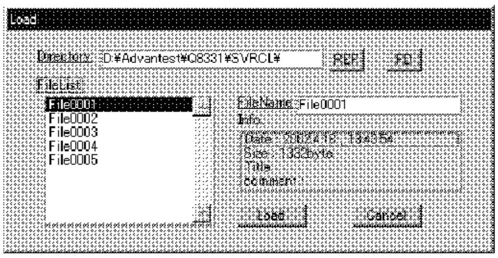


Figure 2-107 Load Dialog Box

Loading data from a floppy disk.

1. Press **SAVE/LOAD** and select ***LOAD.***
2. Insert the floppy disk in the disk drive with the label side facing up.
3. Using the step buttons, select ***FD.*** Then, press **ENTER.**

   The files stored in the floppy disk are displayed.

4. Using the step buttons, select ***File List.***
5. Using the data knob, select the file to load.
6. Using the step buttons, select ***LOAD.*** Then, press **ENTER.**

   The data is loaded from the selected file.

Loading data from the hard disk.

1. Press **SAVE/LOAD** and select ***LOAD***.
2. Using the step buttons, select ***REF***. Then, press **ENTER**.
   The default directory D:\Advantest\Q8331\SVRCL\ is selected.
3. Using the step buttons, select ***File List***. Then, press **ENTER**.
4. Using the data knob, select the file to load.
5. Using the step buttons, select ***Load***. Then, press **ENTER**.
   The Data is loaded from the file.

2.9.3 Data Deletion (DELETE)

This section describes how to delete data saved in the unit.

CAUTION: ***Data cannot be recovered once it is deleted. Check data before deleting.***

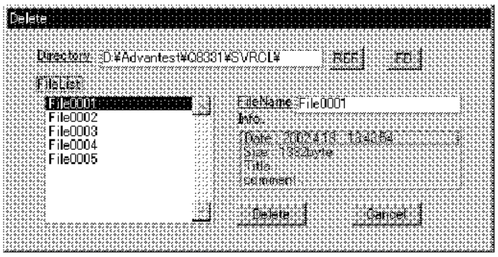


Figure 2-108 Delete Dialog Box

Deleting data from a floppy disk.

1. Press **SAVE/LOAD** and select ***DELETE***.
2. Insert the floppy disk in the disk drive with the label side facing up.
3. Using the step buttons, select ***FD***. Then, press **ENTER**.
   The files stored in the floppy disk are displayed.
4. Using the step buttons, select ***File List***.
5. Using the data knob, select the file to delete.
6. Using the step buttons, select ***Delete***. Then, press **ENTER**.
   The selected file is deleted from the floppy disk.

Deleting data from the hard disk.

1. Press **SAVE/LOAD** and select ***DELETE***.
2. Using the step buttons, select ***REF***. Then, press **ENTER**.
   The default directory D:\Advantest\Q8331\SVRCL\ is selected.
3. Using the step buttons, select ***File List***. Then, press **ENTER**.
4. Using the data knob, select the file to delete.
5. Using the step buttons, select ***Delete***. Then, press **ENTER**.
   The selected file is deleted from the hard disk.

2.10 Copying the Screen (BMP TO FILE)

The displayed contents can be stored in a file with the bitmap format. The data is stored in a floppy disk.

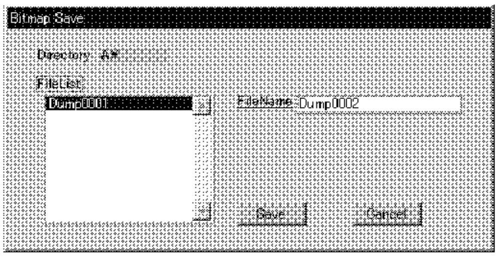


Figure 2-109 Bitmap Save Dialog Box

Storing a bitmap data to a floppy disk.

1. Insert the floppy disk in the disk drive with the label side facing up.
2. Press **COPY** and select ***BMP TO FILE***.
   The Bitmap Save dialog box is displayed.
3. Using the step buttons, select ***File Name*** and press **ENTER**.
   The software keyboard is displayed.
4. Input a file name by using the software keyboard.
   A title and comment can also be input by using the same process. For the software keyboard operations, refer to 2.2.3.3, "Inputting Data by Using the Software Keyboard".
5. Using the step buttons, select ***Save***. Then, press **ENTER**.
   The picture data is stored in the floppy disk.

2.11 Copying and Deleting Files (FILE MANAGER)

This section describes how to copy and delete files from the internal hard disk and floppy disks.

2.11.1 Copying Files

This section describes how to copy files.

1. Press **COPY** and select ***FILE MANAGER***.

   The FILE MANAGER dialog box is displayed.

   D:\MyData is set to ***Directory1*** and A: is set to ***Directory2***.
   List1 and ***List2*** display files and subdirectories in ***Directory1*** and ***Directory2*** respectively.

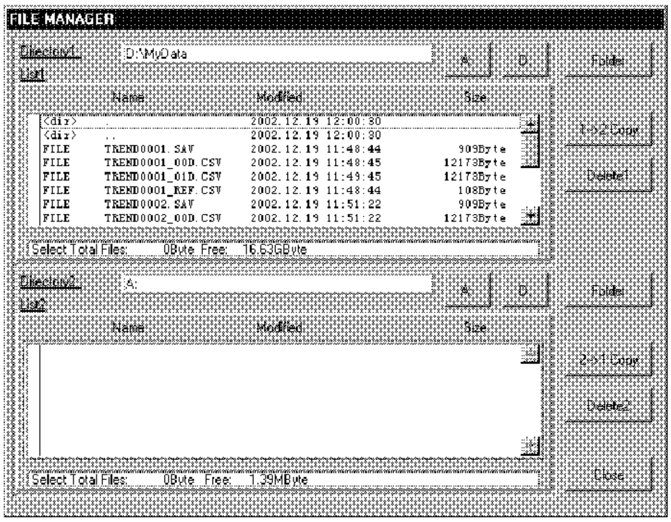


Figure 2-110 FILE MANAGER Dialog Box

Selecting files for copying.

Select files.

2. Move the cursor to ***List1*** by using the step buttons (△, ▽).

3. Select files by rotating the data knob. Then, press **ENTER.**

   A check mark is entered to the left side of the file information. Pressing **ENTER** again clears the check mark.

   More than one file can be selected by using the same method.

   Pressing **ENTER** in the directory "<dir> ." selects all the files and subdirectories in that directory.

   "Select Total Files", which appears under each list, displays the total size of the selected files. Files in subfolders are not included. When copying these files to ***Directory2***, check for sufficient space (Free) and select appropriately sized files.

Creating a new folder in the destination directory.

To create a new folder in the destination directory to save copied files, follow the procedure described below. To copy files in ***Directory2***, skip steps 4 and 5.

4. Move the cursor to the ***Folder*** in the directory by using the step buttons (△, ▽).
5. Press **ENTER.**

   The software keyboard is displayed. A default folder name is already entered. Enter a new folder name if necessary. For more information on the software keyboard operations, refer to 2.2.3.3, "Inputting Data by Using the Software Keyboard."

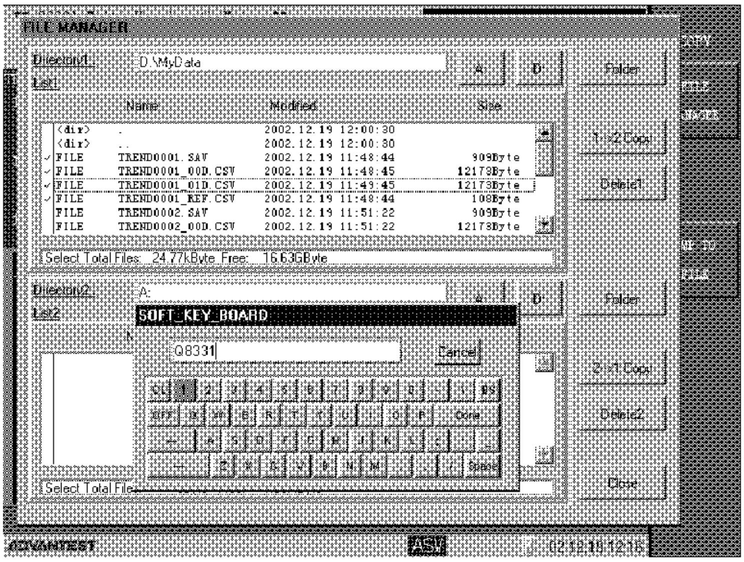


Figure 2-111 Creating a New Folder

Copying files.

Copy the selected files in ***Directory2.***

6. Move the cursor to ***1→2 Copy*** by using the step buttons (△, ▽).
7. Press **ENTER.**

   Copy the files selected in step 3 to ***Directory2.***

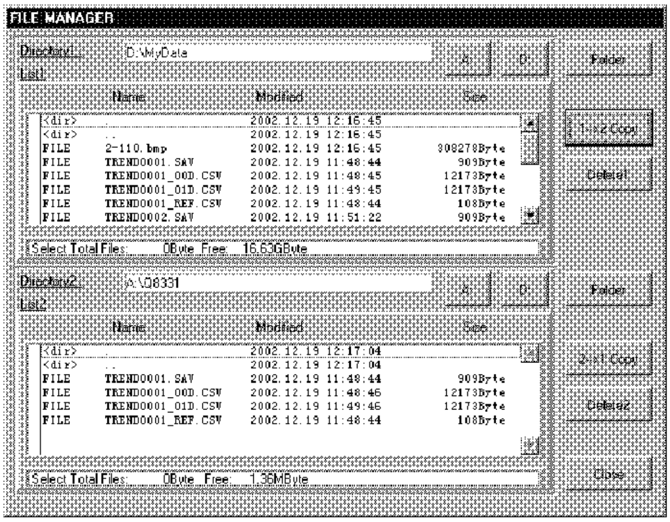


Figure 2-112 Copying Files

8. In the same manner, files located in ***Directory2*** can be copied to ***Directory1***. To do this, select the files in ***List2***. Select ***2→1*** Copy instead of ***1→2*** Copy and then press **ENTER**.

2.11.2 Deleting Files

This section describes how to delete files.

1. Press **COPY** and select ***FILE MANAGER***.

   The FILE MANAGER dialog box is displayed.
   D:\MyData is set to ***Directory1*** and A: is set to ***Directory2***.
   List1 and ***List2*** display files and subdirectories in ***Directory1*** and ***Directory2*** respectively.

Selecting files for deleting.

Select files.

2. Move the cursor to ***List1*** by using the step buttons (△, ▽).

3. Select a file by rotating the data knob and press **ENTER**.

   A check mark is entered on the left side of the file information. Pressing **ENTER** again clears the check mark.

   More than one file can be selected by using the same method.
   Pressing **ENTER** in directory "<dir> ." selects all the files and subdirectories in that directory.

Deleting files.

Delete the selected files in ***Directory1.***

4. Move the cursor to ***Delete1*** by using the step buttons (△, ▽).
5. Press **ENTER**.
6. Delete all the files and sub files selected in step 3.

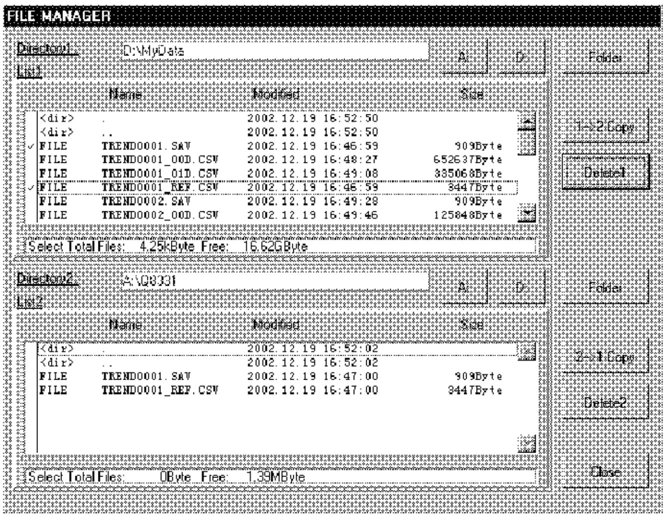


Figure 2-113 Deleting Files

7. The files and subdirectories in ***Directory2*** can be deleted by using the same method.

   To do this, select the files and subdirectories in ***List2***. Select ***Delete2*** instead of ***Delete1*** and then press **ENTER**.

CAUTION: ***Files and directories in the internal hard disk drive (D:) or floppy disk drive (A:) can only be copied or deleted.***
The D:\Advantest\Q8331\SVRCL\ directory includes files for backup settings used when the power is turned on.
Therefore, the D:\Advantest\Q8331\SVRCL\ directory cannot be deleted.
D:\Advantest\Q8331\mwm.DLL and D:\Advantest\Q8331\declare mwm.bas files also cannot be deleted because these two files are used for controlling communication to the instrument from an external controller.

---

3. MEASUREMENT SAMPLES

This chapter introduces practical usages of the Q8331 with measurement samples.

3.1 Wavelength Measurement

This section describes how to measure wavelengths.

Measurement conditions: The sample measures a 1.55 μm wavelength band multi mode laser diode. Select suitable values for the measurement sample when setting parameters.

Turning the Q8331 system on.

1. Install the unit on a stable even floor.

CAUTION: Operate the unit under the even condition only.

2. Ensure that the **POWER** switch on the front panel is turned off.
3. Plug the enclosed power cable into the AC power supply connector on the rear panel.

CAUTION:

1. To avoid damaging the unit, do not apply a voltage or frequency exceeding the specified values (refer to section 1.4.2).
2. Maximum power consumption is 120 VA. Use a suitable power supply.

4. Plug the power cable into the power outlet.
5. Turn on the **POWER** switch located in the front panel.

   Windows is started and the self-test is executed. The measurement window is displayed.

NOTE:

1. For accurate measurements, operate the unit in the specified temperature range.
2. The unit requires 30 minutes or longer warm up time after the power is turned on.
3. The initial measurement display may be different depending on the conditions the unit was last set.

Initializing the setting conditions.

Set the unit to the initial conditions.

6. Press **SYSTEM** and select ***PRESET.***
   The initial setting condition is loaded.

Connecting the light source.

Connect the light source to measure.

7. Connect the light source output and the unit input using a single mode optical fiber cable.

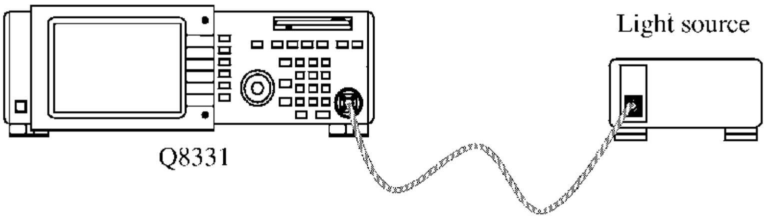


Figure 3-1 Multi Mode Laser Diode Measurements

Setting the measurement conditions.

Set the measurement conditions for easy input signal monitoring.

8. Press **SCALE** and select ***λ-f SCALE.***
   The λ-f SCALE menu is displayed.

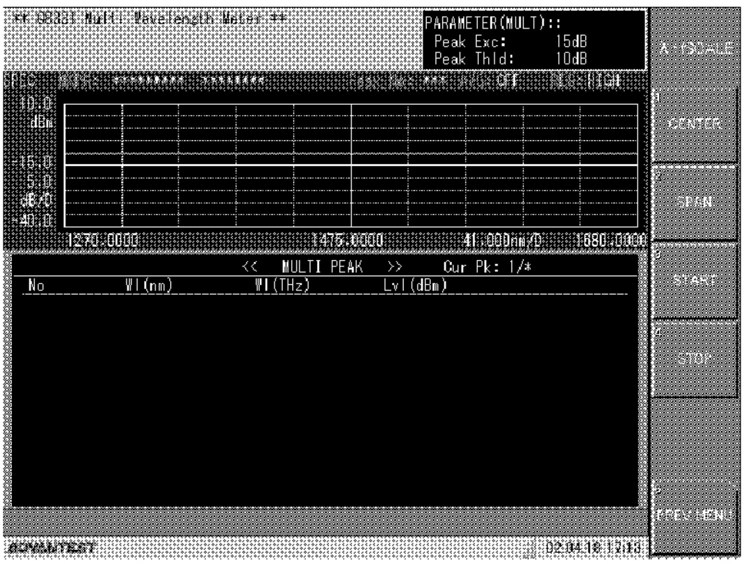


Figure 3-2 Display Scale Setting

Setting the X-axis display.

Set the center wavelength to 1544.5 nm.

9. Select ***CENTER***.
   The input window is displayed.
10. Press **1**, **5**, **4**, **4**, **.**, **5** and **ENTER**.
    The center wavelength is set to 1544.5 nm.

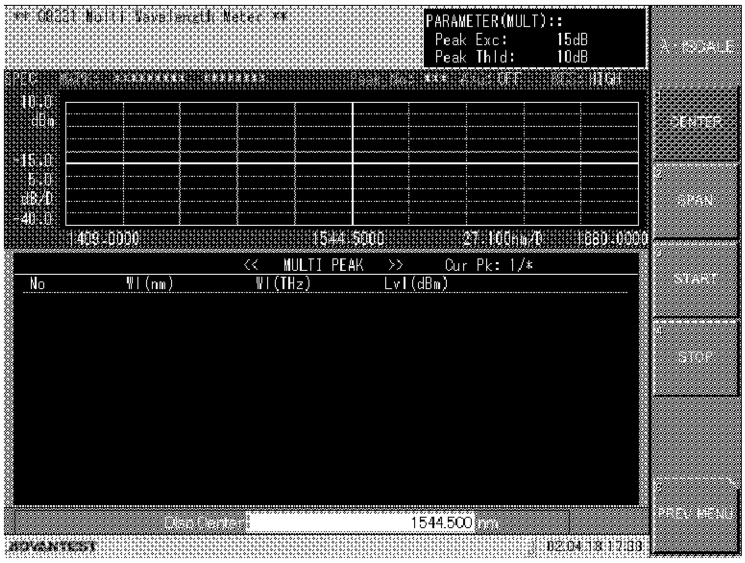


Figure 3-3 Center Wavelength Setting

Set the display span to 10 nm.

11. Select ***SPAN***.
12. Press **1**, **0**, and **ENTER**.
    The display span is set to 10 nm.

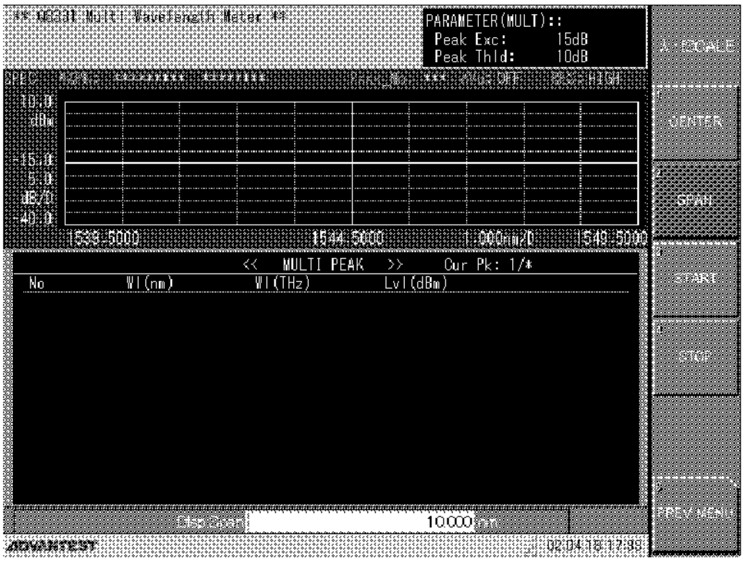


Figure 3-4   Display Span Setting

Setting the Y-axis display.

Set the Y-axis display upper limit to -10 dBm.

13. Select ***PREV MENU***.

    The main menu reappears.

14. Select ***UPPER LEVEL***.

    The input window is displayed.

15. Press **-**, **1**, **0** and **ENTER**.

    The Y-axis display upper limit is set to -10 dBm.

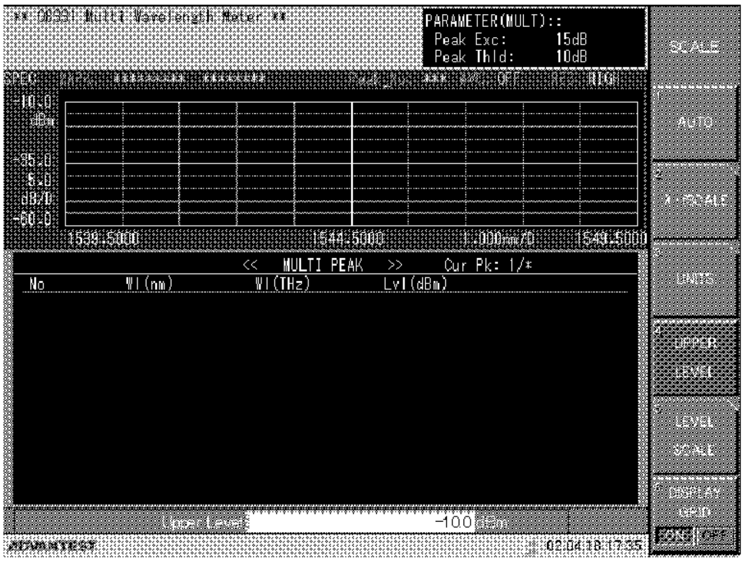


Figure 3-5 Display Level Setting

Executing the measurement.

16. Press **MEASURE** and select ***SINGLE***.

    A measurement is taken and the spectrum and wavelength peak list are displayed.

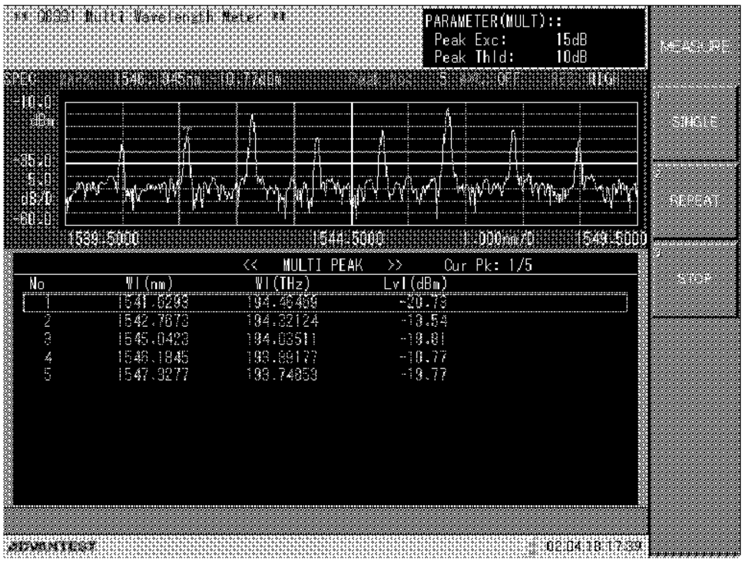


Figure 3-6 Input Signal Measurement Results

Cursor Displays.

Using the cursor function, data is loaded.

17. Press **CURSOR** and select ***X1 ON/OFF***(ON).

    The X1 cursor appears perpendicular to the X-axis on the display. The measurement point (wavelength and level value) specified by the cursor is displayed in the cursor displaying area.

Move the X1 cursor to the wavelength which has the maximum peak level.

18. Select ***STEP PEAK*** and ***MAX PEAK***.

    The X1 cursor moves to the maximum peak level wavelength.

The wavelength difference between 2 wavelengths can be found by using the cursor function.

19. Select ***X2 ON/OFF***(ON).

    The X2 cursor appears perpendicular to the X-axis on the display. The measurement point which X2 is currently specifying is displayed in the upper part of the screen.

20. Move the X2 cursor to the first peak on the left side of the X1 cursor.

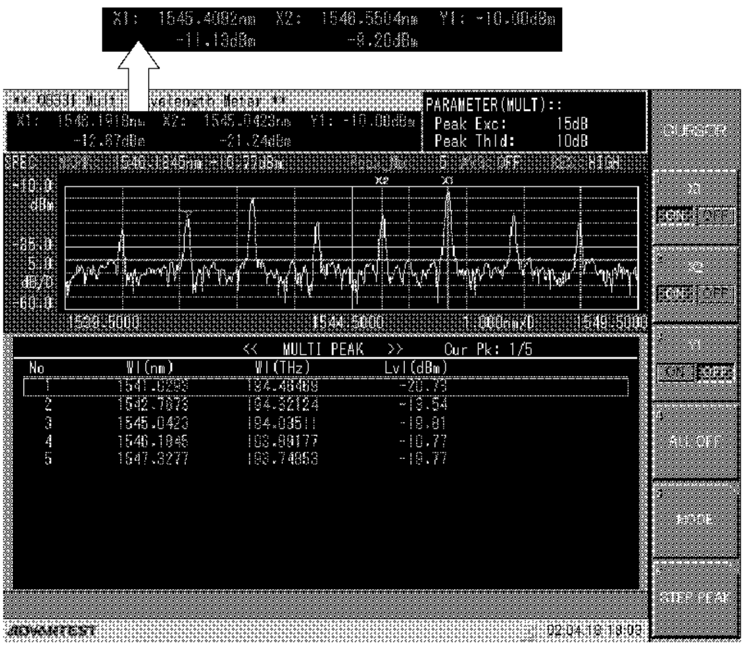


Figure 3-7 Cursor Display

21. Select ***MODE*** and ***DELTA***.

    The X2 displayed in the upper screen window is changed to ΔX. The difference of the 2 wavelengths is displayed.

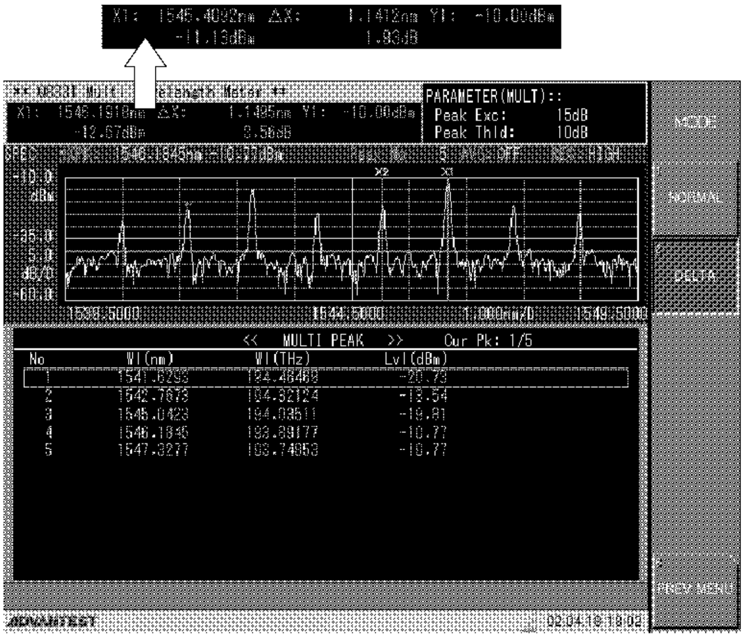


Figure 3-8 Two Wavelengths Interval Measurement

3.2 WDM Optical Signal Characteristic Analysis (LIST Function)

This section describes how to analyze WDM optical signal main parameters.

Measurement conditions: The WDM optical signal source of 1550 nm band wavelength and 8 channel numbers is measured. Other parameters related to the measurement are left out to the initial values when taking the measurement.

Turning the Q8331 system on.

1. Install the unit on a stable even floor.

CAUTION: Operate the unit under the even condition only.

2. Turn on the **POWER** switch located in the front panel.

   Windows is started and the self-test is executed. The measurement window is displayed.

NOTE:

1. For accurate measurements, operate the unit in the specified temperature range.
2. The unit requires 30 minutes or longer warm up time after the power is turned on.
3. The initial measurement display may be different depending on the conditions the unit was last set.

Initializing the setting conditions.

Set the unit to the initial conditions.

3. Press **SYSTEM** and select ***PRESET***.

   The initial setting condition is loaded.

Connecting the light source.

Connect the optical signal to measure.

4. Connect the light source output and the unit input by using a single mode optical fiber cable.

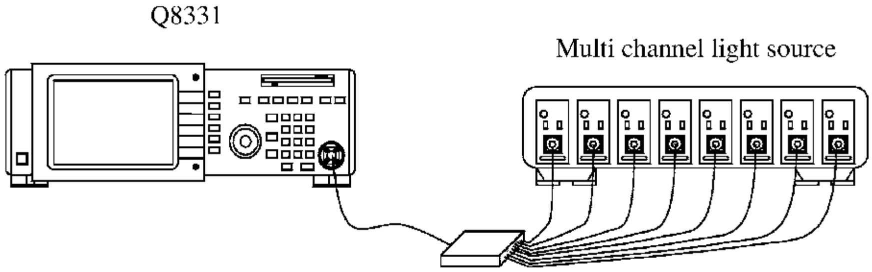


Figure 3-9 Input Signal Connections

Setting the measurement conditions.

Set the measurement conditions for easy input signal monitoring.

5. Press **SCALE** and select ***λ·f SCALE***.

   The λ·f SCALE menu is displayed.

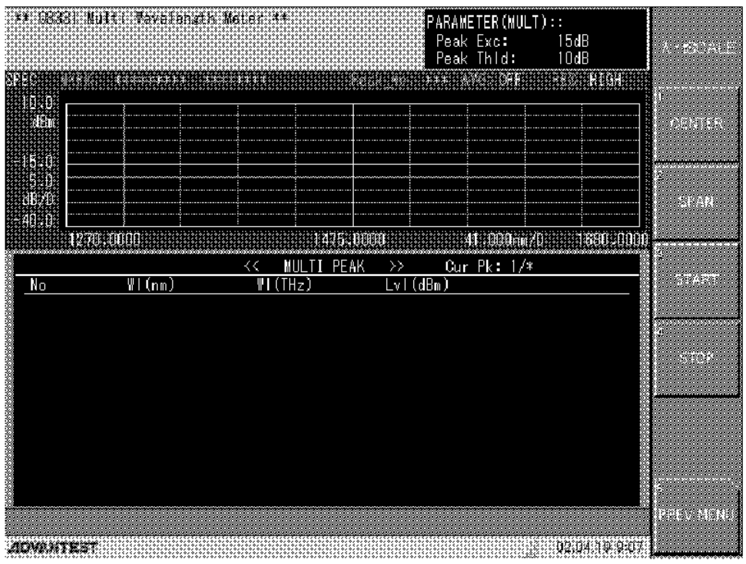


Figure 3-10 Display Scale Setting

Set the center wavelength to 1553 nm.

6. Select ***CENTER***.

   The input window is displayed.

7. Press **1**, **5**, **5**, **3**, and **ENTER**.

   The center wavelength is set to 1553 nm.

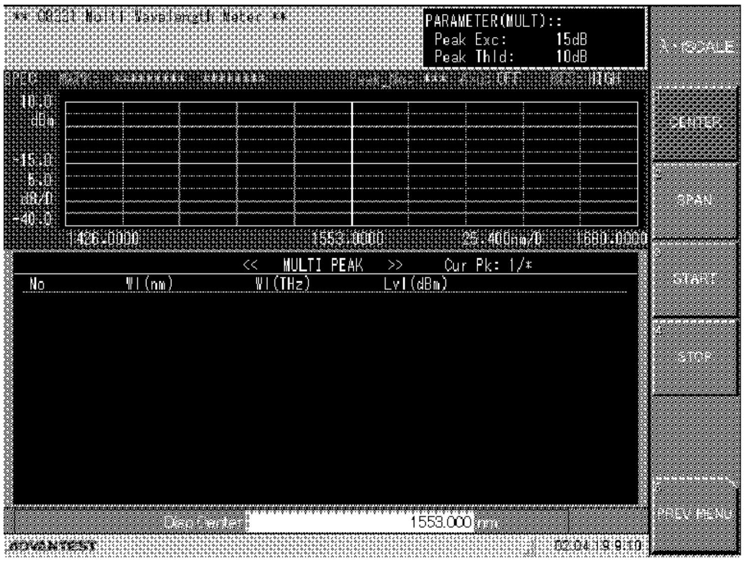


Figure 3-11 Center Wavelength Setting

Set the display span to 4 nm.

8. Select ***SPAN***.

   The input window is displayed.

9. Press **4** and **ENTER**.

   The display span is set to 4 nm.

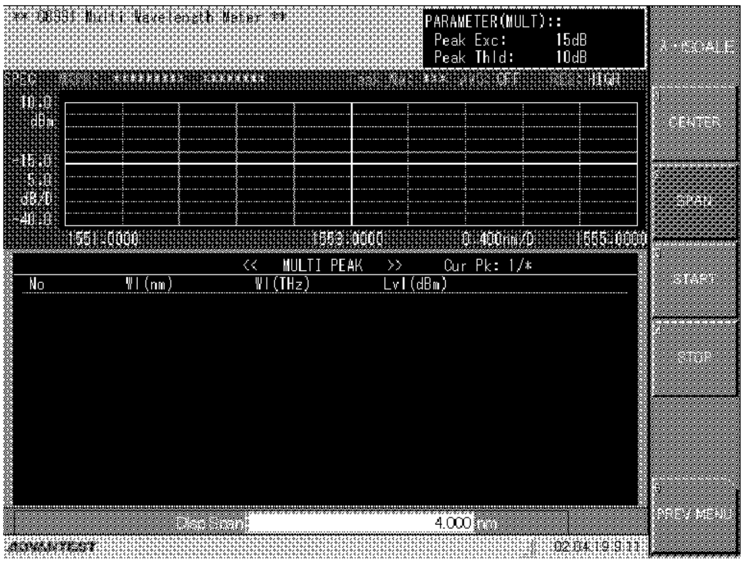


Figure 3-12 Display Span Setting

Setting the Y-axis display.

10. Select ***PREV MENU.***
    The main menu reappears.

Set the Y-axis display upper limit to -5 dBm.

11. Select ***UPPER LEVEL.***
    The input window is displayed.

12. Press **-**, **5** and **ENTER.**
    The Y-axis display upper limit is set to -5 dBm.

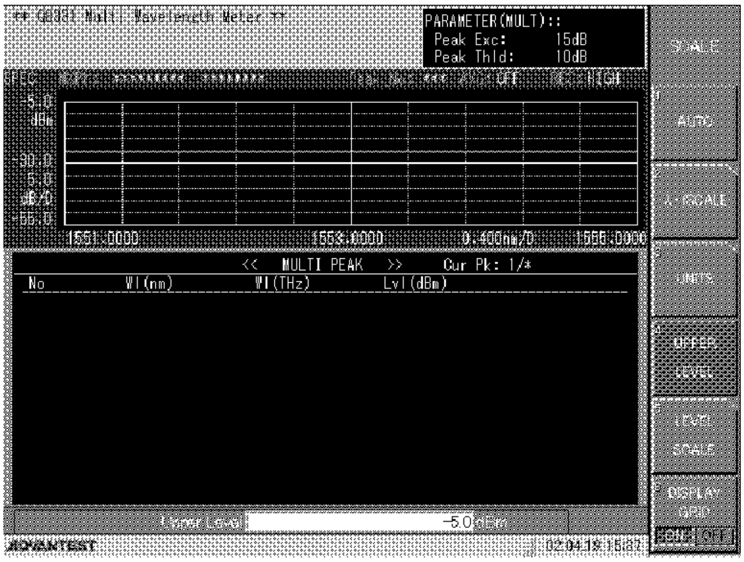


Figure 3-13 Display Upper Level Setting

Executing the measurement.

13. Press **MEASURE** and select ***SINGLE.***
    A measurement is taken and the spectrum is displayed.

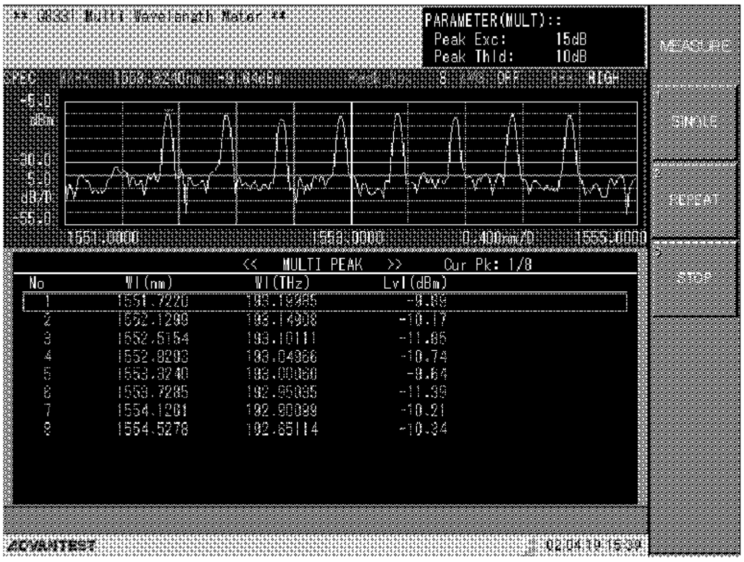


Figure 3-14 Input Signal Measurement Results

Data analysis.

Using the list function, measurement data is analyzed.

14. Press **APPLICATION**.

    The APPLICATION main menu is displayed.

15. Select ***LIST***.

    The LIST menu is displayed.
    In the initial setting, the LIST is set to ON.

    Wavelength peaks which satisfy the specified conditions are listed in the lower half display. For wavelength peak signal condition settings, refer to 2.3.3, "Setting the Signal Threshold (THRESHOLD)".

NOTE: ***The list displays peak wavelengths which are within the measurement calculation process range.***
For the measurement calculation process range setting, refer to 2.3.1, "Setting the Measurement Calculation Process Range (MEAS LIMITS)".

WDM signal wavelength level analysis (Multi peak).

The measurements are made in the MULTI PEAK mode.
The unit is initially set to measure with the MULTI PEAK mode. The measurement list displays wavelength peaks, peak frequencies, and wavelength peak levels in this order from left to right.

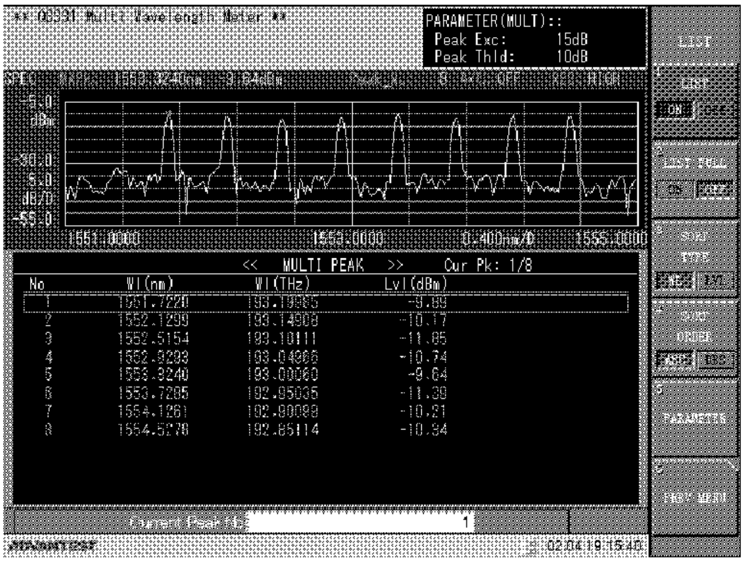


Figure 3-15 MULTI PEAK Mode List Display

SNR analysis.

Each signal SNR is analyzed. For details on SNR calculations, refer to 6.2, "SNR Calculation".

16. Select ***PARAMETER***.

    The dialog box is displayed.

17. Select ***LIST Mode*** by using the step buttons (△, ▽).

18. Rotate the data knob to select ***SNR***.

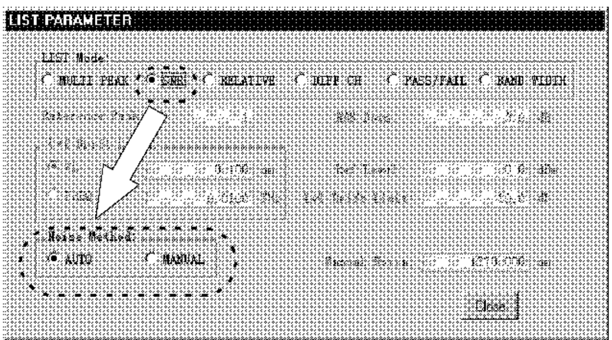


Figure 3-16 List Parameter Setting Screen (Set to SNR)

19. Select ***Noise Method*** by using the step buttons (△, ▽).
20. Rotate the data knob to select ***AUTO***.
21. The dialog box closes.
    The signal level, noise, and SNR for each channel are listed.

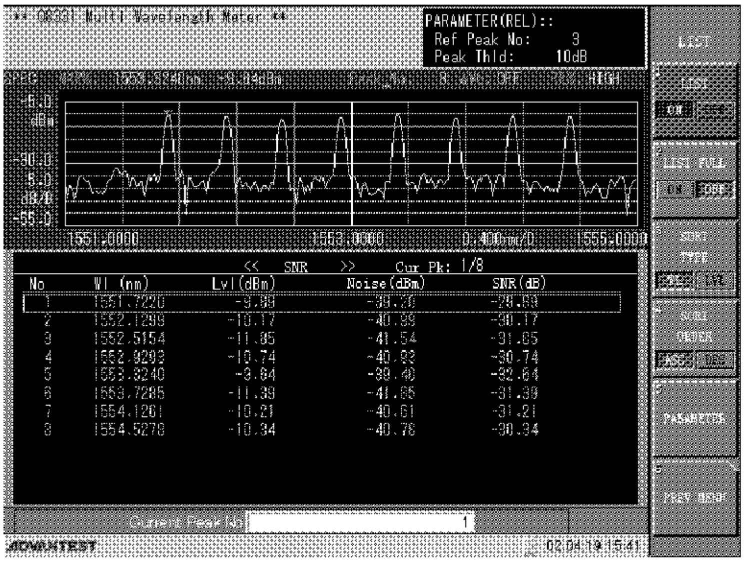


Figure 3-17 SNR List Display

Comparison analysis with the relative peak (RELATIVE).

22. Select ***PARMETER***.
    The dialog box is displayed.
23. Select ***RELATIVE*** in the ***LIST Mode***.

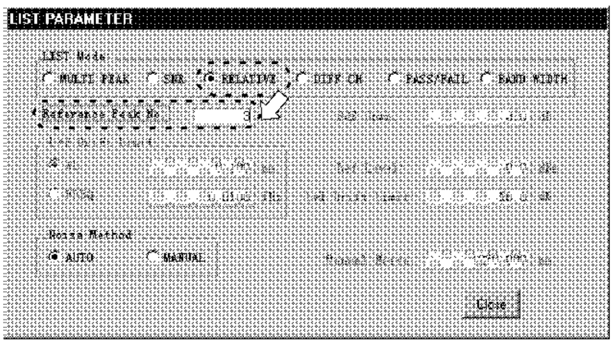


Figure 3-18 List Parameter Setting (Set to RELATIVE)

24. Select ***Reference Peak No*** by using the step buttons (△, ▽).
25. Press **3** and **ENTER**.

    The reference channel is set to 3.
26. The dialog box closes.

For each peak, the measurement list displays the wavelength, channel space, wavelength difference with the reference peak, peak level, and level difference with the reference peak in this order from left to right.

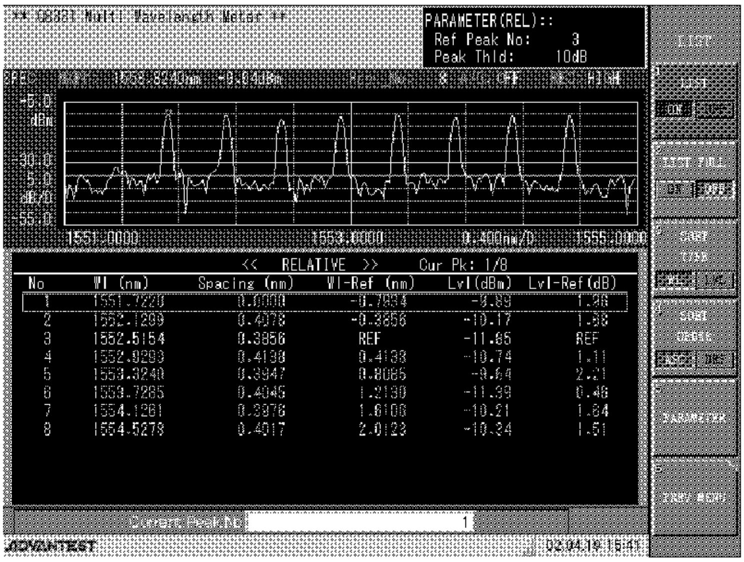


Figure 3-19 Relative Value List Display

Comparison analysis with the reference grid (DIFF CH).

The grid table comparison results are listed.

Setting the reference grid.

27. Press **SET UP** and select ***GRID TABLE***.

    The dialog box is displayed.
28. Set the ***GRID Ref Frequency*** to 193.1 THz and set the ***GRID CH Spacing*** to 50 GHz.

    (For the value setting methods, refer to 2.3.4, "Creating the Grid Table (GRID TABLE)".)
29. Press **APPLICATION** and select ***PARAMETER***.

    The dialog box is displayed.
30. Select ***LIST Mode*** by using the step buttons (△, ▽).

31. Rotate the data knob to select ***DIFF CH***.

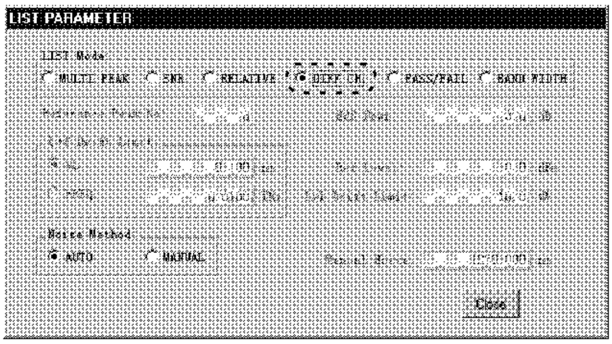


Figure 3-20 List Parameter Setting (Setting to DIFF CH)

32. The dialog box closes.

The measurement list displays reference wavelength, measured wavelength peaks, and wavelength differences between the reference and measured peaks in this order from left to right.

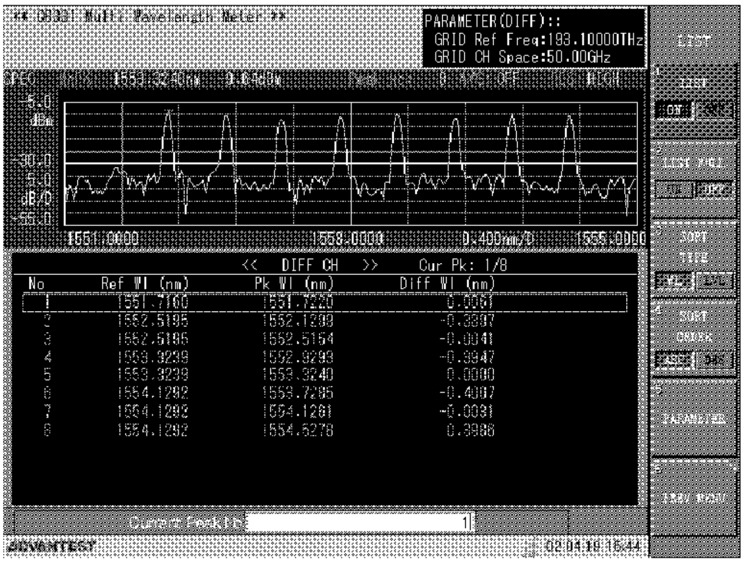


Figure 3-21 Comparison Results With the Reference Grid

PASS/FAIL Evaluation.

Each channel signal conformance to the reference wavelength, grid spacing, signal level, wavelength, and level drift parameters is evaluated.

Set parameters.

33. Select ***PARAMETER***.
    The dialog box is displayed.

Set the LIST mode.

34. Select ***LIST Mode*** by using the step buttons (△, ▽).
35. Rotate the data knob to select ***PASS/FAIL***.

Set the wavelength drift limit value.

36. Select ***λ•f Drift Limit*** by using the step buttons (△, ▽).
37. Move the cursor to the ***WL*** mode by rotating the data knob.
38. Select the WL input area by using the step buttons (△, ▽).
39. Press **0**, **.**, **1**, and **ENTER**.
    The wavelength drift limit is set to 0.1 nm.

Set the reference level.

40. Select ***Ref Level*** by using the step buttons (△, ▽).
41. Press **-**, **1**, **0**, and **ENTER**.
    The reference level is set to -10 dBm.

Set the level drift limit value.

42. Select ***Lvl Drift Limit*** by using the step buttons (△, ▽).
43. Press **1**, **.**, **5**, and **ENTER**.
    The level drift limit is set to 1.5 dB.

Set noise.

44. Select ***Noise Method*** by using the step buttons (△, ▽).
45. Rotate the data knob to select ***AUTO***.

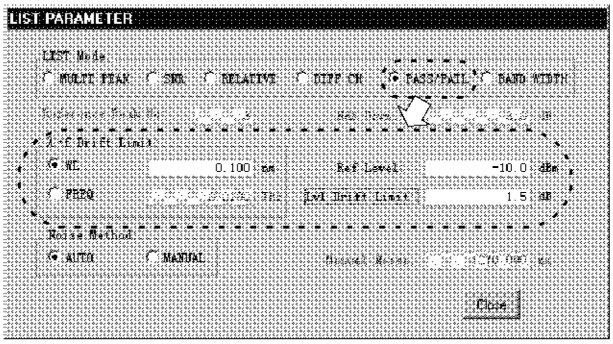


Figure 3-22 List Parameter Setting (Setting to PASS/FAIL)

46. The dialog box closes.

For each measured peak, the list displays pass or fail result, reference wavelength, reference level, wavelength peak, wavelength peak levels, wavelength difference between the reference and peak, and level difference between the reference and peak in this order from left to right.

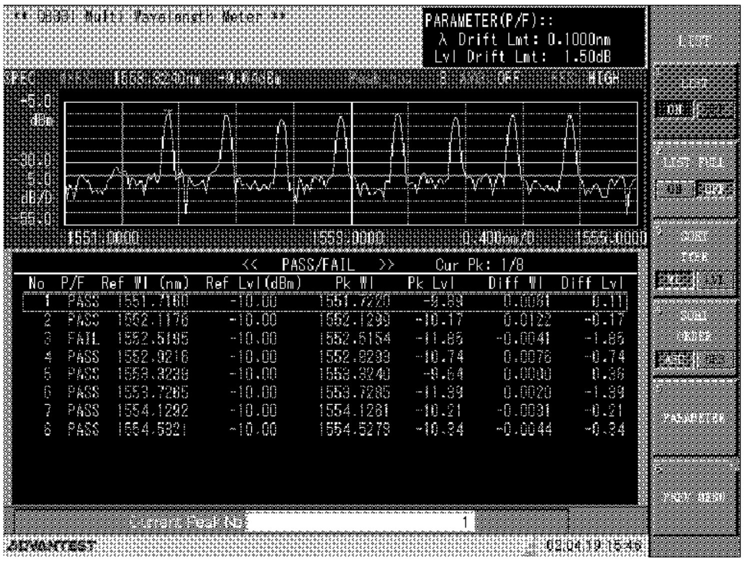


Figure 3-23 PASS/FAIL Measurement Results

3.3 WDM Optical Signal Monitor Measurement (TREND Function)

This section describes how to measure a WDM signal source interval by using the TREND function.

Measurement conditions: The WDM optical signal source of 1550 nm band wavelength and 8 channel numbers is measured. Select suitable values for the measurement sample when setting parameters.

Turning the Q8331 system on.

1. Install the unit on a stable even floor.

CAUTION: Operate the unit under the even condition only.

---

2. Turn on the **POWER** switch located in the front panel.

   Windows is started and the self-test is executed. The measurement window is displayed.

Initializing the setting conditions.

Set the unit to the initial conditions.

3. Press **SYSTEM** and select ***PRESET.***

   The initial setting condition is loaded.

Connecting the light source.

Connect the optical signal to measure.

4. Connect the light source output and the unit input by using a single mode optical fiber cable.

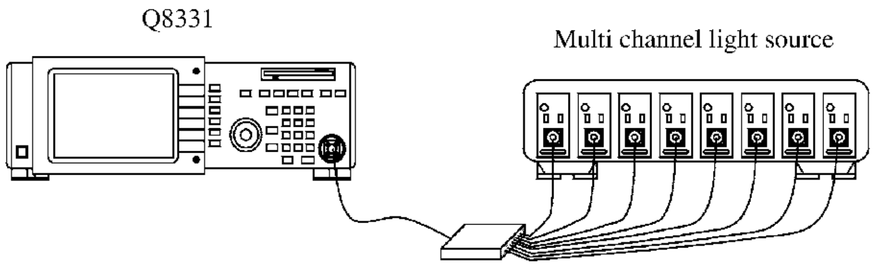


Figure 3-24 WDM Signal Connection

Setting the measurement conditions.

Set the measurement conditions for easy input signal monitoring.

5. Press **SCALE** and select ***λ·f SCALE***.
   The λ·f SCALE menu is displayed.

Main menu

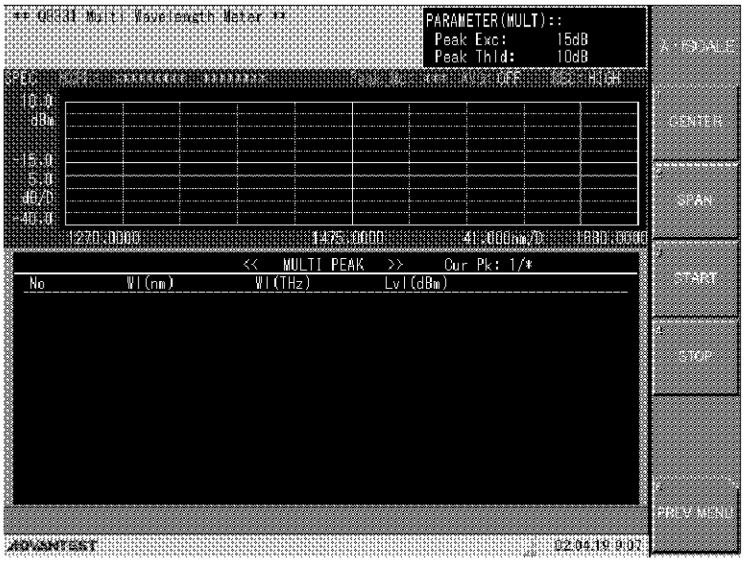


Figure 3-25 Display Scale Setting

Set the center wavelength to 1553 nm.

6. Select ***CENTER***.
   The input window is displayed.
7. Press **1**, **5**, **5**, **3**, and **ENTER**.
   The center wavelength is set to 1553 nm.

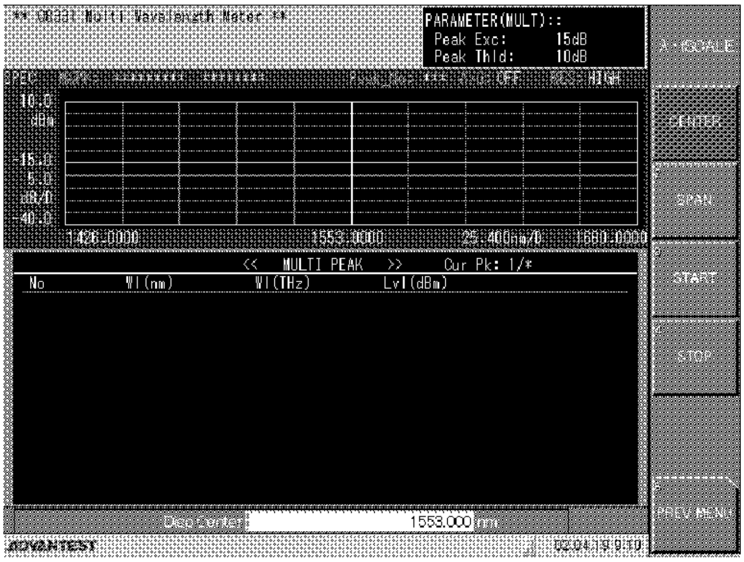


Figure 3-26 Center Wavelength Setting

Set the display span to 4 nm.

8. Select ***SPAN***.

   The input window is displayed.

9. Press **4** and **ENTER**.

   The display span is set to 4 nm.

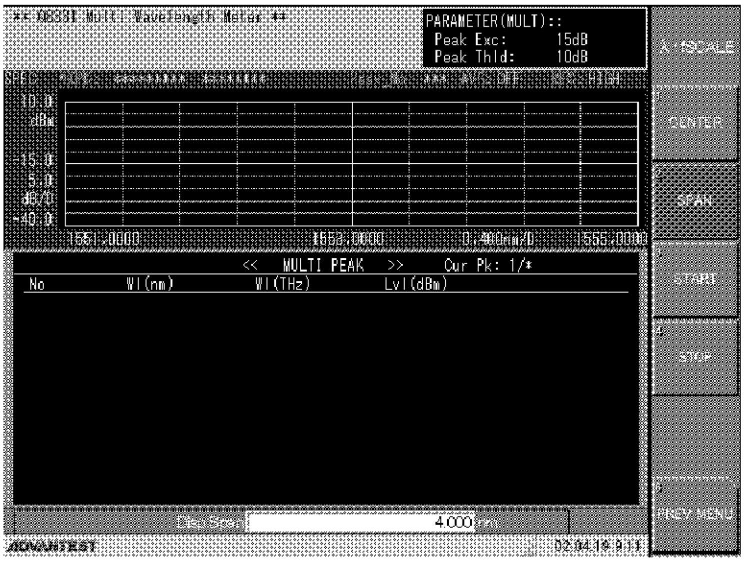


Figure 3-27 Display Span Setting

Setting the Y-axis display.

10. Select ***PREV MENU.***
    The main menu reappears.

Set the Y-axis display upper limit to -5 dBm.

11. Select ***UPPER LEVEL.***
12. Press **-**, **5** and **ENTER.**
    The Y-axis display upper limit is set to -5 dBm.

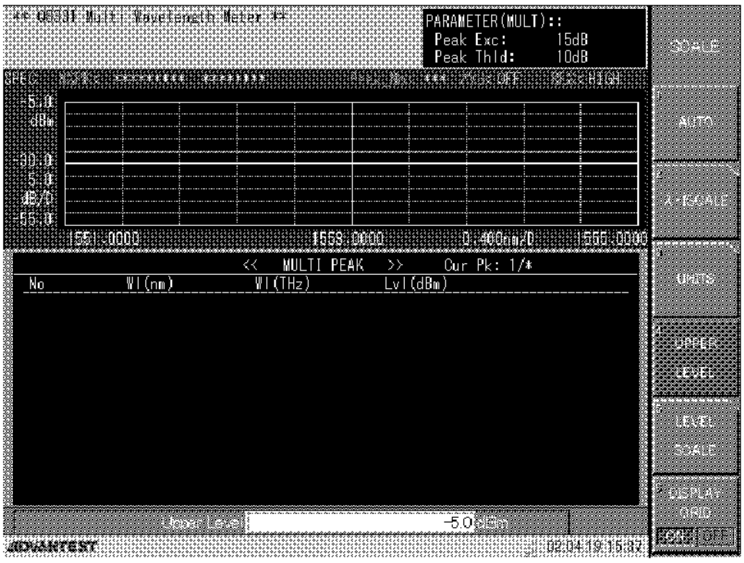


Figure 3-28 Display Level Setting

Executing the measurement.

13. Press **MEASURE** and select ***SINGLE.***
    A measurement is taken and the spectrum is displayed.

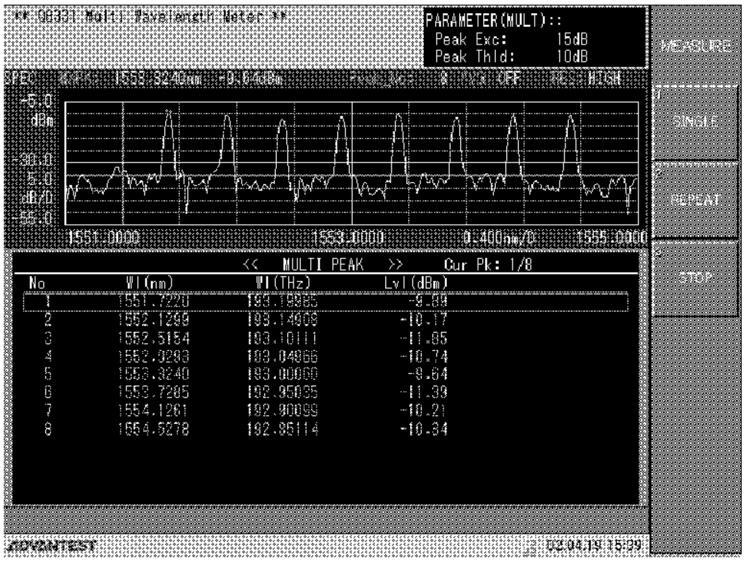


Figure 3-29 Input Signal Measurement Results

Setting the TREND function measurement conditions.

Set the conditions necessary for trend measurements.

14. Press **APPLICATION** and select ***TREND***.
    The TREND function is activated.

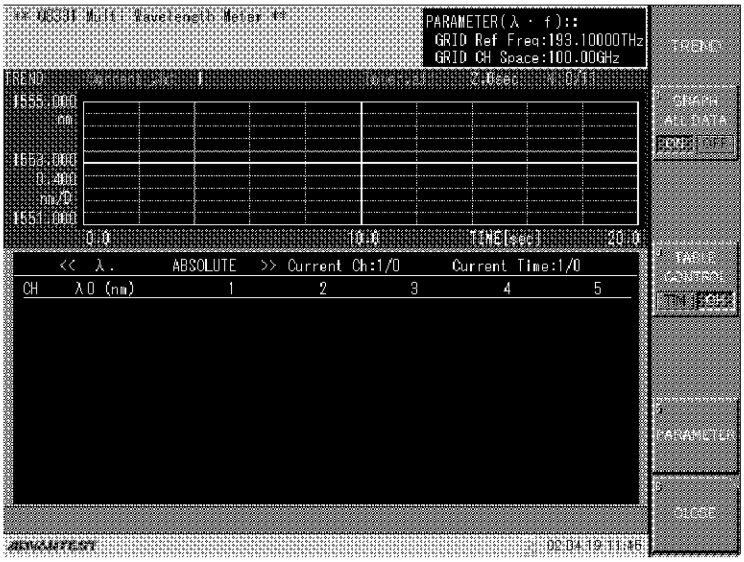


Figure 3-30 TREND Measurement Display

15. Select ***PARAMETER***.
    The dialog box is displayed.

Setting the data calculation mode

The displaying data calculation mode is specified.
For details on data calculation mode, refer to 4.3.1, "APPLICATION Button".

In the following example, the data calculation mode is set to the absolute value display (ABS).

16. Select ***Data Mode*** by using the step buttons (△, ▽).
17. Rotate the data knob to select ***ABS***.
    The data mode is set to ABS.

Setting the time interval and total number for measurements.

18. Select ***Time Interval*** by using the step buttons (△, ▽).
19. Press **5** and **ENTER**.
    The interval time is set to 5 seconds.
20. Select ***Measurement Times*** by using the step buttons (△, ▽).
21. Press **2**, **0**, and **ENTER**.
    The measuring time is set to 20.

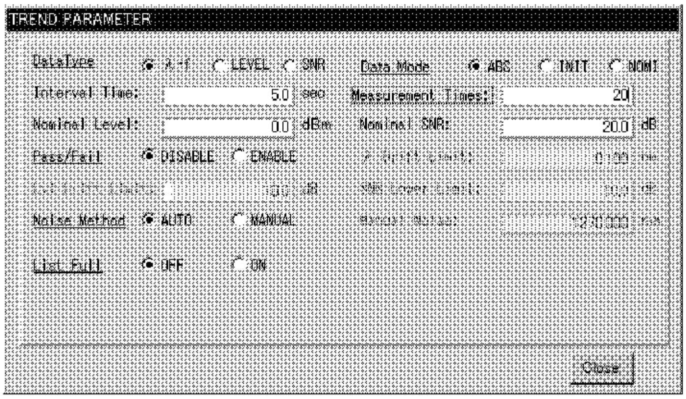


Figure 3-31 TREND Parameter

Setting the data type

The displayed measurement result data type is specified. The specified data type determines the unit for the values displayed in the list and vertical axis of the graph.
For details on data type, refer to 4.3.1, "APPLICATION Button".

In the following example, the data type is set to λ·f.

22. Select ***Data Type*** by using the step buttons (△, ▽).
23. Rotate the data knob to select ***λ·f***.
    The data type is set to λ·f.
24. The dialog box closes.

Monitor measurement

25. Press **MEASURE** and select ***SINGLE***.
    The measurement process starts. The measurement process stops automatically after taking specified number of measurements with the specified time interval.

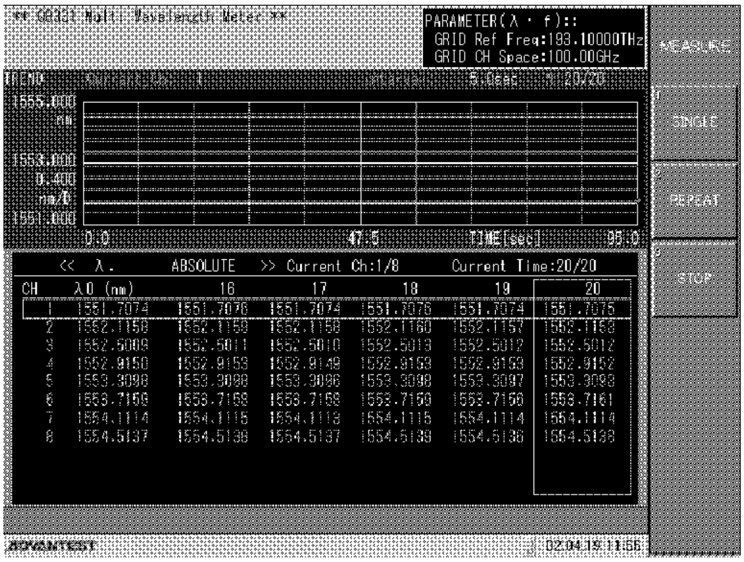


Figure 3-32 WDM Monitor Display

Viewing measurement results.
Measurement results can be viewed by moving the cursor around.
In the following example, the 12th measurement data is viewed.

26. Press **APPLICATION** and select ***TABLE CONTROL TIM/CH***(TIM).

27. Press **1**, **2**, and **ENTER**.

    The 12th data is displayed on the right side of the list.
    The cursor can be moved by using the step keys, data knob, and numeric keypad.

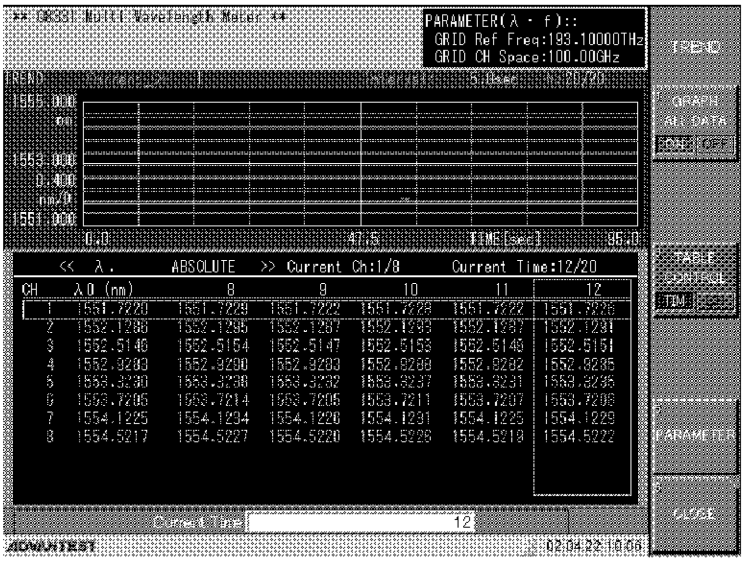


Figure 3-33 Measurement Results Display

3.4 Filter Center Wavelength and Band Width Measurements (BAND WIDTH Function)

This section describes how to measure AWG transmission center wavelength and bandwidth.

Measurement conditions: The ASE light source is used to take AWG measurements. Select suitable values for the measurement sample when setting parameters.

Turning the Q8331 system on.

1. Install the unit on a stable even floor.

CAUTION: Operate the unit under the even condition only.

2. Turn on the **POWER** switch located in the front panel.

   Windows starts and the self-test is executed. The measurement window is displayed.

Initializing the setting conditions.

Set the unit to the initial conditions.

3. Press **SYSTEM** and select ***PRESET***.

   The initial setting condition is loaded.

Connecting the item to measure.

Connect the item to measure.

4. Connect the item to measure (DUT) with the light source output connector. Connect DUT and the main unit connectors by using single mode optical fiber cables.

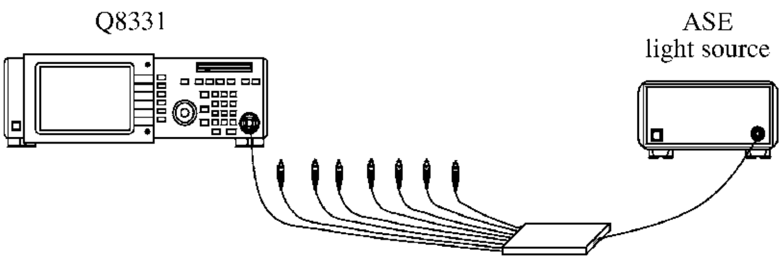


Figure 3-34 AWG Measurement

Setting the measurement conditions.

Set the measurement conditions for easy input signal monitoring.

5. Press **SCALE** and select ***λ·f SCALE.***

   The λ·f menu is displayed.

Main menu

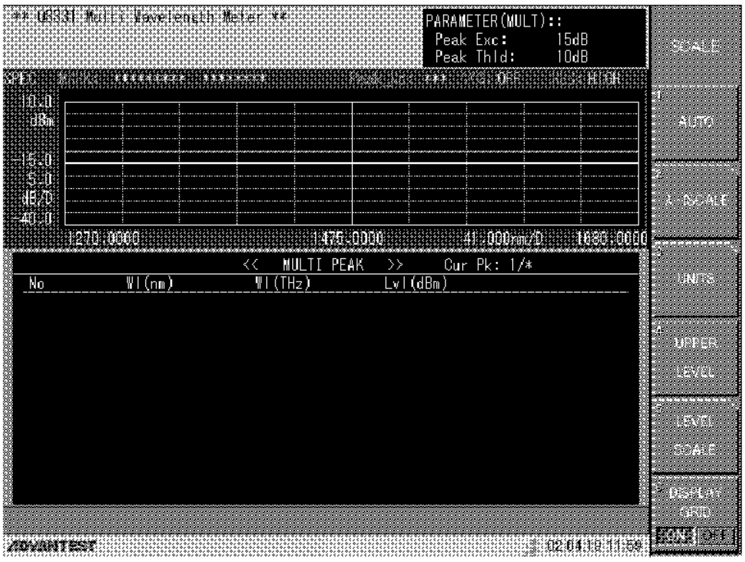


Figure 3-35 Display Scale Setting

Set the center wavelength to 1530 nm.

6. Select ***CENTER.***

   The input window is displayed.

7. Press **1**, **5**, **3**, **0**, and **ENTER.**

   The center wavelength is set to 1530 nm.

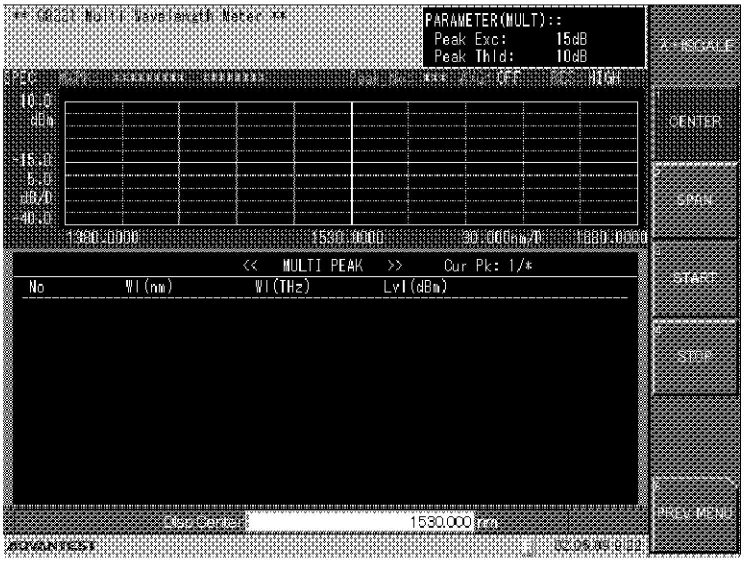


Figure 3-36 Center Wavelength Setting

Set the display span to 4 nm.

8. Select ***SPAN***.

   The input window is displayed.

9. Press **4** and **ENTER**.

   The display span is set to 4 nm.

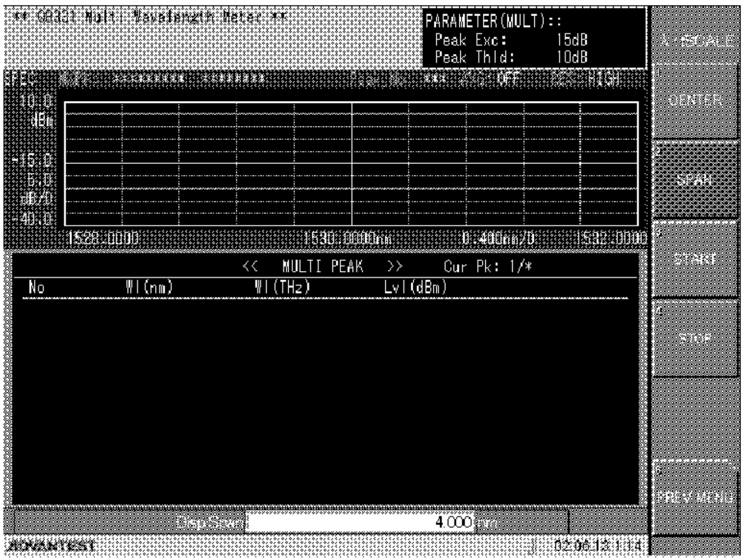


Figure 3-37 Display Span Setting

Setting the Y-axis display.

10. Select ***PREV MENU.***

    The main menu reappears.

Set the Y-axis display upper limit to -20 dBm.

11. Select ***UPPER LEVEL.***

    The input window is displayed.

12. Press **-**, **2**, **0**, and **ENTER**.

    The vertical axis display upper limit is set to -20 dBm.

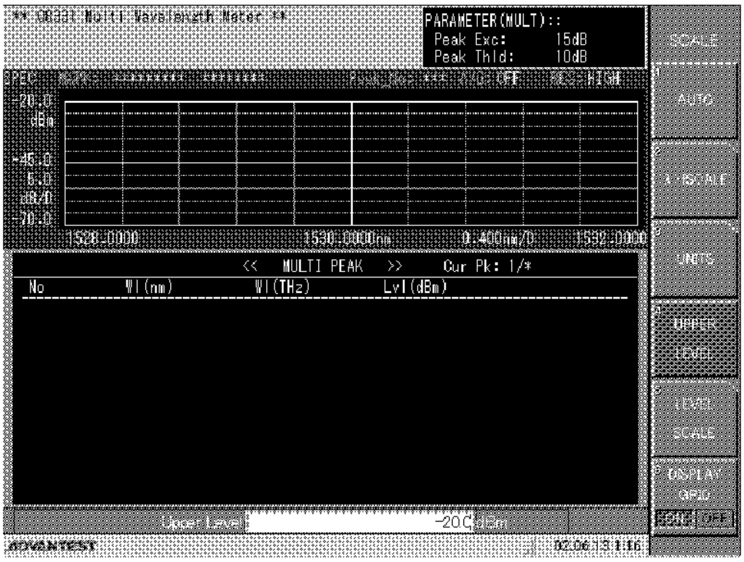


Figure 3-38 Display Upper Level Setting

Executing the measurement.

13. Press **MEASURE** and select ***SINGLE.***

    A measurement is taken and the spectrum is displayed.

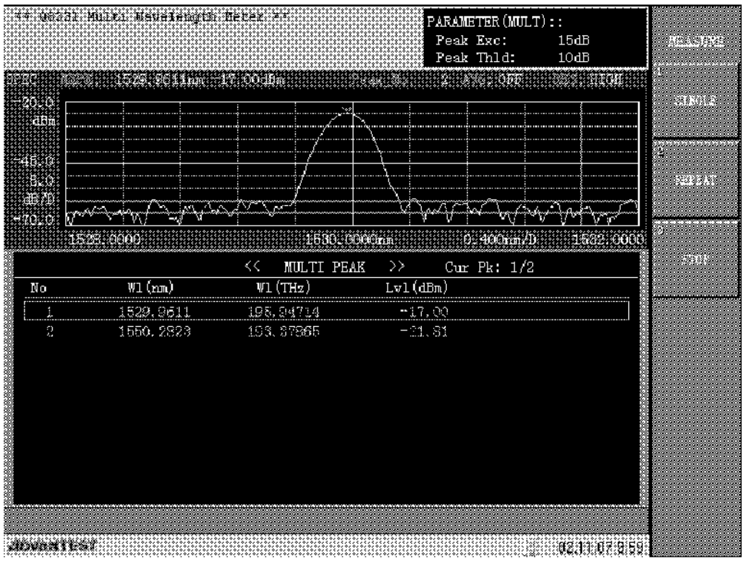


Figure 3-39 Measurement Results

Center wavelength and Wavelength (frequency) width measurements.

The filter center wavelength and wavelength (frequency) width are measured by using the BAND WIDTH function.
The measurements are taken for the peak wavelength in the wavelength list display range (MEAS LIMIT). The BAND WIDTH marker on the graph is displayed for the selected current channel.

14. Press **APPLICATION** and select ***LIST***.
    The LIST menu is displayed.
15. Select ***PARAMETER***.
    The dialog box is displayed.
16. Select ***LIST Mode*** by using the step buttons (△, ▽).
17. Select ***BAND WIDTH*** by rotating the data knob.

Sets a level below the peak at which the wavelength (frequency) width is measured in dB.

18. Select ***NdB Down*** by using the step buttons (△, ▽).
19. Press **0**, **.**, **5**, and **ENTER**.

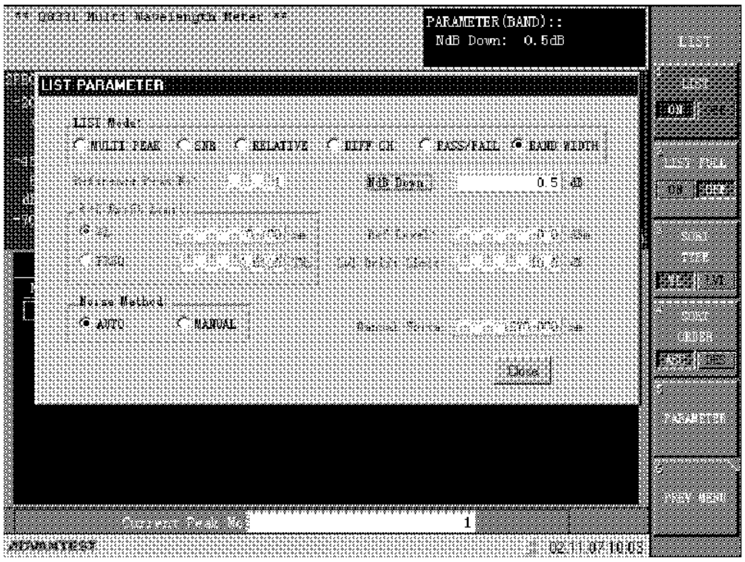


Figure 3-40 Center Wavelength and Bandwidth Measurement Setting

20. Close the dialog box.

    Center wavelengths and wavelength (frequency) widths at 0.5 dB below the peak in each channel are displayed in the list.

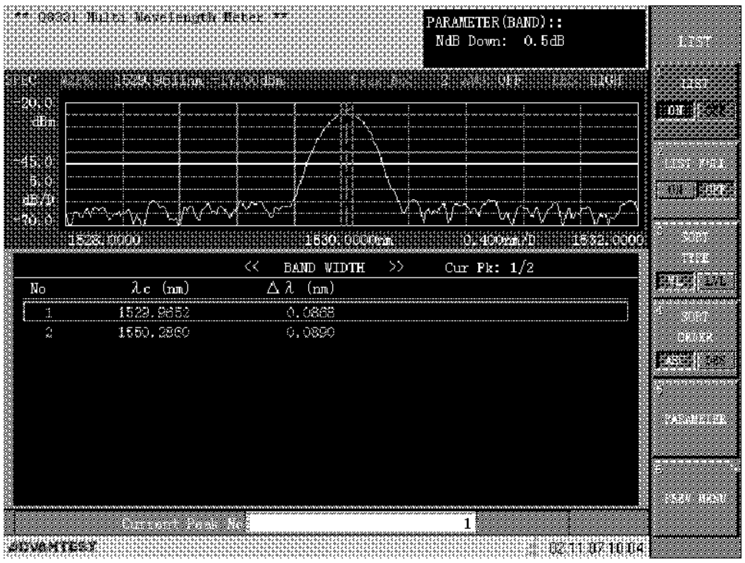


Figure 3-41 Center Wavelength and Bandwidth Measurement Results

4. REFERENCE

This chapter describes panel buttons, keys and Soft button functions in the following topics.

- Menu index: Also referred to as the Chapter 4 key index.
- Menu map: Describes panel button and key menu configurations.
- Function descriptions: Describes panel button and key functions.

In this chapter, panel buttons and keys are listed in alphabetical order.

4.1 Menu Index

This menu index is used to easily find the keys described in Chapter 4.

4.2 Menu Map

This section describes panel button and key configurations.

NOTE: **☐ *indicates panel buttons or keys.***
┆ ┆ *indicates dialog boxes.*
Others indicate soft menus.

APPLICATION ☐

- LIST
  - LIST ON/OFF
  - LIST FULL ON/OFF
  - SORT TYPE WL/LVL
  - SORT ORDER ASC/DES
  - PARAMETER
    - LIST Mode
    - Reference Peak No
    - NdB Down
    - λ•f Drift Limit
    - Ref Level
    - Lvl Drift Limit
    - Noise Method
    - Manual Noise
    - Close
  - PREV MENU
- TREND
  - GRAPH ALL DATA ON/OFF
  - TABLE CONTROL TIM/CH
  - PARAMETER
    - Data Type
    - Data Mode
    - Interval Time
    - Measurement Times
    - Nominal Level
    - Nominal SNR
    - Pass/Fail
    - λ•f Drift Limit
    - Lvl Drift Limit
    - SNR Lower Limit
    - Noise Method
    - Manual Noise
    - List Full
    - Channel Math
    - Auto Save
    - File Divide
    - Save Option
    - Close
  - CLOSE
- PEAK λ•f MAX/AVG

4.2 Menu Map

COPY

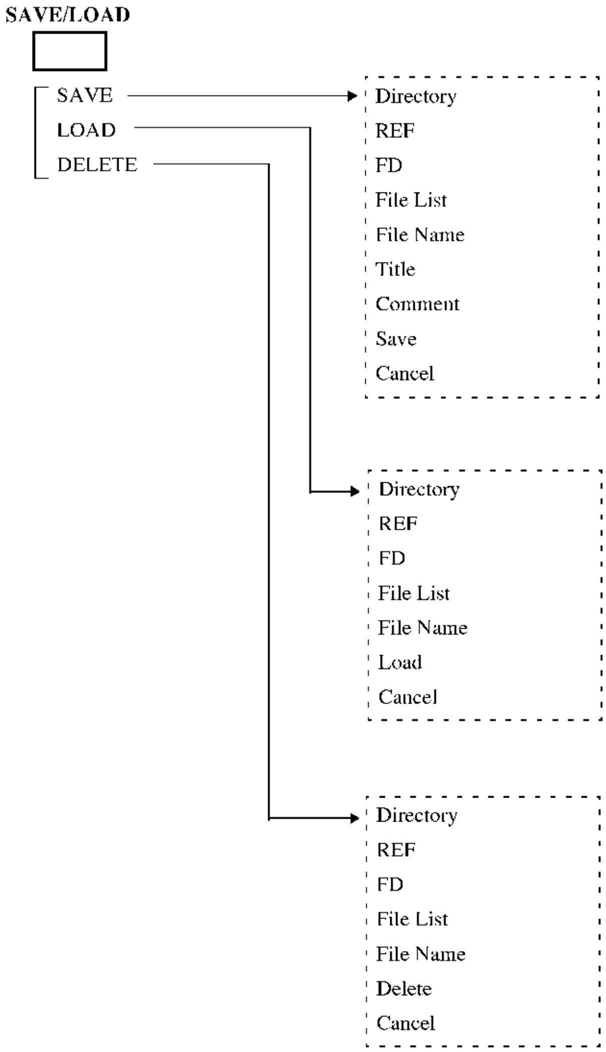
- FILE MANAGER
  - Directory1
  - A:
  - D:
  - List1
  - Folder
  - 1→2 Copy
  - Delete1
  - Directory2
  - A:
  - D:
  - List2
  - Folder
  - 2→1 Copy
  - Delete2
  - Close
- BMP TO FILE
  - File List
  - File Name
  - Save
  - Cancel

CURSOR

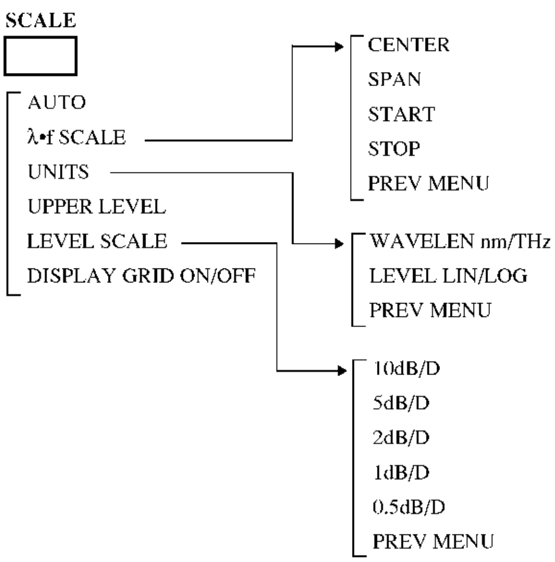
- X1 ON/OFF
- X2 ON/OFF
- Y1 ON/OFF
- ALL OFF
- MODE
  - NORMAL
  - DELTA
  - PREV MENU
- STEP PEAK
  - MAX PEAK
  - LEFT PEAK
  - RIGHT PEAK
  - NEXT PEAK
  - PREV PEAK
  - PREV MENU

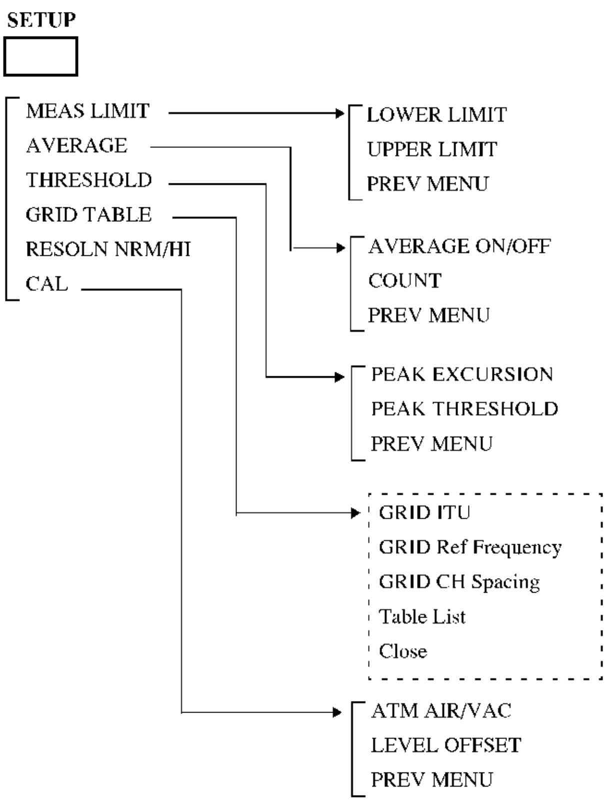
MEASURE

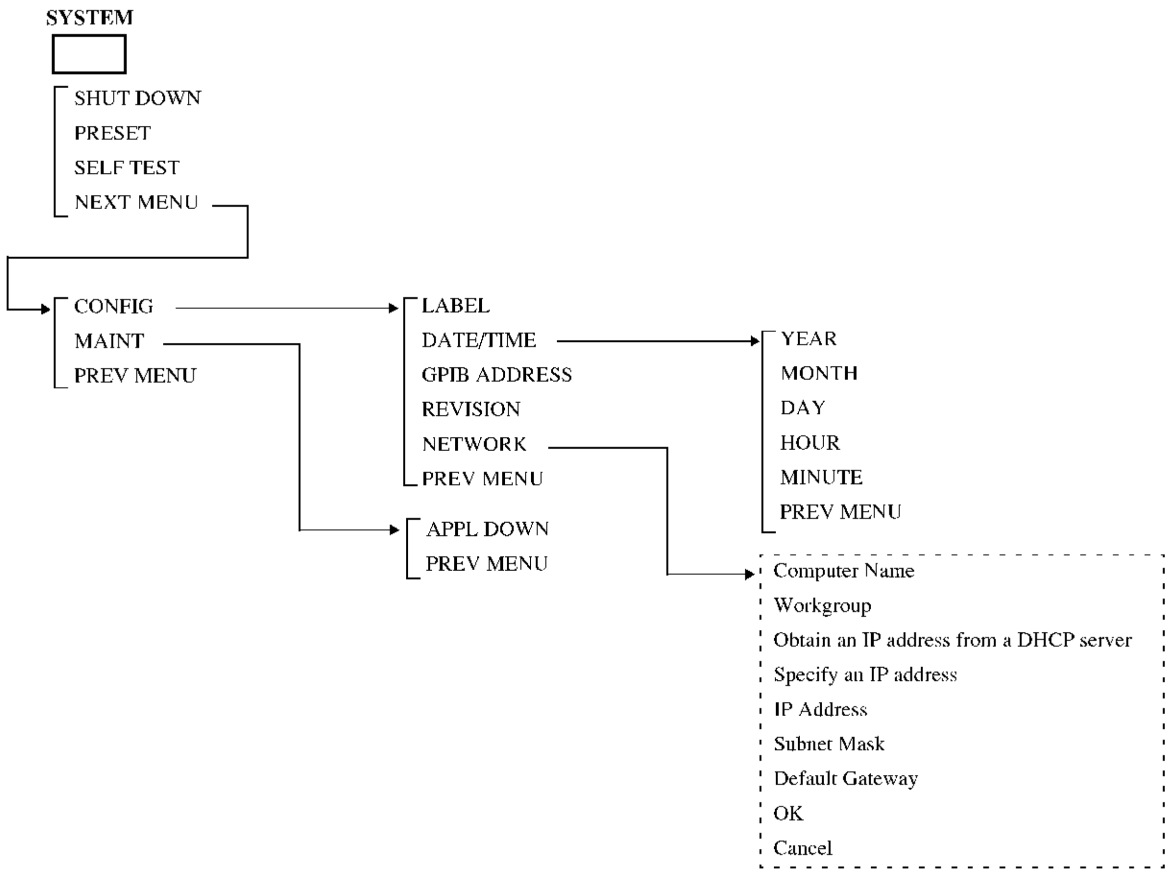
- SINGLE
- REPEAT
- STOP


SAVE/LOAD
SAVE
LOAD
DELETE
Directory
REF
FD
File List
File Name
Title
Comment
Save
Cancel
Directory
REF
FD
File List
File Name
Load
Cancel
Directory
REF
FD
File List
File Name
Delete
Cancel

4.2 Menu Map


SCALE
AUTO
λ•f SCALE
UNITS
UPPER LEVEL
LEVEL SCALE
DISPLAY GRID ON/OFF
CENTER
SPAN
START
STOP
PREV MENU
WAVELEN nm/THz
LEVEL LIN/LOG
PREV MENU
10dB/D
5dB/D
2dB/D
1dB/D
0.5dB/D
PREV MENU


SETUP
MEAS LIMIT
AVERAGE
THRESHOLD
GRID TABLE
RESOLN NRM/HI
CAL
LOWER LIMIT
UPPER LIMIT
PREV MENU
AVERAGE ON/OFF
COUNT
PREV MENU
PEAK EXCURSION
PEAK THRESHOLD
PREV MENU
GRID ITU
GRID Ref Frequency
GRID CH Spacing
Table List
Close
ATM AIR/VAC
LEVEL OFFSET
PREV MENU


SYSTEM
SHUT DOWN
PRESET
SELF TEST
NEXT MENU
CONFIG
MAINT
PREV MENU
LABEL
DATE/TIME
GPIB ADDRESS
REVISION
NETWORK
PREV MENU
APPL DOWN
PREV MENU
YEAR
MONTH
DAY
HOUR
MINUTE
PREV MENU
Computer Name
Workgroup
Obtain an IP address from a DHCP server
Specify an IP address
IP Address
Subnet Mask
Default Gateway
OK
Cancel

4.3 Function Descriptions

This section describes panel buttons and keys as well as Soft buttons.

4.3.1 APPLICATION Button

Pressing the **APPLICATION** button displays the APPLICATION main menu. Measurement function selections are made in the Soft menu.

LIST

Displays the LIST menu.
Detects input signal peaks using THRESHOLD conditions set in the SETUP menu and displays them in a list. The peak search range is set in the MEAS LIMIT menu.

LIST ON/OFF

Turns the list display on and off. Activates the Current Peak No setting and enables the display peak number specification.

ON: Turns the list display on. Detects wavelength peaks in a measured input signal and displays results in the mode specified in the LIST PARAMETER menu.

OFF: Turns the list display off.

LIST FULL ON/OFF

Switches the display between a full screen list and a half screen list with a spectrum waveform shown in one half.

ON: Displays the peak list on a full screen.

OFF: Displays both the peak list and spectrum waveform on one screen.

SORT TYPE WL/LVL

Switches the list data between sorting the wavelength or frequency and level data.

WL: Sorts data based on the peak wavelength or frequency.

LVL: Sorts data based on the peak level value.

SORT ORDER ASC/DES

Switches the list data between sorting in ascending order and descending order.

ASC: Sorts data in ascending order.

DES: Sorts data in descending order.

PARAMETER

Displays the list parameter setting dialog box. Displays the list function and sets calculation mode conditions.

LIST Mode

Selects the list display data mode.

MULTI PEAK:
Displays the detected peaks in absolute values.

SNR: Calculates and displays detected peak values.

RELATIVE:
Displays relative values for a specified reference peak number.

DIFF CH:
Displays relative values for a grid specified in the SETUP menu GRID TABLE.

PASS/FAIL:
Evaluates detected peaks with specified pass/fail conditions. The fail data is displayed in red.

BAND WIDTH:
Calculates and displays the wavelength (frequency) width at the NdB Down level from the peak.

Reference Peak No Sets a reference peak for the RELATIVE mode.

NdB Down Sets the NdB level value in the BAND WIDTH mode.

λ•f Drift Limit Selects whether the wavelength range (WL value) or frequency range (FREQ value) is used for the Pass/Fail evaluation.

WL: Sets a wavelength range to evaluate Pass/Fail. The range is centered on the nearest grid to the reference peak and has limits ±WL. Results within ±WL pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available in the PASS/FAIL mode only.

FREQ: Sets a frequency range to evaluate Pass/Fail. The range is centered on the nearest grid to the reference peak and has limits ±FREQ. Results within ±FREQ pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available in the PASS/FAIL mode only.

Ref Level Sets a Nominal level for the Pass/Fail evaluation. This function is available in the PASS/FAIL mode only.

Lvl Drift Limit Sets a level range to evaluate Pass/Fail. The range is centered on the level set in Ref Level and has limits ± Lvl Drift Limit. Results within ± Lvl Drift Limit pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available in the PASS/FAIL mode only.

Noise Method Determines the noise level for SNR calculation.

AUTO: The noise level is determined automatically and calculates the SNR.
For details on noise level calculation, refer to 6.2.2, "Noise Level Calculation".

MANUAL:
Calculates SNR using the noise level specified in Manual Noise.

Manual Noise Sets a reference wavelength for deciding the noise level. This function is available when Noise Method is set to MANUAL.

Close Closes the parameter setting dialog box.

PREV MENU Returns to the APPLICATION main menu.

TREND Displays the TREND main menu.

GRAPH ALL DATA ON/OFF Selects whether to display the channels selected in Current Channel only or all channels in the monitor graph.

ON: Display all peaks detected.
The selected channels are displayed in yellow and others are displayed in green.

OFF: Displays selected channels only, in yellow.

TABLE CONTROL TIM/CH Switches the trend list display current data selection mode.

TIM: Activates the Current Time setting and selects data in the time axis direction.

CH: Activates the Current Channel setting and selects data in the channel axis direction.

PARAMETER Displays the parameter setting dialog box. Displays the trend measurement function and sets calculation mode conditions.

Data Type Selects the trend display data type.

λ•f: Executes monitor measurements in the peak wavelength (frequency) display mode.

LEVEL: Executes monitor measurements in the peak level display mode.

SNR: Executes monitor measurements in the peak signal SNR display mode.

Data Mode Selects the trend display measurement mode.

ABS: Sets the mode to ABSOLUTE.
Displays measured absolute values.

INIT: Sets the INITIAL mode.
Calculates and displays relative values with the initial measurement data as the reference.

NOMI: Sets the NOMINAL mode.
Calculates and displays relative values for the specified reference values.

Interval Time Sets the measurement time interval.

Measurement Times Sets the number of measurements.

Nominal Level Sets the NOMINAL mode measurement and Pass/Fail evaluation nominal levels.

Nominal SNR Sets the NOMINAL mode measurement nominal SNR.

Pass/Fail Determines whether or not measurement result Pass/Fail evaluations are executed.

ENABLE:
The Pass/Fail evaluation is executed. Fail data is displayed in red.

DISABLE:
No Pass/Fail evaluation is executed.

λ•f Drift Limit Selects whether the wavelength range (WL value) or frequency range (FREQ value) is used for the Pass/Fail evaluation.

WL: Sets a wavelength range to evaluate Pass/Fail. The range is centered on the nearest grid to the reference peak and has limits ±WL. Results within ±WL pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available when Pass/Fail is set to ENABLE.

FREQ: Sets a frequency range to evaluate Pass/Fail. The range is centered on the nearest grid to the reference peak and has limits ±FREQ. Results within ±FREQ pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available when Pass/Fail is set to ENABLE.

Lvl Drift Limit Sets a level range for the Pass/Fail evaluation. Results within the reference data ± Lvl Drift Limit pass. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available when Pass/Fail is set to ENABLE.

SNR Lower Limit Sets a minimum SNR value for the Pass/Fail evaluation. To exclude this condition from the Pass/Fail evaluation, set the limit to 0. This function is available when Pass/Fail is set to ENABLE.

Noise Method Determines the noise level for SNR calculation.

AUTO: The noise level is determined automatically and the SNR is calculated.
For details on noise level calculation, refer to 6.2.2, "Noise Level Calculation".

MANUAL:
Calculates the SNR using the noise level specified in Manual Noise.

Manual Noise Sets a reference wavelength for deciding the noise level. This function is available when Noise Method is set to MANUAL.

List Full Switches the display between a full screen trend list and a half screen trend list with a monitor graph shown on the other half.

ON: Displays the trend list on a full screen.

OFF: Displays both the trend list and monitor graph on one screen.

Channel Math Selects a calculation to be performed for each channel.

NON: No per-channel calculation is performed.

MIN: Calculates up to the current measurement, the minimum value of per-channel measurements and displays the result in the TREND List.

MAX: Calculates up to the current measurement, the maximum value of per-channel measurements and displays the result in the TREND List.

DIFF: Calculates up to the current measurement, the minimum and maximum values of per-channel measurements and displays the result in the TREND List.

Auto Save Selects whether or not to execute AUTO SAVE for TREND data.

ON: Automatically saves measurement data in the built-in disk in the ASCII format per number of measurements specified in Measurement Times.

OFF: Measurement data is not automatically saved.

File Divide Selects whether or not to divide files when saving TREND data by using AUTO SAVE.

ON: Saves data in separate files.

OFF: Saves data in one file.

Save Option

Selects whether or not to save LEVEL or SNR data when saving TREND data by using AUTO SAVE.

LEVEL: When selected, LEVEL data is also saved.
When unselected, no LEVEL data is saved.

SNR: When selected, SNR data is also saved.
When unselected, no SNR data is saved.

Close

Closes the parameter setting dialog box.

CLOSE

Closes the trend measurement function and returns to the APPLICATION main menu.

PEAK λ·f MAX/AVG

Switches the display data mode in the peak data display.

MAX: Displays the maximum peak wavelength and level of all peaks detected.

AVG: Displays the weighted average wavelength and total power of all peaks detected.

4.3.2 COPY Button

Pressing the **COPY** button displays the COPY menu. The COPY button is used to copy and delete files and save measurement screen data as picture files.

FILE MANAGER	Displays the FILE MANAGER dialog box.
Directory1	Displays the directory which contains files and directories for copying and deleting.
A:	Sets the device which copies or deletes files to "A:" (froppy disk).
D:	Sets the device which copies or deletes files to "D:\MyData".
List1	The file and directory list which is in Directory1. Files or directories selected in this list are copied or deleted.
Folder	Creates a new folder in Directory1.
1→2 Copy	Creates copies of Directory1 files or directories selected in List1 in Directory2.
Delete1	Deletes files or directories selected in List1.
Directory2	Displays the directory which contains files and directories for copying and deleting.
A:	Sets the device which copies or deletes files to "A:" (froppy disk).
D:	Sets the device which copies or deletes files to "D:\MyData".
List2	The file and directory list which is in Directory2. Files or directories selected in this list are copied or deleted.
Folder	Creates a new folder in Directory2.
2→1 Copy	Creates copies of Directory2 files or directories selected in List2 in Directory1.
Delete2	Deletes files or directories selected in List2.
Close	Closes the FILE MANAGER dialog box.
BMP TO FILE	Displays the Bitmap Save dialog box.
File List	Displays the saved file list. Files can be selected from the File list by using the data knob.
File Name	Displays the name of the file to be saved. File names can be input by using the software keyboard.
Save	Saves the measurement screen data as picture files under the file names set in the floppy disk and then closes the Bitmap Save dialog box.
Cancel	Cancels the data saving and closes the Bitmap Save dialog box.

4.3.3 CURSOR Button

Pressing the **CURSOR** button displays the CURSOR menu. The CURSOR button is used for displaying line cursors or selecting a cursor data display format. The cursor function is available within the display range only.

X1 ON/OFF Switches the X1 cursor (perpendicular to the wavelength axis) setting between ON and OFF.

ON: Activates the X1 cursor setting and displays X1. The cursor position wavelength (frequency) and level are displayed in the cursor display area.

OFF: Turns the X1 cursor off.

X2 ON/OFF Switches the X2 cursor (perpendicular to the wavelength axis) setting between ON and OFF.

ON: Activates the X2 cursor setting and displays X2. The cursor position wavelength (frequency) and level are displayed in the cursor display area.

OFF: Turns the X2 cursor off.

Y1 ON/OFF Switches the Y1 cursor (parallel to the wavelength axis) setting between ON and OFF.

ON: Activates the Y1 cursor setting and displays Y1. The cursor position level is displayed in the cursor display area.

OFF: Turns the Y1 cursor off.

ALL OFF Turns all cursors off.

MODE Displays the MODE menu for switching the cursor display area data display mode.

- ***NORMAL*** Displays X1 and X2 cursor data individually.
- ***DELTA*** Displays the difference of X1 and X2 cursor data, |X1-X2|.
- ***PREV MENU*** Returns to the CURSOR menu.

STEP PEAK Displays the STEP PEAK menu to move the X1 or X2 cursor to a signal peak. Turn the X1 cursor display ON if the X1 and X2 cursor displays are OFF. The cursor moves to the signal peaks within the graph display range.

- ***MAX PEAK*** Moves either of the active X1 or X2 cursor to the maximum level peak.
- ***LEFT PEAK*** Moves either of the active X1 or X2 cursor to the left side of the current peak.
- ***RIGHT PEAK*** Moves either of the active X1 or X2 cursor to the right side of the current peak.
- ***NEXT PEAK*** Moves either of the active X1 or X2 cursor to the closest peak below the current peak level.
  This key does not perform to the same level peaks.
- ***PREV PEAK*** Moves either of the active X1 or X2 cursor to the closest peak above the current peak level.
  This key does not perform to the same level peaks.

PREV MENU	Returns to the CURSOR menu.

4.3.4 MEASURE Button

Pressing the **MEASURE** button displays the MEASURE menu. The MEASURE button is used for the measurement execution mode control.

SINGLE	Takes a measurement.
REPEAT	Sets the repeat measurement mode and repeats measurements.
STOP	Stops the measurement.

4.3.5 SAVE/LOAD Button

Pressing the **SAVE/LOAD** button displays the SV/LD menu for saving, loading, and deleting data.

SAVE	Displays the Save dialog box.
Directory	Displays the directory to save the data into.
REF	Suggests a directory for saving the file into.
FD	The data file is saved in the floppy disk.
File List	Displays the saved file list. Files can be selected from the saved file list by using the data knob.
File Name	Displays the name of the file to be saved. File names can be input by using the software keyboard.
Title	Input a title for the file to save by using the software keyboard.
Comment	Input a comment for the file to save by using the software keyboard.
Save	Saves the data in the specified file and closes the Save dialog box.
Cancel	Cancels the data saving and closes the Save dialog box.
LOAD	Displays the Load dialog box.
Directory	Displays the directory to load the data from.
REF	Suggests a directory to move the file to.
FD	The data file is moved to the floppy disk.
File List	Displays the saved file list. Files can be selected from the file list using the data knob.
File Name	Displays the name of the file to be loaded. File names can be input by using the software keyboard.
Load	Loads the data from the specified file and closes the Load dialog box.
Cancel	Cancels the data loading and closes the Load dialog box.
DELETE	Displays the Delete dialog box.
Directory	Displays the directory to delete the data from.

REF	Suggests a directory for deleting a file from.
FD	The data file is deleted from the floppy disk.
File List	Displays the saved file list. Files can be selected from the saved file list by using the data knob.
File Name	Displays the name of the file to be deleted. File names can be input by using the software keyboard.
Delete	Deletes the data from the specified file and closes the Delete dialog box.
Cancel	Cancels the data deleting and closes the Delete dialog box.

4.3.6 SCALE Button

Pressing the **SCALE** button displays the SCALE menu. The SCALE button is used for graph display scale settings.

AUTO

Set X-axis and Y-axis display scales to display measurement data in correct monitoring positions. These settings do not reflect to peak or trend list displays.

NOTE: The display scales cannot be optimized without a measurement data to display.

λ·f SCALE	Displays the λ·f SCALE menu. Specifies the wavelength (frequency) range for graph display.
CENTER	Activates the center wavelength (frequency) setting.
SPAN	Activates the wavelength (frequency) span setting.
START	Activates the START wavelength (frequency) setting.
STOP	Activates the STOP wavelength (frequency) setting.
PREV MENU	Returns to the SCALE menu.
UNITS	Displays the UNITS menu for selecting the wavelength (frequency) and amplitude scales.
WAVELEN nm/THz	Switches between the wavelength scale and frequency scale displays. nm: Displays with the wavelength scale. THz: Displays with the frequency scale.
LEVEL LIN/LOG	Switches between the linear scale and log scale displays. LIN: Displays with the linear scale set between 0 mW and UPPER LEVEL. LOG: Displays with the log scale set in LEVEL SCALE.
PREV MENU	Returns to the SCALE menu.
UPPER LEVEL	Activates the scale Nominal level setting.
LEVEL SCALE	Displays the LVL SC menu for level scale graduation. The LVL SC menu is available when the log scale is selected.

10 dB/D	Graduates the level scale to 10 dB/div.
5 dB/D	Graduates the level scale to 5 dB/div.
2 dB/D	Graduates the level scale to 2 dB/div.
1 dB/D	Graduates the level scale to 1 dB/div.
0.5 dB/D	Graduates the level scale to 0.5 dB/div.
PREV MENU	Returns to the SCALE menu.
DISPLAY GRID ON/OFF	Switches the graph grid line display between ON and OFF. ON: Displays the grid lines. OFF: Does not display the grid lines.

4.3.7 SETUP Button

Pressing the **SETUP** button displays the SETUP menu. The SETUP button is used for setting basic measurement parameters.

MEAS LIMIT	Displays menus for setting LIST and TREND mode display ranges.
LOWER LIMIT	Activates measurement range lower limit setting.
UPPER LIMIT	Activates measurement range upper limit setting.
PREV MENU	Returns to the SETUP menu.
AVERAGE	Displays the AVERAGE menu.
AVERAGE ON/OFF	Switches the average mode setting between ON and OFF. ON: Starts the complex average calculation process as the measurement begins and completes it for the specified number of times. OFF: Turns off the average mode.
COUNT	Activates the averaging times setting.
PREV MENU	Returns to the SETUP menu.
THRESHOLD	Displays the THRESHOLD menu. The threshold is set from the light input for measurement.
PEAK EXCURSION	Activates the peak excursion setting. Sets a level difference threshold for a waveform maximum point and the nearest waveform minimum point. If the level differences between a maximum point and the nearest minimum points on both sides of it are greater than the set threshold value, the maximum point is recognized as a peak.
PEAK THRESHOLD	Activates the peak threshold setting. Sets the level threshold value from the maximum peak level. Maximum points greater than the set level threshold value are recognized as peaks.
PREV MENU	Returns to the SETUP menu.
GRID TABLE	Displays the GRID table setting dialog box. A GRID table is created using the reference frequency set in the GRID Ref Frequency and the frequency space set in the GRID CH Spacing.

GRID ITU	Sets a GRID table as the ITU GRID (GRID Ref Frequency: 193.1 THz and GRID CH Spacing: 100 GHz).
GRID Ref Frequency	Sets a GRID reference frequency and creates user defined GRID table.
GRID CH Spacing	Sets a GRID spacing (frequency) and creates user defined GRID table.
Close	Closes the GRID table setting dialog box.
RESOLN NRM/HI	Switches the measurement resolution setting. NRM: Sets to the standard mode (separating resolution: 20 GHz). HI: Sets to the high precision mode (Separating resolution: 10 GHz).
CAL	Displays the CAL menu. Sets wavelength and / or level adjustments.
ATM AIR/VAC	Switches the wavelength adjustment mode. Wavelength is adjusted using the system internal air pressure sensor and temperature sensor. AIR: Displays the wavelength in air. VAC: Displays the wavelength in vacuum.
LEVEL OFFSET	Activates the level offset value. Displays the offset input level. To invalidate the offset, input 0.
PREV MENU	Returns to the SETUP menu.

4.3.8 SYSTEM Button

Pressing the **SYSTEM** button displays the SYSTEM menu. The SYSTEM button is used for turning off the unit system, initializing the system setup, and running a self-test as well as the clock, GPIB address, and system configuration settings.

SHUT DOWN	Turns the system off. The power switch is set to OFF automatically.
PRESET	Sets the system to the initial conditions.
SELF TEST	Executes the self-test.
NEXT MENU	Displays the SYSTEM (2) menu.
CONFIG	Displays the CONFIG menu.
LABEL	Changes the screen title. Displays the software keyboard for alphanumeric input.
DATE/TIME	Displays the DATE/TIME menu for setting up the clock and date (year/month/day).
YEAR	Activates the year information input.
MONTH	Activates the month information input.
DAY	Activates the day information input.
HOUR	Activates the hour information input.

MINUTE	Activates the minute information input.
PREV MENU	Displays the configuration menu.
GPIB ADDRESS	Activates the GPIB address setting
REVISION	Displays the software revision.
NETWORK	Displays the NETWORK settings dialog box.
Computer Name	Changes the Q8331 system NETWORK name.
Workgroup	Changes work group NETWORK settings.
Obtain an IP address from a DHCP server	Sets the mode which automatically obtains an IP address from the DHCP server.
Specify an IP address	Sets the mode which specifies a fixed IP address.
IP Address	Changes the IP address setting.
Subnet Mask	Changes the subnet mask setting.
Default Gateway	Changes the default gateway address setting.
OK	Internally sets all dialog box settings in the NETWORK setting and closes the dialog box.
Cancel	Deletes the new settings and closes the NETWORK setting dialog box.
PREV MENU	Displays the SYSTEM (2) menu.
MAINT	Displays the MAINT menu for the Q8331 system maintenance. This is normally not used.
APPL DOWN	Closes the measuring instrument applications. This can be used only by ADVANTEST service personnel.
PREV MENU	Displays the SYSTEM (2) menu.
PREV MENU	Displays the SYSTEM menu.

4.4 LIST Function/TREND Function Parameter Settings and PASS/FAIL Evaluation Standard

The LIST function and TREND function contain several data modes. Each data mode measurement requires parameter settings. This section describes items displayed and parameter settings necessary in each mode as well as the PASS/FAIL evaluation standards.

4.4.1 LIST Function Settings

Parameter settings necessary for the LIST function and PASS/FAIL evaluation standards are described in Table 4-1.

Table 4-1 Settings for Each Data Mode

DATA MODE	Setting	Items displayed	Evaluation standard
MULTI PEAK	None	Peak wavelength, frequency, and peak level.	None
SNR	Noise Method	Peak wavelength (frequency), peak level, noise level, and SNR.	None
RELATIVE	Reference Peak No	Peak wavelength (frequency), peak wavelength spacing (peak frequency spacing), difference with the reference wavelength (frequency), peak level, and difference with the Nominal level.	None
DIFF CH	GRID TABLE	Nearest GRID channel to the peak wavelength, peak wavelength, and wavelength difference.	None
PASS/FAIL	GRID TABLE λ•f Drift Limit *1, *2 Ref Level *1 Lvl Drift Limit *1, *2	PASS/FAIL evaluation result, nearest grid channel to the peak wavelength (frequency), Nominal level, peak wavelength (frequency), peak level, wavelength (frequency) difference, and level difference.	Both the wavelength difference from the wavelength set in the GRID TABLE and the level difference from the level set in the Ref Level must be within ± Drift Limit.
BAND WIDTH	NdB Down	Center wavelength (frequency) and wavelength (frequency) half band width which results from the half band width calculation.	None

*1: Possible to set when the PASS/FAIL is set to Enable only.
*2: To exclude this condition from the Pass/Fail evaluation, set the limit to 0.

4.4.2 TREND Function Settings

Parameter settings necessary for the TREND function and PASS/FAIL evaluation standards are described in Table 4-2 and Table 4-3.

Table 4-2 Settings for Each Data Mode

DATA MODE	DATA TYPE	Settings	Items displayed
ABS	λ•f	None	Absolute value of the λ•f
	LEVEL	None	Absolute value of the LEVEL.
	SNR	None	Absolute value of the SNR.
INIT	λ•f	None	Difference with the initial value.
	LEVEL	None	Difference with the initial value.
	SNR	None	Difference with the initial value.
NOMI	λ•f	GRID TABLE	Difference with the nearest grid wavelength.
	LEVEL	Nominal Level	Difference with the Nominal Level.
	SNR	Nominal SNR	Difference with the Nominal SNR.

Table 4-3 PASS/FAIL Function Settings and Evaluation Standards

<table>
<tr><th>DATA MODE</th><th colspan="2">Current Data Comparative Item</th><th>Settings</th><th>Evaluation Standards</th></tr>
<tr><td>ABS</td><td colspan="2">SNR Lower Limit</td><td>SNR Lower Limit *1</td><td>SNR must be equal to or higher than the limit value.</td></tr>
<tr><td rowspan="3">INIT</td><td rowspan="2">Initial setting value</td><td>λ•f</td><td>λ•f Drift Limit *1</td><td rowspan="2">Difference with the initial value must be within ± Drift Limit.</td></tr>
<tr><td>Level</td><td>Lvl Drift Limit *1</td></tr>
<tr><td colspan="2">SNR Lower Limit</td><td>SNR Lower Limit *1</td><td>SNR must be equal to or higher than the limit value.</td></tr>
<tr><td rowspan="3">NOMI</td><td colspan="2">λ (GRID TABLE)</td><td>GRID TABLE
λ•f Drift Limit *1</td><td>Difference with the GRID must be within ± Drift Limit.</td></tr>
<tr><td colspan="2">Nominal Level</td><td>Nominal Level
Lvl Drift Limit *1</td><td>Difference with the Nominal Level must be within ± Drift Limit.</td></tr>
<tr><td colspan="2">Nominal SNR</td><td>Nominal SNR</td><td>SNR must be equal to or higher than the Nominal SNR.</td></tr>
</table>

*1: Possible to set when the PASS/FAIL is set to Enable only.

4.5 Settings List

(1 of 3)

Settings: Panel button	Settings: Soft menu	Initial value	Minimum value	Maximum value	Setting resolution	Back up	File save
SYSTEM	GPIB ADDRESS	8	0	30	1	Available	Impossible
SETUP	MEAS LIMIT *1	1270 nm to 1680 nm	Measurement range: 1270 nm to 1680 nm Minimum span: 1.285 nm Setting resolution: 1 pm			Available	Possible
	AVERAGE						
	AVERAGE ON/OFF	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	COUNT	2	2	64	1	Available	Possible
	THRESHOLD						
	PEAK EXCURSION	15 dB	1 dB	30 dB	1 dB	Available	Possible
	PEAK THRESHOLD	10 dB	0 dB	40 dB	1 dB	Available	Possible
	GRID TABLE	GRID ITU	Inapplicable	Inapplicable	Inapplicable		
	GRID Ref Frequency	193.1 THz	178.4479	236.0571	0.1 GHz	Available	Possible
	GRID CH Spacing	100 GHz	10 GHz	10000 GHz	0.1 GHz	Available	Possible
	RESOLN NRM/HI	HI	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	CAL						
	ATM AIR/VAC	VAC	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	LEVEL OFFSET	0 dB	-20 dB	20 dB	0.1 dB	Available	Possible
SCALE	λ•f SCALE	1270 nm to 1680 nm / 178.4479 THz to 236.0571 THz	Measurement range: 1270 nm to 1680 nm / 178.4479 THz to 236.0571 THz Minimum span: 1.285 nm / 180.6 GHz *2 10 pm / 1 GHz *3 Setting resolution: 1 pm / 100 MHz			Available	Possible
	UNITS						
	WAVELEN nm/THz	nm	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	LEVEL LIN/LOG	LOG	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	UPPER LEVEL	10 dBm / 10 mW	-50 dBm / 10 nW	30 dBm / 1 W	0.1 dB/ 0.1 nW	Available	Possible
	LEVEL SCALE	5 dB/Div.	0.5 dB/D	10 dB/D	Inapplicable	Available	Possible
	DISPLAY GRID ON/OFF	ON	Inapplicable	Inapplicable	Inapplicable	Available	Possible

*1: Possible to set when LOWER LIMIT < UPPER LIMIT only.

*2: In the LIST mode.

*3: In the TREND mode.

(2 of 3)

Settings: Panel button	Settings: Soft menu	Initial value	Minimum value	Maximum value	Setting resolution	Back up	File save
APPL	LIST						
	LIST ON/OFF	ON	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Current Peak No	1	1	300 *4	1	Unavailable	Possible
	LIST FULL ON/OFF	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	PARAMETER						
	List Mode	Multi Peak	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Reference Peak No	1	1	= 300 *4	1	Unavailable	Possible
	NdB Down	3 dB	0 dB	40 dB	0.1 dB	Available	Possible
	# λ•f Drift Limit *5	WL	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	# WL	0.1 nm	0 pm	10 nm	1 pm	Available	Possible
	# FREQ	0.01 THz	0.0 THz	0.1 GHz	Inapplicable	Available	Possible
	Ref Level	0 dBm	-30 dBm	13 dBm	0.1 dB	Available	Possible
	# Lvl Drift Limit	10 dB	0 dB	40 dB	0.1 dB	Available	Possible
	# Noise Method	AUTO	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	# Manual Noise	1270 nm	1270 nm	1680 nm	1 pm	Available	Possible
	TREND	CLOSE	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible
	GRAPH ALL DATA ON/OFF	ON	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	TABLE CONTROL TIM/CH	CH		Inapplicable	Inapplicable	Unavailable	Impossible
	Current Channel	1	1	= 300 *6	1	Unavailable	Impossible
	Current Time	1	1	= 500 *7	1	Unavailable	Impossible
	PARAMETER						
	Data Type	λ•f	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Data Mode	ABS	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Interval Time *8	2.0 sec	1.0 sec	86400 sec	0.1 sec	Available	Possible
	*9	2.0 sec	0.5 sec	86400 sec	0.1 sec	Available	Possible
	Measurement Times	11	11	500	1	Available	Possible
	Nominal Level	0 dBm	-30 dBm	13 dBm	0.1 dB	Available	Possible
	Nominal SNR	20 dBm	0 dB	40 dB	0.1 dB	Available	Possible
	Pass/Fail	Disable	Inapplicable	Inapplicable	Inapplicable	Available	Possible

*4: The total number of peaks measured becomes the maximum value.

*5: Items marked with "#" are common parameters for the LIST and TREND.

*6: The total number of channels measured becomes the maximum value.

*7: The total number of measurements becomes the maximum value.

*8: These setting ranges are applied when HI is selected in RESOLN on the SETUP menu.

*9: These setting ranges are applied when NRM is selected in RESOLN on the SETUP menu.

(3 of 3)

Settings		Initial value	Minimum value	Maximum value	Setting resolution	Back up	File save
Panel button	Soft menu						
APPL	# λ•f Drift Limit	WL	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	# WL	0.1 nm	0 pm	10 nm	1 pm	Available	Possible
	# FREQ	0.01 THz	0.0 THz	0.1 GHz	Inapplicable	Available	Possible
	# Lvl Drift Limit	10 dB	0 dB	40 dB	0.1 dB	Available	Possible
	SNR Lower Limit	10 dB	0 dB	40 dB	0.1 dB	Available	Possible
	# Noise Method	AUTO	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	# Manual Noise	1270 nm	1270 nm	1680 nm	1 pm	Available	Possible
	List Full	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Channel Math	NON	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Auto Save	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	File Divide	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Save Option LEVEL	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	Save Option SNR	OFF	Inapplicable	Inapplicable	Inapplicable	Available	Possible
	PEAK λ•f MAX/AVG	MAX	Inapplicable	Inapplicable	Inapplicable	Available	Possible
CURSOR	CURSOR	All Off	Inapplicable	Inapplicable	Inapplicable	Unavailable	Possible
	MODE	NORMAL	Inapplicable	Inapplicable	Inapplicable	Available	Possible
SV/LD	Directory	D:\Advantest \Q8331\SVRCL *10	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible
	Filename	Automatic numbering *11	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible
COPY	FILE MANAGER						
	Directory1	D:\MyData	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible
	Directory2	A:\	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible
	BMP TO FILE						
	Filename	Automatic numbering	Inapplicable	Inapplicable	Inapplicable	Unavailable	Impossible

*10: Default directory used for saving.

*11: Auto numbering in the default directory.

5. REMOTE PROGRAMMING

5.1 GPIB

5.1.1 GPIB Command Index

Use this GPIB Command Index as an index for Chapter 5 GPIB Commands.

5.1.2 GPIB Remote Programming

The network analyzer is equipped with a GPIB (General-Purpose Interface Bus) as standard, which complies with IEEE standards 488.1-1987 and 488.2-1987 and can be remotely controlled by means of an external controller. The analyzer also has a built-in control function, enabling easy configuration of small GPIB systems.

The following describes the method of control using the GPIB remote control functions.

5.1.2.1 GPIB

The GPIB is a high-performance interface bus used to connect the measuring instruments to the computer.

The operations of the GPIB are defined by IEEE standard 488.1-1987. Since the GPIB has a bus-configured interface, it can specify a device by assigning a specific address to each device. Up to 15 devices can be connected in parallel to a single bus. GPIB devices have one or more of the following functions:

- Talker

  The talker is a device which is specified to send data to the bus. Only one active talker can exist on the GPIB bus.

- Listener

  The listener is a device which is specified to receive data from the bus. Multiple active listeners can exist on the GPIB bus.

- Controller

  The controller is a device which specifies the talker and listener. Only one active controller can operate on the GPIB bus. Controllers which control IFC and REN messages are called "system controllers".

  The GPIB bus can have only one system controller on it. If there are multiple controllers on the bus, the system controller becomes the active controller, while other devices which have a control function operate as addressable devices when the system is started up.

  The TCT (Take Control) interface message is used to set a controller other than the system controller as the active controller. After setting, the system controller will become the non-active controller.

  The controller controls the entire system by sending interface messages or device messages to each measuring instrument. The functions of the messages are:

  - Interface message: Control of the GPIB bus
  - Device message: Control of the measuring instrument

5.1.2.2 GPIB Setup

1. Connecting GPIB

   The following shows the standard GPIB connector. Secure the GPIB connector with the two screws to prevent it from coming loose during use.

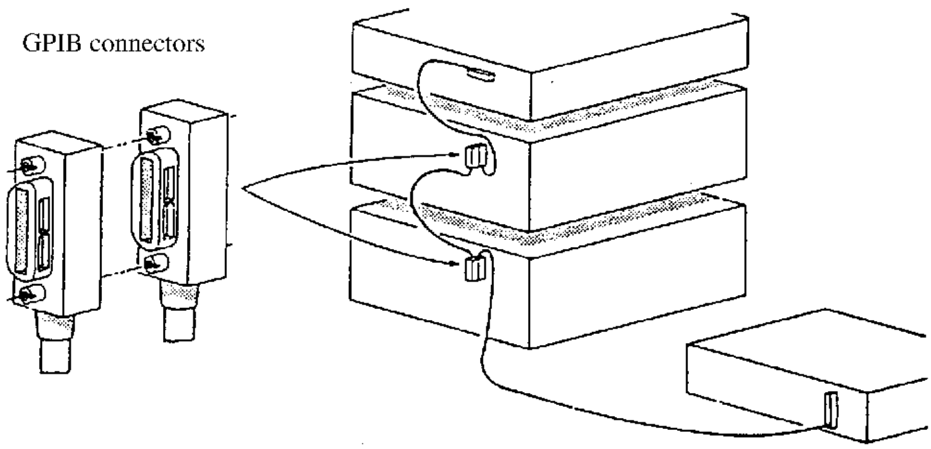


Figure 5-1 Connecting GPIB

The following precautions should be observed when using the GPIB interface:

- The total GPIB cable length in a single bus system should not exceed n × 2 meters, where n = the number of devices to be connected, including the GPIB controller. In no case should the cable length exceed 20 meters.
- Up to 15 devices can be connected to a single bus system.
- There are no restrictions concerning the method of connection between cables. However, no more than three GPIB connectors should be connected to a single device, since the use of excessive force could damage the connector mounting.
- For example, the total cable length in a system with five devices should be 10 meters or less (2 meters × 5 devices = 10 meters).The total cable length can be distributed freely within the range of the maximum allowed cable length. However, if more than ten devices are to be connected, some of them should be connected using cables of less than 2 meters so that the total cable length does not exceed 20 meters.

2. Setting GPIB address

   The GPIB address is set in the System menu GPIB ADDRESS. For details on how to set the GPIB address, refer to 2.8.6, "Setting the GPIB Address (GPIB ADDRESS)."

5.1.3 GPIB Bus Functions

5.1.3.1 GPIB Interface Functions

Table 5-1 GPIB Interface Functions

Code	Description
SH1	With source handshake function
AH1	With acceptor handshake function
T6	Basic talker function, serial polling function, listener-specified talker cancel function
TE0	Without extended talker function
L4	Basic listener function, talker-specified listener cancel function
LE0	Without extended listener function
SR1	With service request function
RL1	Remote function, local function, local lockout function
PP0	Without parallel polling function
DC1	Device clear function
DT1	Device trigger function
C0	Without the system controller function
E1	Using open-collector bus driver

5.1.3.2 Responses to Interface Messages

The responses of the analyzer to interface messages are defined by IEEE standards 488.1-1987 and 488.2-1987 and are described in this section.

For information on how to send interface messages to the analyzer, refer to the instruction manual of the controller to be used.

5.1.3.2.1 Interface Clear (IFC)

The IFC message is transmitted directly to the analyzer through a signal line.

The message allows the analyzer to stop the operation of the GPIB bus. Although all input/output operation is stopped, the input/output buffer is not cleared. Note that the DCL is used to clear the buffer. If the analyzer is specified as an active controller at that time, control of the GPIB bus will be removed from the analyzer and transferred to the system controller.

5.1.3.2.2 Remote Enable (REN)

The REN message is transmitted directly to the analyzer through a signal line.

If the analyzer is specified as a listener when the message is true, the analyzer is in the remote mode.

The analyzer remains in the remote mode until the GTL message is received, or the REN becomes false, or the LOCAL key is pressed.

When the analyzer is in the local mode, it ignores all the received data.

When the analyzer is in the remote mode, it ignores all key inputting other than LOCAL key inputting.

When the analyzer is in the LOCAL LOCKOUT mode (refer to 5.1.3.2.8, "Local Lockout (LLO)"), it ignores all key inputting.

5.1.3.2.3 Serial Polling Enable (SPE)

When the analyzer receives a message from external devices, it is in the serial polling mode.

If the analyzer is specified as a talker in this mode, it sends status bytes instead of normal messages. The analyzer remains in the serial polling mode until the SPD (Serial Polling Disable) message or the IFC message is received.

When the analyzer sends an SRQ (Service Request) message to the controller, bit 6 (RQS bit) of the response data is set to 1 (true). When the analyzer has finished sending this message, the RQS bit reverts to 0 (false). The SRQ (Service Request) message is sent directly through a signal line.

5.1.3.2.4 Group Execute Trigger (GET)

This message triggers the unit function. The unit starts measuring.

5.1.3.2.5 Device Clear (DCL)

When the analyzer receives the DCL message, it performs the following:

- Clearing of the input and output buffers
- Resetting of syntax analysis, execution control and response data generation
- Cancellation of all commands that prevent the remote command from being executed next
- Cancellation of commands that are paused to wait for other parameters
- Cancellation of *OPC and *OPC?

It does not perform the following:

- Changing of data set or stored in the analyzer
- interruption of the front panel operation
- Modification or interruption of analyzer operations being executed
- Changing of status bytes other than MAV. (MAV becomes 0 when the output buffer is cleared.)

5.1.3.2.6 Selected Device Clear (SDC)

The SDC message operates in the same manner as the DCL message. However, it is executed only when the analyzer is as a listener.In other cases, it is ignored.

5.1.3.2.7 Go To Local (GTL)

The GTL message places the analyzer in the local mode. In the local mode, all the operations on the front panel are available.

5.1.3.2.8 Local Lockout (LLO)

The LLO message places the analyzer in the local lockout mode. If the analyzer is set to the remote mode in this mode, all the operations on the front panel will be inhibited. (Note that in the normal remote mode, front panel operations can be performed using the LOCAL key.)

The following three methods can be used to set the analyzer to the local mode from the local lockout mode:

- Sending a GTL message to the analyzer
- Setting the REN message to false (In this case, the local lockout mode will be canceled.)
- Switching on the analyzer power again

5.1.3.3 Message Exchange Protocol

The analyzer receives program messages from controllers or other devices through the GPIB bus and generates response data. The program messages include commands, queries (commands used to query response data) and data. The procedure used to exchange these commands, queries and data is explained in this section.

5.1.3.3.1 GPIB Buffers

The analyzer is equipped with the following three buffers:

- Input buffer

  The input buffer is used to store data temporarily for command analysis (1024 bytes).

  Either of the following two methods can be used to clear the input buffer:

  - Switching on the analyzer power
  - Execution of the DCL or the SDC

- Output buffer

  The output buffer is used to store data which are to be read from the controller (1024 bytes).

  Either of the following two methods can be used to clear the output buffer:

  - witching on the analyzer power
  - Execution of the DCL or the SDC

- Error queue

  The error queue is available only for IEEE488.2-1987 command mode. It is used to store up to ten error messages for remote commands. Each time an error occurs during remote command analysis or in execution, an error message is stored in the queue. The SYST:ERR command is used to read out these messages. When a message is read out, it is removed from the queue.

  Either of the following two methods can be used to clear the error queue:

  - Switching on the analyzer power
  - Execution of the *CLS

5.1.3.3.2 IEEE488.2-1987 Command Mode

IEEE488.2-1987 command mode performs the sending and receiving of messages in accordance with the message exchange protocol in compliance with IEEE standard 488.2-1987.

The following are the most important events when another controller or device receives messages from the analyzer in this mode:

- Response data are generated when a query is received.
- Data are generated in the order of query execution.

Purser

The purser receives command messages in the order of reception from the input buffer, analyzes the syntax and determines what the received command is to execute.

The purser traces the tree structure of the commands when analyzing the command program. It memorizes which part of the tree structure is to be used to start analysis when analyzing the next command. This information is returned to the head of the structure when the purser is cleared.

Any of the following four methods can be used to clear the purser:

- Switching on the analyzer power
- Reception of the DCL or the SDC
- Reception of ":" following ";"
- Reception of the terminator or the EOI signal

Generating response data

When the purser executes a query, the analyzer generates data in the output buffer in response to it (that is, to output data a query must be sent immediately before the data). The procedure implies that unless the controller reads out the data generated through the query, the data will never be cleared.

Apart from the controller read operation, there are two conditions under which the data are cleared. A query error will occur under the following conditions:

- Unterminated condition

  When the controller has read the response data without terminating (LF code of ASCII or END message of GPIB) or sending the query
- Interrupted condition

  When the controller has received the next program message before reading the response data

5.1.4 Command Syntax

5.1.4.1 IEEE488.2-1987 Command Mode

For characters input in IEEE488.2-1987 command mode other than character string data and block data, no distinction is made between upper case and lower case.

5.1.4.1.1 Command Syntax

The command syntax is defined by the following format:

Header	→	Space (space character)	⇒	data

NOTE: ***"⇒ " indicates repetition.***

1. Header

   The header has a hierarchical structure consisting of multiple mnemonics separated by a colon. A four-character (or three-character) "short form" is provided for each mnemonic consisting of four characters or more. (Mnemonics which are not abbreviated are called "long forms".) It is possible to use any form in any combination.

   Any command with a header followed immediately by "?" becomes a query command.

2. Space (space character)

   One space or more is required in this field; otherwise, a syntax error will occur.

3. Data

   When the command requires multiple data, the data should be separated with commas. A space may be inserted before or after the each comma.

   For details of data types, refer to "5.1.4.1.2 Data Formats".

4. Writing multiple commands

   In IEEE488.2-1987 command mode, it is possible to write multiple commands by separating them with semicolons.If commands are written in this way, they should be executed while changing the current path in the hierarchical structure of the header.

5. Changing the current path

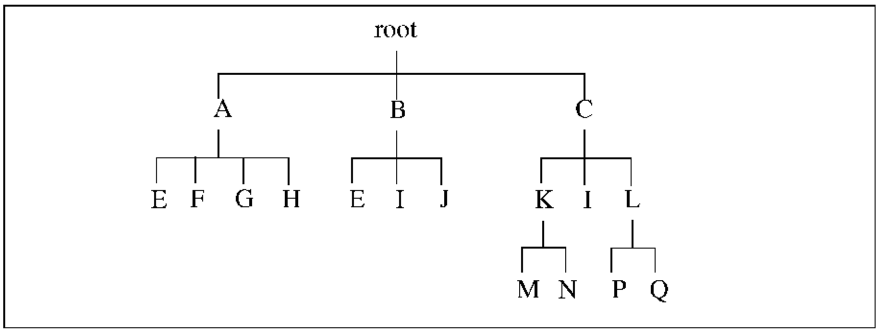
   The current path should be changed in accordance with the following rules:

   - Switching on: The current path is set to "root".
   - Terminator: The current path is set to "root".
   - Colon (:): The current path is changed to the layer immediately below in the command tree. If the colon is at the beginning of the command, the current path will be changed to "root".
   - Semicolon (;): The current path is not changed.

- Common command:

  The command can be executed regardless of the current path position. When the *RST command is executed, the current path is set to "root". (See the example below.)

The following header structure is given as an example:



In this example, the current path is changed as follows:

1. :A:E;:B:E

   Since the colon in the second command changes the current path to "root", commands "A:E" and "B:E" are both valid.

2. :A:E<END> B:E

   Since <END> (terminator) changes the current path to "root", commands "A:E" and "B:E" are both valid.

3. :A:E;F;G;H

   Since the semicolon does not change the current path, ":A:E;F;G;H" results in the four commands "A:E", "A:F", "A:G" and "A:H".

4. :C:I;K:N;M

   Since the colon changes the current path, "K:N" is viewed from the ":C:" layer. Therefore, "K:N" results in "C:K:N". At the same time, since "K:N" includes a colon, the current path is changed to ":C:K:" and the last "M" is interpreted as "C:K:M".

5. :A:E;*ESR 16

   Since the common command is independent of the current path, "*ESR 16" will be executed correctly.

6. :A:E;*ESR 16;F;G;H

   Since the common command does not change the current path, the third item, "F", will be searched for using the current path ":A:" set by the first item ":A:E". Therefore, "F", "G" and "H" result in "A:F", "A:G" and "A:H", respectively.

The following examples show syntax errors.

1. :A:E;B:E

   Since "A:E" changes the current path to ":A:", "B:E" will be searched for in the layer of ":A:". However, because the mnemonic "B" is not found, an error will occur.

2. :C:K:M;L:P

   Since ":C:K:M" changes the current path to ":C:K:", "L:P" will be searched for in the layer of ":C:K:". However, because the mnemonic "L" is not found, an error will occur.

5.1.4.1.2 Data Formats

In IEEE488.2-1987 command mode, the analyzer uses the data formats for data input/output shown in this section.

1. Numeric data

   There are three numeric data formats, any of which can be used for numeric data input. (The data are rounded up or down in accordance with the data format to be input.)

   Some commands add the units to the data at data inputting. For information on units, refer to 5. below.

   The following shows the format of the character data.

   - Integer type : NR1 format

     [Symbol] → Number ⇒

   - Fixed-point type : NR2 format

     [Symbol] → Number ⇒ . → Number ⇒

   - Floating-point type : NR3 format

     [Symbol] → Number ⇒ . → Number ⇒ E or e → Symbol → Number ⇒

   NOTE: " ⇒ " indicates repetition. Symbols at the beginning may be omitted.

2. Character data

   Alphabetic character → Alphanumeric character or _ ⇒

   NOTE: "⇒ " indicates repetition.

3. Character string data

   There are two character string data formats.

   " → Character/ " " ⇒ "

   ' → Character/ ' ' ⇒ '

   Each format can be used as an ASCII 7-bit code character in the character string data.

NOTE: ***In character string data starting with ["], ["] must be represented by [""]. In character string data starting with ['], ['] must be represented by ['']. "⇒ " indicates repetition.***

When the response data are character string data, character string data starting with ["] should be output.

4. Block data

   There are two block data formats. Either can be used for inputting into the analyzer.

Fixed-length format:	# → Number → Number ⇒ DATA ⇒
Undefined-length format:	# → 0 → DATA ⇒ LF^EOI

NOTE: ***"⇒ " indicates repetition.***

In the fixed-length format, the one-digit number following "#" represents the number of digits for the bytes in the data following that number. "0" cannot be used, because it indicates the undefined-length format.

Example: Block data #3128 <data byte>

"3" following "#" represents the number of digits in the character string (128) following "3", while "128" represents the number of bytes in <data byte> following that number.

Also, binary data format can be selected between the single precision (32 bit) and double precision (64 bit).

Single precision format: Sign for the constant (bit 31), exponent (bit 30-23), and constant (bit 22-0).

Double precision format: Sign for the constant (bit 63), exponent (bit 62-52), and constant (bit 51-0).

5. Units

   Units are the suffix following a numeric value. The suffix can be used as a prefix for the unit. The table below lists the suffixes and the units which can be used.

Table 5-2 Suffixes and Units that can be used

Suffixes		Unit	Command examples
1E18	EX		:CALCulate2:WLIMit:STARt[:WAVelength]
			:CALCulate2:WLIMit:STOP[:WAVelength]
1E15	PE	M	:DISPlay:MARKer1:WAVelength
			:DISPlay:MARKer2:WAVelength
1E12	T		
			:CALCulate2:WLIMit:STARt:FREQuency
			:CALCulate2:WLIMit:STOP:FREQuency
1E9	G	Hz	:DISPlay:MARKer1:FREQuency
1E6	MA		:DISPlay:MARKer2:FREQuency
1E3	K		
			:CALCulate2:PEXCursion
1E-3	M *		:CALCulate2:PTHReshold
		DB	:SENSe:CORRection:OFFSet[:MAGNitude]
1E-6	U		:CALCulate3:BANDwidth:NDB
1E-9	N	DBM	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:RLEVel
1E-12	P		:DISPlay:MARKer3:POWer
1E-15	F	M	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:RLEVel
			:DISPlay:MARKer3:POWer
1E-18	A	S	:TRIGger[:SEQuence]:DELay

NOTE: For commands not listed in the table, only the suffix can be used.

*: If HZ or OHM is used as the unit, the command will be executed using the suffix 1E6 (equivalent to MA).

5.1.5 Status Bytes

The analyzer has a hierarchical status register structure in compliance with IEEE standard 488.2-1987, which is used to send various device status information to the controller. This chapter explains the operational models of the status byte and event assignments.

1. Status Register

   The analyzer employs the status register model defined by IEEE standard 488.2-1987 and consists of a condition register, an event register and an enable register.

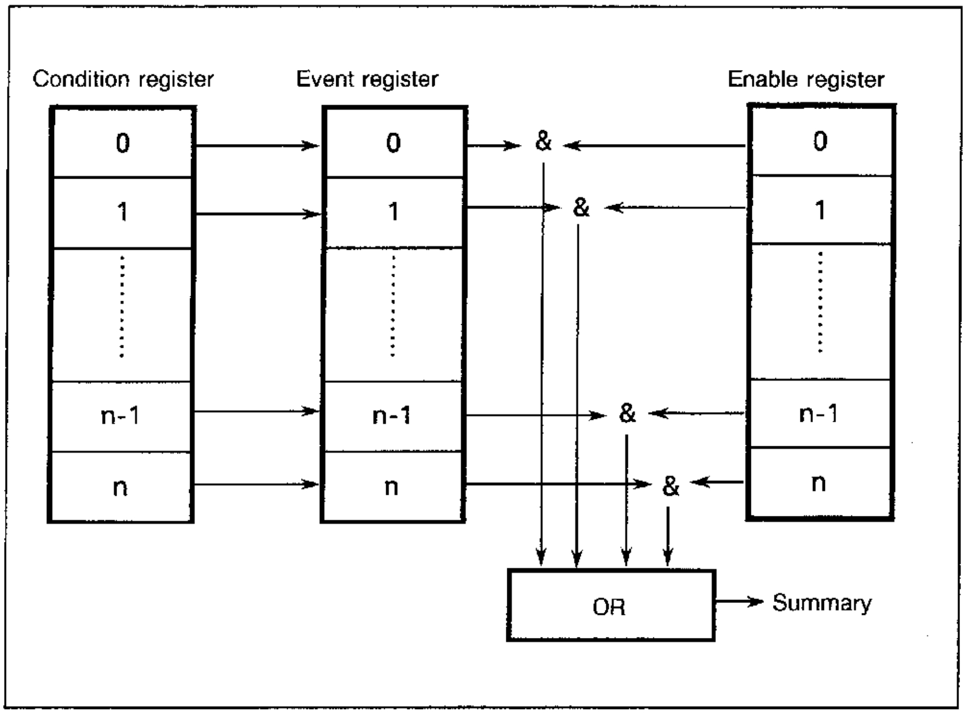


Figure 5-2 Status Register Configuration

a. Condition register

   The condition register continuously monitors the status of devices, that is, retains the latest status of devices. No data can be written into this register.

b. Event register

   The event register latches and retains the status information from the condition register. (In some cases, it retains status changes.)

   Once the register is set, the condition is maintained until a query command reads out the information or the register is reset by means of the *CLS command. No data can be written into this register.

c. Enable register

   The enable register specifies which bit in the event register is to be used as the valid status to generate a summary. The enable register is ANDed with the event register. The OR of the result of the AND operation is generated as a summary. The summary is written into the following status registers. Any data can be written into these registers.

There are 5 unit status registers.

- Status byte register
- Standard event register
- Standard operation status register
- Questionable status register
- Device status register

The arrangement of the status registers of the spectrum analyzer are shown in Figure 5-3.
The status registers are shown in detail in Figure 5-4.

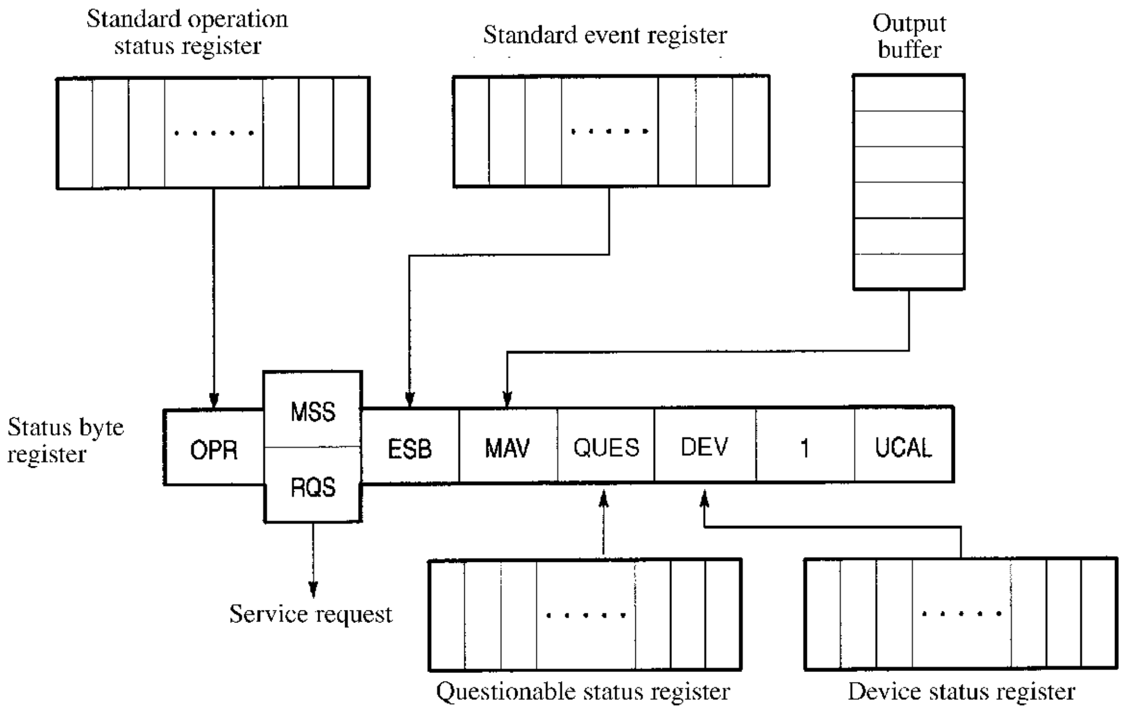


Figure 5-3 Arrangement of the Three Status Registers

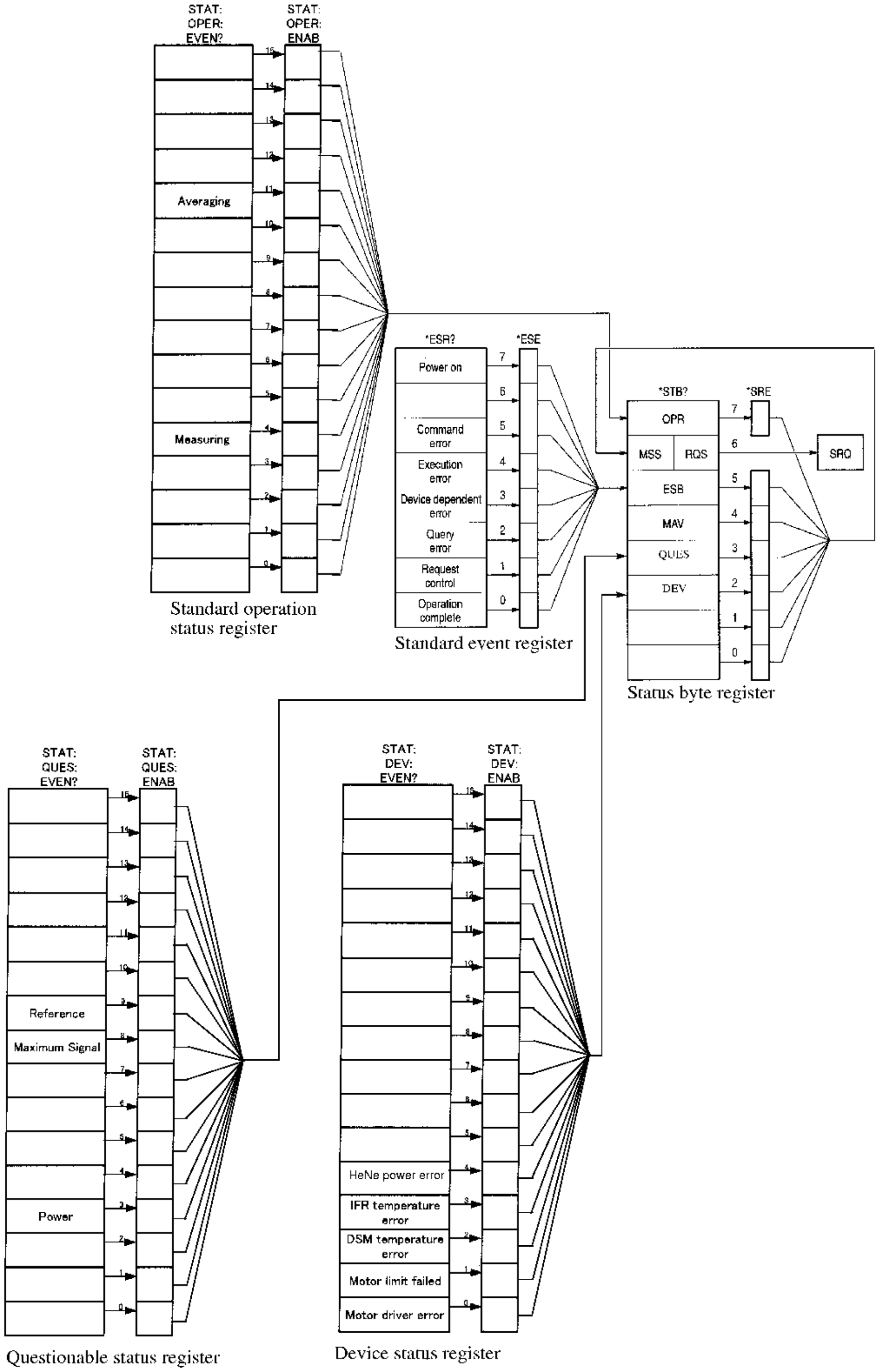


Figure 5-4 Details of the Three Status Registers

2. Event Enable Register

   Each event register has an enable register to determine which bit is available. The enable register sets the corresponding bit in decimal value.

   - Set of Service Request Enable Register: *SRE
   - Set of Standard Even Status Enable Register: *ESE
   - Set of Operation Status Enable Register: OPR
   - Set of Questionable status register: STAT:QUES:ENAB
   - Set of Device status register: STAT:DEV:ENAB

3. Standard Operation Status Register

   Bit assignments for the event register (which represents the standard operation status) is listed below:

Table 5-3 Standard Operation Status Register Allocations

Bit	Functional definition	Description
15 to 12		This is always 0
11	Averaging	This is set to 1 when averaging is completed
10 to 5		This is always 0
4	Measuring	Set to 1 when the measurement is complete.
3 to 0		This is always 0

4. Questionable status register

   The event register assignments for the questionable status are as follows.

Table 5-4 Questionable Status Register Allocations

Bit	Functional definition	Description
15 to 10		This is always 0
9	Reference	Set to 1 when the reference is different to the current input signal number.
8	Maximum Signal	Set to 1 when the maximum signal is detected.
7 to 4		This is always 0
3	Power	Set to 1 when an excess signal power level is input.
2 to 0		This is always 0

5. Device status register

The event register assignments for the device register are as follows.

Table 5-5 Device Status Register Allocations

Bit	Functional definition	Description
15 to 5		This is always 0
4	HeNe power	Set to 1 when the He-Ne laser power was too low.
3	IFR temperature	Set to 1 when there is an abnormal temperature rise in the interferometer.
2	DSM temperature	Set to 1 when there is an abnormal temperature rise in the DSM.
1	Motor limit	Set to 1 when there is an abnormal movement in the movable reflector.
0	Motor driver	Set to 1 when there is an abnormality in the movable reflector or in the reflector control unit.

6. Status Byte Register

The status byte register summarizes the information from the status register. In addition, a summary of the status byte register is sent to the controller as a service request. As a result, this register operates slightly differently from the status register. This section explains the status byte register.
The structure of the status byte register is shown in Figure 5-5.

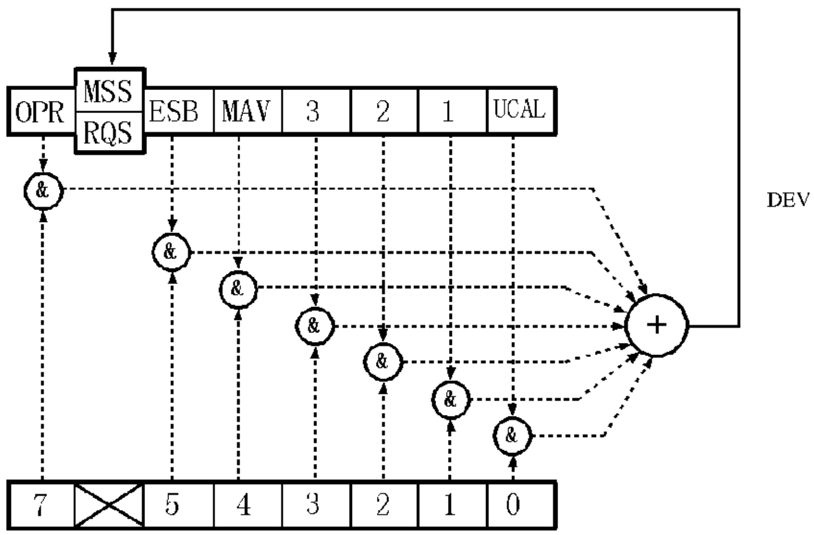


Figure 5-5 Structure of the Status Byte Register

This status byte register has the same functions as the status register, except for the following three points:

- The summary of the status byte register is written in bit 6 of the status byte register.
- Bit 6 of the enable register is always valid and cannot be changed.
- Bit 6 (MSS) of the status byte register writes the RQS of the service request.

The register responds to serial polling from the controller. On doing so, bits 0 to 5 and bit 7 of the status byte register and the RQS are read out, and then the RQS is reset to 0. Other bits are not cleared until each factor has been reset to 0.
The status byte register, RQS, and MSS can be cleared by executing "*CLS," the SRQ line is now false.

The table below explains the meanings of the bits in the status byte register.

Table 5-6 Status Bite Registers

Bit	Functional definition	Description
7	OPR	The OPR bit is a summary of the standard operation status register.
6	MSS	The RQS bit is true when the MSS bit of the status byte register is set to 1. The MSS bit is the summary bit for the entire status data structure. The serial poll cannot read out the MSS bit. (However, the MSS bit is understood to be 1 when the RQS bit is 1.) To read the MSS bit, use the common command *STB?. The *STB? command can read out bit 0 to 5 and bit 7 of the status byte register and the MSS bit. In this case, neither the status byte register nor the MSS bit can be cleared. The MSS bit cannot become 0 until all the unmasked factors in the status register structure have been cleared.
5	ESB	The ESB bit is a summary of the standard event register.
4	MAV	Summary bit for the output buffer. "1" while there is output data in the output buffer. "0" after data has been read out.
3	QUES	QUES is the questionable status register summary.
2	DEV	DEV is the device status register summary.
1 to 0		This is always 0.

7. Standard event register

   The table below explains the meanings of the bits in the standard event register.

Table 5-7 Standard Event Register Allocations

Bit	Functional definition	Description
7	Power on	This is set to 1 when the spectrum analyzer is switched on
6		This is always 0
5	Command Error	This is set to 1 when the parser finds a syntax error
4	Execution Error	This is set to 1 when the system fails to execute an instruction received as a GPIB command for some reason (such as out-of-range parameter)
3	Device Dependent Error	This is set to 1 when errors other than command errors, execution errors, or query errors occur
2	Query Error	This is set to 1 when no data exists or data has been deleted when the controller attempts to read out data from the spectrum analyzer
1	Request Control	"1" is set when the analyzer must become the active controller.
0	Operation Complete	"1" is set after an *OPC command is received and there are no more commands left for the analyzer to execute.

5.1.6 Command Reference

This chapter explains the program for all the remote commands of the analyzer (command syntax, or query syntax, or both), formats of response data (when there is a query), and other details.

NOTE: ***When referring to a command, note that part of the command mnemonic can be omitted.***

Example: ***Although the following two commands have different syntax, they function in the same way:***
TRIG:SEQ:DELAY 1S
TRIG:DELAY 1S

The commands are grouped in the following subsystems:

Common command	:	Is used for identical operation of all measuring instruments.
MEASURE command	:	Start and stop measuring.
SETUP command	:	Set up basic measurement conditions.
APPLICATION command	:	The measurement application command.
SCALE command	:	Set display conditions.
CURSOR command	:	The cursor command.
SYSTEM command	:	The system command.
SAVE/LOAD command	:	Saves and opens a file.
COPY command	:	Copies and deletes files.
GRIB function command	:	The GPIB command.

5.1.6.1 Command Description Format

The following section explains the command mode of IEEE488.2-1987 in detail.

The following precautions should be taken:

CAUTION:

1. ***The command and response data formats are described using the following symbols:***

   <>: ***Indicates an element of syntax. The contents are written after the symbol.***

   | : ***Indicates selection of one item from among multiple items.***
   Example: A | B | C Means that A, B, or C is selectable.

   []: ***Indicates that the enclosed item is an option (omissible).***

   {}: ***Indicates that the enclosed item is a group of selections separated by | and that you can select one of them.***

2. ***A four-letter word, MODE has no distinction between short and long forms.***

   (Example) ***DISPlay:MARKer:MODE***

   Short form: DISP, MARK

   Long form: DISPLAY, MARKER

   A four-letter word, MODE has no distinction between short and long forms.

3. ***Query commands must have "?" as their header. For a query which requires parameters, the query format must be described.***

4. ***The description format of parameters used commonly in this section are indicated below:***

<ch>:	***Channel No.***	***1 - 300, When omitted = Active Channel***
<bool>:	***Truth Value***	***0, 1, OFF, or ON (0 = OFF, 1 = ON)***
<int>:	***Integer Value***	
<real>:	***Real Number Value***	
<str>:	***"Character string"***	
<block>:	***Block Data***	
-:	***No specified parameter***	
×:	***Not available***	

5.1.6.2 Common Commands

1. *CLS

- Function — Clearing status byte and related data
- Presence of command and query
  Command
- Command — *CLS
- Description — The *CLS command clears the status data structure and forcibly cancels *OPC and *OPC?. It also clears the error queue.
  Since this command does not clear the output buffer, the MAV bit is not cleared when output data is present.
  If this command is executed at the beginning of the line, all the status bits, including the MAV status bit, are cleared.
  The *CLS command also clears the error queue.

2. *DDT

- Function — Macro definition for GET
- Presence of command and query — Command / Query
- Command — *DDT <block>
- Parameter — <block>
- Response type — <block>
- Description — The *DDT command defines the command sequence which is to be executed when the *TRG interface message or the *GET interface message is received. That is, it replaces the *TRG operation with a series of commands which has been written into the <block> data. The length of the sequence to be defined must not exceed 255 characters.

  If the *DDT command defines block data (#10) with a length of 0, the *TRG interface message or the GET interface message will execute nothing. The macro can be canceled by executing the *RST command.

  Block data are used to respond a query. If the *DDT? command is executed with the macro not yet defined, block data (#10) with a length of 0 will be returned.
- Caution — Do not use the *TRG interface message in this definition. If it is used in the definition with the *DDT command, the sequence set by the *DDT command will be called instead of the trigger, and thus an endless loop will be formed. (Actually, a macro error will occur because of nesting limitation.)
- Example — When the *DDT command is #212INIT:CONT ON, *TRG replaces INIT:CONT ON.

3. *DMC

- Function: Macro definition
- Presence of command and query: Command
- Command: *DMC <str>,<block>
- Parameter: <str>
  <block>
- Description: The *DMC command defines the command sequence in the macro label specified by <str>. When <str> is received, the definition allows the system to operate as if it has received <block> itself. (However, *EMC must be 1.)

  A hierarchical command can be used for this macro label. In addition, it is possible to overwrite the macro on command defined in advance. (However, it is not possible to overwrite on the common command.) Then, when the macro is enabled by *EMC 1, the system will perform the original operation by disabling a series of commands which has been replaced with the macro using *EMC 0. Use the *PMC command to delete the macro which has been defined by the *DMC command. Once registered, a macro cannot be re-registered until it has been cleared by the *PMC command.

  Follow the grammar of command to write the macro body. Up to nine parameters ($1 to $9) can be given to the macro command. "1" must be given to the parameter following the macro command, "2" to the next parameter, and so on. Also, the macro definition can include the macro. Up to nine levels of nesting are supported. Up to 30 macros can be registered as new macros (depending on the condition).

  See *PMC, *GMC?, *LMC? and *EMC.
- Example: When the *DMC command is "LIMIT", #238CALC2:WLIM: START $1;STOP $2, LIMIT 1300E-6, 1500E-6 replaces CALC2:WLIM:START 1300E-6;CALC2:WLIM:STOP 1500E-6.

4. *EMC

- Function: Permission for macro execution
- Presence of command and query: Command / Query
- Command: *EMC<int>
- Parameter: <int>
- Response type: 0 | 1
- Description: The *EMC command permits (1) or inhibits (0) the execution of the macro.

  This command does not affect the contents of the macro definition. It is used to execute an original command which has been overwritten by the macro.

  *RST inhibits the execution of the macro.

  See *DMC, *PMC, *GMC? and *LMC?.

5. *ESE

- Function: Setting of standard event status enable register
- Presence of command and query: Command / Query
- Command: *ESE <int>
- Parameter: <int>
- Response type: NR1 (integer value)
- Description: The *ESE command sets the enable register in the standard event status register. The standard event status register corresponding to the bit set to 1 in this register is reflected in the status byte register as a valid bit.

  For details, see the description of the status data structure and *ESR?.
- Example: When the operation complete bit (bit 0) and the device dependent error bit (bit 3) are set to "enable", calculate:

  $2^3 + 2^0 = 8 + 1 = 9$ and set *ESE 9.

6. *ESR?

- Function — Readout of standard event status register
- Presence of command and query
  Query
- Query — *ESR?
- Response type — NR1 (integer value)
- Description — The *ESR command reads out the standard event status register value. When the register is read out, it is cleared and the corresponding bit (bit 5) of the status byte is cleared.
  For details, see the description of the status data structure.

Table 5-8 Table Standard Event Register Assignmen

bit		Description
7	Power on	Set to 1 when the system is switched on
6		Always 0
5	Command Error	Set to 1 when the purser detects a grammar error
4	Execution Error	Set to 1 when the system fails to execute the instruction which has been received as a GPIB command for some reason (such as parameter out of range)
3	Device Dependent Error	Set to 1 when an error other than a command error, an execution error, or a query error occurs
2	Query Error	Set to 1 if there are no data or if data have been deleted when the controller attempts to read out data from the analyzer
1	Request Control	Set to 1 when the analyzer is required to be active controller
0	Operation Complete	Set to 1 when the analyzer has no command to be executed after it has received the *OPC command

7. *GMC?
   - Function — Query of macro definition
   - Presence of command and query — Query
   - Query — *GMC? <name>
   - Parameter — <name>
   - Response type — <block>
   - Description — The *GMC? command reads out the macro definition specified by <name>.

     If the command reads out an undefined <name> macro, block data (#10) with a length of 0 will be returned.

     See *DMC, *PMC?, *LMC? and *EMC.

8. *IDN?
   - Function — Query of devices
   - Presence of command and query — Query
   - Query — *IDN?
   - Response type — "<manufacturer>,<model>,<serial number>,<firmware level>"

     <manufacturer> = ADVANTEST

     <model> = Model name

     <serial number> = Serial number

     <firmware level> = System version
   - Description — The *IDN? extracts system identification information. This command outputs four items in the character string format, as shown in the response format above.

9. *LMC?
   - Function — Readout of all macros
   - Presence of command and query — Query
   - Query — *LMC?
   - Response type — "<macro label>"|,"<macro label>"...|

     <macro label> = Macro header
   - Description — Answers all the macro headers in the character string format.

     When multiple macros are defined, they are separated by ",". If there is no defined macro, the system responds with a character string with a length of 0 ("").

     See *DMC, *PMC, *GMC? and *EMC.

10. *OPC
    - Function: Notification of end of all operations in progress
    - Presence of command and query: Command / Query
    - Command: *OPC
    - Response type: 1
    - Description: The *OPC command sets the 'Operation complete' bit of the standard event status register to 1 when all commands being executed have been completed. If the next command is received before the command being executed finishes, the *OPC command waits until the execution of that command has been completed. Therefore, if the analyzer does not execute a command after receiving the *OPC command, the status register will be set.

      The *OPC? writes 1 into the output buffer while the *OPC command above sets the 'Operation complete' bit. Therefore, the *OPC? command allows the command to be finished when the controller receives the response from the analyzer.

      Both *OPC and *OPC? can be canceled by using a DCL interface message, the *CLS command, or the *RST command.
      See *WAI.
11. *PCB
    - Function: Setting of the GPIB address used to return the right of control
    - Presence of command and query: Command
    - Command: *PCB <primary>[,<secondary>]
    - Parameter: <primary>
      <secondary>
    - Description: The *PCB command sets the address of the external controller to which the analyzer is connected.
12. *PMC
    - Function: Deletion of all macro definitions
    - Presence of command and query: Command
    - Command: *PMC
    - Description: The *PMC command deletes all the macro definitions. This command deletes all the macro headers and bodies from the memory of the analyzer, making it possible to register new macros.

      See *DDT, *DMC, *GMC?, *LMC? and *EMC.

13. *RCL

- Function — Recalls the device settings
- Presence of command and query — Command
- Command — *RCL {<int> | POFF}
- Parameter — <int> = register number (0 to 9999)
  POFF = Settings before the power-off
- Description — The *RCL command recalls the analyzer settings from the specified internal register. If the register number 0 or POFF (or RECLPOFF) is used, this command recalls the settings before the power-off.

14. *RST

- Function — Resetting of devices
- Presence of command and query — Command
- Command — *RST
- Description — The *RST command resets the analyzer. The following operations are performed on the system:
  1. System initialization
  2. Initialization of the macro defined by the *DDT command.
  3. Invalidation of the macro (Same as *EMC 0)
  4. Invalidation of the *OPC bit and the *OPC? bit

  The resetting does not affect:
  1. GPIB bus condition
  2. GPIB address
  3. Output buffer
  4. Status data structure
  5. Macro defined by the *DMC command
  6. Calibration data of the device

  See SYSTem:PRESet(IP).

15. *SAV

- Function: Saves the device settings
- Presence of command and query: Command
- Command: *SAV <int>
- Parameter: <int> = register number (1 to 9999)
- Description: The *SAV command saves the analyzer settings in an internal register with a specified number.

  Executing the save register command files and stores data in the hard disk (D drive). Data which exceeds the D drive memory size cannot be stored.

16. *SRE

- Function: Setting of service request enable register
- Presence of command and query: Command / Query
- Command: *SRE <int>
- Parameter: <int>
- Response type: NR1 (integer value)
- Description: The *SRE command sets the service request enable register. The status byte register corresponding to the bit in this register which is set to 1 is reflected in the MSS bit as a valid bit.

  Bit 6 of the response data for the query command is always 0.

  For details, see the description of the status data structure.

  See *STB?.
- Example: If the OPR bit (bit 7), the ESB bit (bit 5) and the MAV bit (bit 4) are set to "enable", calculate:

  $2^7 + 2^5 + 2^4 = 128 + 32 + 16 = 176$ and set *SRE 176.

17. *STB?

- Function — Readout of status byte register
- Presence of command and query — Query
- Query — *STB?
- Response type — NR1 (integer value)
- Description — The *STB? command reads out the contents of the status byte register.

  The summary bit of the request to be read out here is the MSS bit.

  This register and the MSS bit are not cleared, even if the register is read out.

  For details, see the description of the status data structure.

Table 5-9 Standard Event Register Assignments

bit		Description
7	OPR	OPR is a summary of the standard operation status register.
6	MSS	When the MSS bit of the status byte register is set to 1, the RQS bit is TRUE and the MSS bit is the summary bit for all of the status data structure.
		The service request cannot read out the MSS bit. (However, when the RQS bit is 1, it is understood that the MSS bit is 1.)
		To read the MSS bit, the common command *STB? should be used. The *STB? command can read out bits 0 to 5 and bit 7 of the status byte register and the MSS bit. In this case, the status byte register and the MSS bit are not cleared.
		The MSS bit does not become 0 until all the unmasked factors in the status register structure are cleared.
5	ESB	The ESB bit is a summary of the standard event register.
4	MAV	The MAV bit is a summary bit of the output buffer.
		The MAV bit is 1 when the output buffer has data to be output and it is 0 when the data are read out.
3	QUES	The QUES is a summary of the questionable status register.
2	DEV	The DEV is a summary of the device status register.
0 to 1		Always 0

18. *TRG

- Function — Triggering device
- Presence of command and query — Command
- Command — *TRG
- Description — The *TRG command triggers the unit function. The unit starts measuring when the trigger message is received.

  The *TRG and GET interface messages are sent to the input buffer and processed in the order they are input.

19. *TST?

- Function — Query of self test result
- Presence of command and query — Query
- Query — *TST?
- Response type — 0 | error code
- Description — The *TST? command allows the analyzer to start the self test and return the result. Answering with 0 indicates that the test has been passed, while other answers indicate error codes.

20. *WAI

- Function — Waiting for end of all operations being performed
- Presence of command and query — Command
- Command — *WAI
- Description — The *WAI command is used to wait for the completion of all the commands which are being executed. If this command is executed, all commands input after that time will be delayed until all the commands being executed have been completed.

  *WAI can be canceled by means of the DCL interface message.

5.1.6.3 MEASURE Command

Table 5-10 MEASURE Command

Function	Command	Parameter (overview)	Query (overview)
Measurement start	:INITiate:IMMediate	Unnecessary	Inapplicable
Measurement stop	:ABORt	Unnecessary	Inapplicable
Continuous measurement ON/OFF	:INITiate:CONTinuous	<bool> =OFF(0) =ON(1)	ON|OFF

5.1.6.4 SETUP Command

Table 5-11 SETUP Command (1 of 2)

Function	Command	Parameter (overview)	Query (overview)
Measurement range			
Lower limit (wavelength)	:CALCulate2:WLIMit:STARt[:WAVelength]	<real>	<real>
Lower limit (frequency)	:CALCulate2:WLIMit:STARt:FREQuency	<real>	<real>
Upper limit (wavelength)	:CALCulate2:WLIMit:STOP[:WAVelength]	<real>	<real>
Upper limit (frequency)	:CALCulate2:WLIMit:STOP:FREQuency	<real>	<real>
Average			
ON/OFF	:CALCulate1:CAVErage[:STATe]	<bool>	ON|OFF
Count	:CALCulate1:CAVErage:COUNt	<int>	<int>
Threshold			
Peak excursion level	:CALCulate2:PEXCursion	<int>	<int>
Peak threshold level	:CALCulate2:PTHReshold	<int>	<int>
Grid table			
Table preset (ITU GRID)	:CALCulate3:CHANnel:PRESet	Unnecessary	Inapplicable
Reference frequency	:CALCulate3:CHANnel:ITU:REFerence :FREQuency	<real>	<real>
Channel spacing	:CALCulate3:CHANnel:ITU:SPACing	<real>	<real>
Table number	:CALCulate3:CHANnel:POINts?	Unnecessary	<int>
Grid table output	:CALCulate3:CHANnel:DATA?	FREQuency|WAVelength	<block> or <real> =(*1)

(*1): When the value data format is set, data for each table is output.
The outputting data can be switched with the output data format setting.

Table 5-11 SETUP Command (2 of 2)

Function	Command	Parameter (overview)	Query (overview)
Measurement resolution			
Sweep point number	:SENSe:SWEep:POINts	NORMal|HIGH or 0|1	NORM|HIGH
Calibration			
Wavelength correction mode	:SENSe:CORRection:MEDium	AIR|VAC or 1|0	AIR|VAC
Level offset	:SENSe:CORRection:OFFSet[:MAGNitude]	<real>	<real>

5.1.6.5 APPLICATION Command

Table 5-12 APPLICATION Command (1 of 3)

Function	Command	Parameter (overview)	Query (overview)
List			
ON/OFF	:DISPlay[:WINDow]:LIST[:STATe]	<bool>	ON|OFF
Full list display ON/OFF	:DISPlay[:WINDow]:LIST:ALL[:STATe]	<bool>	ON|OFF
Current channel	:DISPlay[:WINDow]:LIST:CURRent	<int>	<int>
Sort type of the list	:CALCulate3:SORT:TYPE	WAVelength|POWer or 0|1	WAV|POW
Sort order of the list	:CALCulate3:SORT:ORDer	ASCEnding|DESCending or 0|1	ASCE|DESC
List parameter			
Multi peak mode	:CALCulate3:PRESet	Unnecessary	Inapplicable
SNR mode (*2)	:CALCulate3:SNR[:STATe]	<bool>	ON|OFF
Noise method	:CALCulate3:SNR:AUTO	<bool> =OFF(0):MANUAL =ON(1):AUTO	ON|OFF
Manual noise (wavelength specification)	:CALCulate3:SNR:REFerence[:WAVelength]	<real>	<real>
Manual noise (frequency specification)	:CALCulate3:SNR:REFerence:FREQuency	<real>	<real>
Relative mode (*2)	:CALCulate3:RELAtive[:STATe]	<bool>	ON|OFF
Reference channel number	:CALCulate3:RELAtive:REFerence:CHANnel	<int>	<int>
Difference mode (*2)	:CALCulate3:DIFFerence[:STATe]	<bool>	ON|OFF
Pass / Fail mode (*2)	:CALCulate3:PASSfail[:STATe]	<bool>	ON|OFF
Wavelength range/frequency range selection	:CALCulate3:PASSfail:MODE	WAVelength|FREQuency or 0|1	WAV|FREQ
Wavelength range	:CALCulate3:PASSfail:DWAVelength	<real>	<real>
Frequency range	:CALCulate3:PASSfail:DFREquency	<real>	<real>
Reference level	:CALCulate3:PASSfail:POWer	<real>	<real>

Table 5-12 APPLICATION Command (2 of 3)

Function	Command	Parameter (overview)	Query (overview)
Power level range	:CALCulate3:PASSfail:DPOWer	<real>	<real>
NdB Down	:CALCulate3:BANDwidth:NDB	<real>	<real>
List data output			
Output data number	:CALCulate3:POINts?	Unnecessary	<int>=Peak number
Data output per type	:CALCulate2:DATA?	FREQuency|POWer|WAVelength	<block> or <real> =(*3)
Set data output	:CALCulate3:DATA?	Unnecessary	<block> or <real> =(*4)
Trend			
ON/OFF	:CALCulate3:TRENd[:STATe]	<bool>	ON|OFF
All channel monitor ON/OFF	:DISPlay[:WINDow]:TRENd:TRACe:ALL [:STATe]	<bool>	ON|OFF
Current data selection mode	:DISPlay[:WINDow]:TRENd:LIST	CHANnel|TIME or 1|0	CHAN|TIME
Current data number	:DISPlay[:WINDow]:TRENd:LIST{:CHAN| :TIME}:CURRent	<int>	<int>
Trend parameter			
Data type	:CALCulate3:TRENd:TYPE	WAVelength|POWer|SNR or 0|1|2	WAV|POW|SNR
Data mode	:CALCulate3:TRENd:MODE	ABSolute|INITial|NOMInal or 0|1|2	ABS|INIT|NOMI
Interval time	:TRIGger[:SEQuence]:DELay	<real>	<real>
Measurements count	:TRIGger[:SEQuence]:COUNt	<int>	<int>
Display all windows list ON/OFF	:DISPlay[:WINDow]:TRENd:LIST:ALL[:STATe]	<bool>	ON|OFF
Noise method	:CALCulate3:SNR:AUTO	<bool> =OFF(0):MANUAL =ON(1):AUTO	ON|OFF
Manual noise (wavelength specification)	:CALCulate3:SNR:REFerence[:WAVelength]	<real>	<real>
Manual noise (frequency specification)	:CALCulate3:SNR:REFerence:FREQuency	<real>	<real>
Reference level	:CALCulate3:PASSfail:POWer	<real>	<real>
Reference SNR	:CALCulate3:TRENd:REFerence:SNR	<real>	<real>
Pass / Fail mode	:CALCulate3:TRENd:PASSfail[:STATe]	<bool>	ON|OFF
Wavelength range/frequency range selection	:CALCulate3:PASSfail:MODE	WAVelength|FREQuency or 0|1	WAV|FREQ
Wavelength range	:CALCulate3:PASSfail:DWAVelength	<real>	<real>
Frequency range	:CALCulate3:PASSfail:DFREquency	<real>	<real>
Power level range	:CALCulate3:PASSfail:DPOWer	<real>	<real>
SNR lower limit	:CALCulate3:TRENd:SNR:LIMIt:LOWer	<real>	<real>

Table 5-12 APPLICATION Command (3 of 3)

Function	Command	Parameter (overview)	Query (overview)
Channel Math	:CALCulate3:TRENd:MATH	NON|MINimum|MAXimum|DIFFerence or 0|1|2|3	NON|MIN|MAX|DIFF
Auto save	:CALCulate3:TRENd:ASAVe[:STATe]	<bool>	<bool>
Auto-saved data file division	:CALCulate3:TRENd:ASAVe:DIVIde[:STATe]	<bool>	<bool>
Auto-saved data addition (level data)	:CALCulate3:TRENd:ASAVe:POWer[:STATe]	<bool>	<bool>
Auto-saved data addition (SNR data)	:CALCulate3:TRENd:ASAVe:SNR[:STATe]	<bool>	<bool>
Trend data output			
Channel number output	:CALCulate3:TRENd:POINts?	Unnecessary	<int>=Channel number
Trend data output	:CALCulate3:TRENd:DATA[<ch>]?	Unnecessary	<block> or <real> =(*5)
Wavelength (frequency) data output	:FETCh:TRENd[<ch>]:ARRay:X?	Unnecessary	<block> or <real> =(*6)
Power level data output	:FETCh:TRENd[<ch>]:ARRay:POWer?	Unnecessary	<block> or <real> =(*6)
SNR data output	:FETCh:TRENd[<ch>]:ARRay:SNR?	Unnecessary	<block> or <real> =(*6)
MATH data output	:CALCulate3:TRENd:MATH:DATA[<ch>]?	Unnecessary	<block> or <real> =(*7)
Peak λ•f			
Display mode	:CALCulate3:PEAK	MAXimum|AVErage or 0|1	MAX|AVE
Display data output	:CALCulate3:PEAK:DATA?	Unnecessary	<real>,<real> =Wavelength, level

(*2): Only one mode can be set to ON.

(*3) to (*6): The output data can be switched with the output data format setting.

(*3): When the value data format is set, data for each table is output.

(*4): The output data changes depending on the list mode.

Multi peak mode	The peak 1 wavelength, peak 1 frequency, peak 1 power level, ..., peak N wavelength, peak N frequency, and peak N power level.
SNR mode	The peak 1 wavelength (frequency), peak 1 power level, peak 1 noise level, peak 1 SNR, ..., peak N wavelength (frequency), peak N power level, peak N noise level, and peak N SNR.
Relative mode	The peak 1 wavelength (frequency), 0, peak 1 and reference peak wavelength (frequency) difference, peak 1 and reference peak power level difference, ..., peak N wavelength (frequency), peak N and peak N-1 wavelength (frequency) difference, peak N and reference peak wavelength (frequency) difference, peak N power level, and peak N and reference peak power level difference.
Difference mode	The nearest GRID wavelength (frequency) to peak 1, peak 1 wavelength (frequency), peak 1 and its nearest GRID wavelength (frequency) difference, ..., the nearest GRID wavelength (frequency) to peak N, peak N wavelength (frequency), and peak N and its nearest GRID wavelength (frequency) difference,
Pass / Fail mode	The peak 1 pass or fail result, the nearest GRID wavelength (frequency) to peak 1, peak 1 wavelength (frequency), peak 1 power level, peak 1 and its nearest GRID wavelength (frequency) difference, peak 1 and reference power level difference, ..., peak N pass or fail result, the nearest GRID wavelength (frequency) to peak N, peak N wavelength (frequency), peak N power level, peak N and its nearest GRID wavelength (frequency) difference, and peak 1 and reference power level difference.
BAND WIDTH mode	The peak 1 center wavelength (frequency), peak 1 wavelength (frequency) half-width, ..., peak N center wavelength (frequency), and peak N wavelength (frequency) half-width.

(*5): The measurement data specified in the current channel or the header parameter <ch> are output. The output data content changes depending on the data mode settings.

Data outputting order	The trend measurement reference data, first measurement data, ..., and Nth measurement data.
Trend measurement reference data	The wavelength (frequency), power level, and SNR
Nth measurement data (pass / fail mode setting OFF)	The wavelength (frequency), power level, and SNR
Nth measurement data (pass / fail mode setting ON)	The wavelength (frequency), wavelength (frequency) pass or fail result, power level, power level pass or fail result, SNR, and SNR pass or fail result.

(*6): When the value data format is set, data for each measurement is output.

(*7): The MATH calculation results specified in the current channel or the header parameter <ch> are output. Wavelength (frequency), level, and SNR data are output in order.

5.1.6.6 SCALE Command

Table 5-13 SCALE Command

<table>
<tr><th>Function</th><th>Command</th><th>Parameter (overview)</th><th>Query (overview)</th></tr>
<tr><td>Auto scale</td><td>:DISPlay[:WINDow]:TRACe:ALL[:SCALe]
:AUTO</td><td>Unnecessary</td><td>Inapplicable</td></tr>
<tr><td>Center wavelength
(frequency)</td><td>:DISPlay[:WINDow]:TRACe:X[:SCALe]:CENTer</td><td><real></td><td><real></td></tr>
<tr><td>Display span</td><td>:DISPlay[:WINDow]:TRACe:X[:SCALe]:SPAN</td><td><real></td><td><real></td></tr>
<tr><td>Starting wavelength
(frequency)</td><td>:DISPlay[:WINDow]:TRACe:X[:SCALe]:LEFT</td><td><real></td><td><real></td></tr>
<tr><td>Stopping wavelength
(frequency)</td><td>:DISPlay[:WINDow]:TRACe:X[:SCALe]:RIGHt</td><td><real></td><td><real></td></tr>
<tr><td>Display unit
X-axis scale</td><td>:UNIT:WAV</td><td>NM|THZ or 0|1</td><td>NM|THZ</td></tr>
<tr><td rowspan="2">Y-axis scale</td><td>:DISPlay[:WINDow]:TRACe:Y[:SCALe]
:SPACing</td><td>LINear|LOGarithmic or 1|0</td><td>LIN|LOG</td></tr>
<tr><td>:UNIT:POWer</td><td>LINear|LOGarithmic or 1|0</td><td>LIN|LOG</td></tr>
<tr><td>Reference level</td><td>:DISPlay[:WINDow]:TRACe:Y[:SCALe]:RLEVel</td><td><real></td><td><real></td></tr>
<tr><td>XdB/Div</td><td>:DISPlay[:WINDow]:TRACe:Y[:SCALe]
:PDIVision</td><td>10|5|2|1|0.5</td><td>10|5|2|1|0.5</td></tr>
<tr><td>Grid display ON/OFF</td><td>:DISPlay[:WINDow]:TRACe:GRAPhics:GRID
[:STATs]</td><td><bool></td><td>ON|OFF</td></tr>
</table>

5.1.6.7 CURSOR Command

Table 5-14 CURSOR Command

Function	Command	Parameter (overview)	Query (overview)
X1 cursor			
ON/OFF	:DISPlay:MARKer1[:STATs]	<bool>	ON|OFF
Wavelength	:DISPlay:MARKer1:WAVelength	<real>	<real>
Frequency	:DISPlay:MARKer1:FREQuency	<real>	<real>
X2 cursor			
ON/OFF	:DISPlay:MARKer2[:STATs]	<bool>	ON|OFF
Wavelength	:DISPlay:MARKer2:WAVelength	<real>	<real>
Frequency	:DISPlay:MARKer2:FREQuency	<real>	<real>
Y1 cursor			
ON/OFF	:DISPlay:MARKer3[:STATs]	<bool>	ON|OFF
Level	:DISPlay:MARKer3:POWer	<real>	<real>
All cursor OFF	:DISPlay:MARKer:AOFF	Unnecessary	Inapplicable
Cursor data mode	:DISPlay:MARKer:MODE	NORMal|DELTa or 0|1	NORM|DELT
Cursor data output	:DISPlay:MARKer:DATA?	Unnecessary	<real>,<real>,<real> <real>,<real>=(*8)
Peak search			
MAX peak	:DISPlay:MARKer[1|2]:MAXimum	Unnecessary	Inapplicable
LEFT peak	:DISPlay:MARKer[1|2]:MAXimum:LEFT	Unnecessary	Inapplicable
RIGHT peak	:DISPlay:MARKer[1|2]:MAXimum:RIGHt	Unnecessary	Inapplicable
NEXT peak	:DISPlay:MARKer[1|2]:MAXimum:NEXT	Unnecessary	Inapplicable
PREV peak	:DISPlay:MARKer[1|2]:MAXimum:PREVious	Unnecessary	Inapplicable

(*8): The output data differs depending on the cursor data mode setting.

Normal mode	The X1 cursor wavelength (frequency), X1 cursor level, X2 cursor wavelength (frequency), X2 cursor level, and Y1 cursor level.
Delta mode	The X1 cursor wavelength (frequency), X1 cursor level, X1 and X2 cursor wavelength (frequency) difference, X1 and X2 cursor level difference, and Y1 cursor level.

5.1.6.8 SYSTEM Command

Table 5-15 SYSTEM Command

Function	Command	Parameter (overview)	Query (overview)
Preset	:SYSTem:PRESet	Unnecessary	Inapplicable
Label input	:DISPlay[:WINDow]:TEXT:DATA	<str>	<str>
Date setting	:SYSTem:DATE	<int>,<int>,<int> =Year, month, day	<int>,<int>,<int> =Year, month, day
Time setting	:SYSTem:TIME	<int>,<int> =Hours and Minutes	<int>,<int> =Year, month, day
System turning off	:SYSTem:HALT	<int>={1|2|3} *9	Inapplicable

(*9) 1: Turn off the power after closing Windows.
2: Closing Windows.
3: Restarting.

5.1.6.9 SAVE/LOAD Command

Table 5-16 SAVE/LOAD Command

Function	Command	Parameter (overview)	Query (overview)
Save	:FILE:STORe	<int> or <str>	Inapplicable
Load	:FILE:LOAD	<int> or <str>	Inapplicable

5.1.6.10 COPY Command

Table 5-17 COPY Command

Function	Command	Parameter (overview)	Query (overview)
Copy	:FILE:COPY	<str>, <str> *10	Inapplicable
Delete	:FILE:DELete	<str> *11	Inapplicable

(*10): Send the desired file name and destination directory parameters in order. Specify the desired file name by using a full path such as "D:\Advantest\Q8331\SVRCL\File0001.SAV". Specify the destination directory such as "A:\". The destination directory cannot be specified in "C:\".
If the same file name exists in the directory, the file is not copied and an error occurs.
If "....File0001.*" is used as a file name, File0001 files that have different extensions can be copied.

(*11): Specify a file name to be deleted by using a full path.
In the same manner stated in (*10), if "....File0001.*" is used as a file name, File0001 files that have different extensions can be deleted.
Delete the correct file because whether or not the file should be deleted is not confirmed.

5.1.6.11 GPIB Command

Table 5-18 GPIB Command

<table>
<tr><th>Function</th><th>Command</th><th>Parameter (overview)</th><th>Query (overview)</th></tr>
<tr><td>Output data format</td><td></td><td></td><td></td></tr>
<tr><td>Format selection</td><td>:FORMat:DATA</td><td>ASCii|REAL,{32|64}
=ASCii: Value data
=REAL: Binary data *12</td><td>ASC|REAL,32|REAL,64</td></tr>
<tr><td>Binary format</td><td>:FORMat:BORDer</td><td>SWAPped|NORMal</td><td>SWAP|NORM</td></tr>
<tr><td>Operation status enable register, setting and reading</td><td>:STATus:OPERation:ENABle</td><td><int>=0 to 65535</td><td><int></td></tr>
<tr><td>Questionable status enable register, setting and reading</td><td>:STATus:QUEStionable:ENABle</td><td><int>=0 to 65535</td><td><int></td></tr>
<tr><td>Standard operation status register reading</td><td>:STATus:OPERation[:EVENt]?</td><td>Unnecessary</td><td><int>=0 to 65535</td></tr>
<tr><td>Questionable status register reading</td><td>:STATus:QUEStionable[:EVENt]?</td><td>Unnecessary</td><td><int>=0 to 65535</td></tr>
<tr><td>Status bite clear</td><td>:STATus:PRESet</td><td>Unnecessary</td><td>Inapplicable</td></tr>
<tr><td>Error reading</td><td>:SYSTem:ERRor?</td><td>Unnecessary</td><td><int>,<str></td></tr>
</table>

*12: Selects the data format between 32 bit and 64 bit.

5.1.7 Example Programs

This section describes program examples used when remotely controlling the Q8331 through the GPIB port.

5.1.7.1 Sample Programs for Setting or Reading Measurement Conditions

CAUTION: ***Visual Basic 6.0 (referred to as VB henceforth) is used in the sample programs shown here. Also, National Instruments-made GPIB board (referred to as NI-made for brevity henceforth) is used for the GPIB control board; NI-made driver is used for the control driver.***

- VB Program

  Example VB-1: Sets necessary measurement parameters and measures in the Multi Peak mode of the LIST. The end of measurement is detected by using *OPC, the frequency data is read in the binary code.

```
Dim Rdbuff$, Snum$
Dim ibuf%, num%, i%
Dim frequency#(1 To 300)

Call ibclr(mwm)                                        ' Device Clear (Clears the device).
Call ibwrt(mwm, "*RST")                                ' Resets the Q8331.
Call ibwrt(mwm, ":FORM:DATA ASC")                      ' Sets the data format to ASCII.

Call ibwrt(mwm, ":SENS:CORR:MED VAC")                  ' Sets the wavelength display in vacuum.
Call ibwrt(mwm, ":SENS:SWE:POIN HIGH")                 ' Sets the resolution to High.
Call ibwrt(mwm, ":CALC2:PEXC 5DB;PTHR 20DB")           ' Sets the Peak Excursion to 5 dB and Peak Threshold to 20 dB.
Call ibwrt(mwm, ":UNIT:WAV THZ;POW LOG")               ' Sets the horizontal axis to Frequency and vertical axis to LOG.

Call ibwrt(mwm, ":DISP:TRAC:X:CENT 193.55THZ;SPAN 5THZ")  ' Sets the spectrum display range to 191.05 THz - 196.05 THz.

Call ibwrt(mwm, ":DISP:LIST ON;LIST:ALL OFF")          ' Sets the peak list and spectrum wavelength display.
Call ibwrt(mwm, ":CALC3:PRES")                         ' Sets the list mode to the Multi Peak mode.

Call ibwrt(mwm, ":INIT:IMM")                           ' Starts the single sweep.

Rdbuff = Space(3)
Do
    Call ibwrt(mwm, "*OPC?")                           ' Requests for the End of Sweep notification.
    Call ibrd(mwm, Rdbuff)                             ' Reads the End of Sweep notification.
Loop Until (Int(Val(Rdbuff)) And 1) = 1

Call ibconfig(mwm, IbcReadAdjust, 0)
Call ibwrt(mwm, ":FORM:DATA REAL,64;BORD SWAP")        ' Sets the output data format to the binary code and performs a byte swap.
Call ibwrt(mwm, ":CALC2:DATA? FREQ")                   ' Requests for frequency data output.

Call ibrd32(mwm, ibuf, 1)                              ' Reads the 1 byte of the data head.

If Chr(ibuf) = "#" Then                                ' Reads the data byte length in case of block data.
    Call ibrd32(mwm, ibuf, 1)
    Snum = ""
    For i = 1 To Val(Chr(ibuf))
        Call ibrd32(mwm, ibuf, 1)
        Snum = Snum + Chr(ibuf)
    Next i
End If

num = CLng(Snum) / 8                                   ' Calculates the number of data from the byte length.
Erase frequency()

Call ibrd32(mwm, frequency(1), num * 8)                ' Reads the frequency data in the list.

Call ibrd32(mwm, ibuf, 1)                              ' Obtains LF.
```

Example VB-2: Sets necessary parameters and takes 5 measurements in the LIST Pass/Fail mode. With *WAI, wait for the end of measurement after each measurement. When the measurement is completed, the data set is read in the ASCII code. (Set a time-out period longer than the estimated measurement time prior to the measurements.)

```
Dim Rdbuff$
Dim num%, i%, j%, k%, P%
Dim Dat#(), PF%(), GRID#(), Pk#(), Lvl#(), Spac#(), Diff#()

Call ibclr(mwm)                                       ' Device Clear (Clears the device).
Call ibwrt(mwm, "*RST")                               ' Resets the Q8331.
Call ibwrt(mwm, ":FORM:DATA ASC")                     ' Sets the data format to ASCII.

Call ibwrt(mwm, ":SENS:CORR:MED VAC")                 ' Sets the wavelength display in vacuum.
Call ibwrt(mwm, ":SENS:SWE:POIN H_GI")                ' Sets the resolution to High.
Call ibwrt(mwm, ":CALC2:PEXC 5DB;PTHR 20DB")          ' Sets the Peak Excursion to 5 dB and Peak Threshold to 20 dB.
Call ibwrt(mwm, ":UNIT:WAV NM;POW LOG")               ' Sets the horizontal axis to Frequency and vertical axis to LOG.
Call ibwrt(mwm, ":CALC3:CFAN:PRES")                   ' Sets the GRID TABLE to GRID ITU.

Call ibwrt(mwm, ":DISP:TRAC:X:CENT 1550NM;SPAN 40NM") ' Sets the spectrum display range to 1530 nm - 1570 nm.

Call ibwrt(mwm, ":DISP:LIST ON;LIST:ALL OFF")         ' Sets the peak list and spectrum wavelength display.
Call ibwrt(mwm, ":CALC3:PASS ON")                     ' Sets the list mode to the Multi Peak mode.
Call ibwrt(mwm, ":CALC3:PASS:MODE WAV")               ' Uses the CALC3 : PASS : DWAV value for the Pass/Fail evaluation
                                                      ' of the wavelength.

Call ibwrt(mwm, ":CALC3:PASS:DWAV 0.01NM;DPOW 5DB;POW -5DBM") ' Sets the λ Drift Limit to 0.01 nm, Level Drift Limit to 5 dB, and
                                                      Reference Level to -5 dBm.
For i = 1 To 5                                        ' Repeats the measurement 5 times.

    Call ibwrt(mwm, ":INIT:IMM")                      ' Starts the single sweep.

    Call ibwrt(mwm, "*WAI")                           ' Waits until the sweep is completed.

    Call ibwrt(mwm, ":CALC3:POIN?")                   ' Requests for the information on the number of peaks in the list.
    Rdbuff = Space(5)                                 ' Reserve a maximum of 5 byte regions including the delimiter.
    Call ibrd(mwm, Rdbuff)                            ' Reads the number of peaks in the list.
    num = Val(Rdbuff)

    Rdbuff = Space(num * 72 + 1)                      ' Reserve all data regions including the delimiter.
    ReDim Dat(1 To num * 6), PF(1 To num), GRID(1 To num), Pk(1 To num)
    ReDim Lvl(1 To num), Spac(1 To num), Diff(1 To num)

    Call ibwrt(mwm, ":CALC3:DATA?")                   ' Requests for set data output in the list.
    Call ibrd(mwm, Rdbuff)                            ' Reads the set data in the list.

    For j = 1 To num * 6                              ' Converts the data read in the ASCII code into numerical array data.
        P = InStr(Rdbuff, ",")
        If P <> 0 Then
            Dat(j) = Val(Mid(Rdbuff, 1, P - 1))
            Rdbuff = Mid(Rdbuff, P + 1)
        Else
            Dat(j) = Val(Mid(Rdbuff, 1))
        End If

    Next j

    For j = 1 To num
        PF(j) = Dat((j - 1) * 6 + 1)                  ' Stores Pass/Fail results in PF(j).
        GRID(j) = Dat((j - 1) * 6 + 2)                ' Stores the grid wavelength data closest to the peaks in GRID(j).
        Pk(j) = Dat((j - 1) * 6 + 3)                  ' Stores peak wavelength data in Pk(j).
        Lvl(j) = Dat((j - 1) * 6 + 4)                 ' Stores level data in Lvl(j).
        Spac(j) = Dat((j - 1) * 6 + 5)                ' Stores distance data between the grids and peak wavelengths in Spac(j).
        Diff(j) = Dat((j - 1) * 6 + 6)                ' Stores a level difference between the peak level and the reference level in
                                                      Diff(j).
    Next j

Next i
```

Example VB-3: Sets necessary parameters and measures in the TREND mode. Sets the data level on the screen to the NOMINAL mode. After detecting the end of measurement by using *OPC, read the set data in the ASCII code.

```
Dim Rdbuff$
Dim num%, i%, j%, k%, P%
Dim Dat#(), Pk#(), Lvl#(), SNR#()

Call ibclr(mwm)                                  ' Device Clear (Clears the device).
Call ibwrt(mwm, "*RST")                          ' Resets the Q8331.
Call ibwrt(mwm, ":FORM:DATA ASC")                ' Sets the data format to ASCII.

Call ibwrt(mwm, ":SENS:CORR:MED VAC")            ' Sets the wavelength display in vacuum.
Call ibwrt(mwm, ":SENS:SWE:POIN HIGH")           ' Sets the resolution to High.
Call ibwrt(mwm, ":CALC2:PEXC 5DB;PTHR 20DB")     ' Sets the Peak Excursion to 5 dB and Peak Threshold to 20 dB.
Call ibwrt(mwm, ":UNIT:WAV NM;POW LOG")          ' Sets the horizontal axis to Frequency and vertical axis to LOG.
Call ibwrt(mwm, ":CALC3:CHAN:PRES")              ' Sets the GRID TABLE to GRID ITU.

Call ibwrt(mwm, ":DISP:TRAC:X:CENT 1550NM;SPAN 40NM")  ' Sets the spectrum display range to 1530 nm - 1570 nm.

Call ibwrt(mwm, ":CALC3:TREN ON")                ' Sets the mode to TREND.
Call ibwrt(mwm, ":DISP:TREN:TRAC:ALL ON")        ' Displays all peak trend data.
Call ibwrt(mwm, ":DISP:TREN:LIST:ALL OFF")       ' Displays the trend list and monitor graph.

Call ibwrt(mwm, ":TRIG:DEL 10S;COUN 20")         ' Sets 20 measurements to be taken with 10-second intervals.
Call ibwrt(mwm, ":CALC3:TREN:TYPE POW;MODE NOMI;PASS OFF")  ' Sets the level data in the NOMINAL mode without Pass/Fail
                                                             judgments.
Call ibwrt(mwm, ":CALC3:SNR:AUTO ON")            ' Sets the noise calculation method to AUTO.
Call ibwrt(mwm, ":CALC3:PASS:POW -5DB")          ' Sets the reference level to -5 dBm.

Call ibwrt(mwm, ":INIT:IMM")                     ' Starts the single sweep (Performs 20 measurements).

Rdbuff = Space(3)                                ' Reserve a maximum of 3 byte regions including delimiters.
Do
    Call ibwrt(mwm, "*OPC?")                     ' Requests for the end of sweep notification.
    Call ibrd(mwm, Rdbuff)                       ' Reads the end of sweep notification.
Loop Until (Int(Val(Rdbuff)) And 1) = 1

Rdbuff = Space(5)                                ' Reserves a maximum of 5 byte regions including the delimiters.
Call ibwrt(mwm, ":CALC3:TREN:POIN?")             ' Requests for information on the number of trend data channels.
Call ibrd(mwm, Rdbuff)                           ' Reads the number of channels.
num = Val(Rdbuff)

ReDim Dat(1 To num, 0 To 21 * 3 - 1)
ReDim Pk(1 To num, 0 To 20), Lvl(1 To num, 0 To 20), SNR(1 To num, 0 To 20)

For i = 1 To num                                 ' Outputs data, one channel at a time (i represents the channel number).
    Call ibwrt(mwm, ":CALC3:TREN:DATA" & Trim(Str$(i)) & "?")  ' Requests for the current channel data output.
    Rdbuff = Space(21 * 39 - 1)                  ' Reserve all data regions including the delimiters.
    Call ibrd(mwm, Rdbuff)                       ' Reads the current channel data.

    For j = 0 To 21 * 3 - 1                      ' Converts the data read in the ASCII code into numerical array data.

            P = InStr(Rdbuff, ",")
        If P <> 0 Then
            Dat(i, j) = Val(Mid(Rdbuff, 1, P - 1))
            Rdbuff = Mid(Rdbuff, P + 1)
        Else
            Dat(i, j) = Val(Mid(Rdbuff, 1))
        End If

    Next j

    For j = 0 To 20                              ' Stores each measurement data (j represents the measurement number).
        Pk(i, j) = Dat(i, j * 3)                 ' Stores peak wavelength data in Pk(i,j). (The reference data is stored as the 0th
                                                   data measurement.)
        Lvl(i, j) = Dat(i, j * 3 + 1)            ' Stores level data in Lvl(i,j). (The reference data is stored as the 0th measure-
                                                   ment data.)
        SNR(i, j) = Dat(i, j * 3 + 2)            ' Stores SNR data in SNR(i,j). (The reference data is stored as the 0th measure-
                                                   ment data.)
    Next j

Next i
```

5.2 Communication Control Functions

This section describes the application function groups for controlling communication through the Internet. The application functions can be executed by using the D:\Advantest\Q8331\mwm.dll of the Q8331. To use the DLL, add the D:\Advantest\Q8331\declare_mwm.bas to the project as the standard module.

5.2.1 Communication Control Basic Function Used for the Q8331

5.2.1.1 Error Code List

Error	Code	Description
ERR_SOCKET_COM	0x0100	A socket communication error has occurred.
ERR_SEND_SIZE	0x0101	The amount of transmitted data is incorrect.
ERR_RECV_SIZE	0x0102	The amount of received data is incorrect.
ERR_PACKET_ATTR	0x0103	The packet attribute is incorrect.
ERR_ILLEGAL_COM	0x0104	This is an incorrect response to the transmit command.
ERR_QUERY_BUF	0x0105	The query buffer contains no data or is unspecified.
ERR_PARAM_NUM	0x0106	The number of received data parameters is different from the number of destination variables.
ERR_NO_TYPE	0x0107	The received data type is inappropriate.
ERR_TYPE_SIZE	0x0108	The LONG, SINGLE or DOUBLE type data size is incorrect.
ERR_ALLOC	0x0109	An internal area to receive data is unavailable.
ERR_WSAECONNRE FUSED	10061	Client applications cannot be connected to the server, because the amount of backlog in the server has reached the server limit.
FALSE	0x0001	Other errors.

5.2.1.2 Communication Control Basic Functions List

The following communication control functions are used in creating applications.

1. WmtOpenPacket() Always call this function to secure a communication pathway to the measuring instrument when starting the application.
2. WmtGetIpStr() Obtain an IP address from the host name.
   The obtained IP address is stored as a character string.
3. WmtClosePacket() Call this function to release the communication pathway to the measuring instrument when quitting the application.

5.2.1.3 WmtOpenPacket

Function name	long WmtOpenPacket
Function	Securing a communication pathway with the measuring instrument.

Argument	[IN] char * strIP // A character string which indicates the IP address
	// (ex."127.0.0.1").
	// "127.0.0.1": The system.
	// "xxx.xxx.xxx.xxx": The IP address used
	// when connected to a LAN.
	char * strBD // A character string which indicates a board identifier.
	// Relevant products allow the specification of "" only.
	[OUT] long * lngID // The connection identifier. Specify this number
	// as the first argument of each API function and
	// specify the connection to.

Return value	0: Normal completion. Other than 0: Error occurrence (For more information, refer to 5.2.1.1, "Error Code List").
Description	Always call this function to secure a communication pathway to the measuring instrument when starting the application. All supplied API functions cannot be operated correctly without first executing WmtOpenPacket().

Sample	Public Declare Function WmtOpenPacket Lib "mwm.dll" _
	(ByVal strIP As String, ByVal strBD As String, ByRef lngID As Long) As Long
	
	Private Sub cmdOpen_Click()
	Dim lngID As Long
	Dim lngErr As Long
	
	lngErr = WmtOpenPacket("127.0.0.1", "", lngID) "When local.
	If (lngErr <> 0) Then
	MsgBox "Invalid open the Communication Port.(" _
	& Str(lngErr) & ")", vbOKOnly
	Else
	lngErr = WmtCalc1CAveCoun(lngID, 32)
	End If
	End Sub

5.2.1.4 WmtGetIpStr

Function name	long WmtGetIpStr
Function	Obtaining an IP address from the host name.
Argument	[IN] char * strHost // A character string which indicates the host name. char **strIpAddr // A pointer that indicates the character string // which stores an IP address.
Return value	0: Normal completion.
Description	The function obtains an IP address from the host name. The obtained IP address is stored in the character string variable specified by *strIpAddr*. Example: For the IP address 192.10.100.1 strIpAddr = "192.10.100.1"
Sample	See below

```
Public Declare Function WmtOpenPacket Lib "mwm.dll" _
        (ByVal strIP As String, ByVal strBD As String, ByRef lngID As Long) As Long
Public Declare Function WmtGetIpStr Lib "mwm.dll" _
                        (ByVal strHost As String, ByRef strIpAddr As String) As Long

Private Sub cmdOpen_Click()
    Dim lngErr As Long
    Dim strIpAddr As String * 16     "Must always secure the IP address by using a character
                                      string of fixed length and of 16 characters or more.

    WmtGetIpStr("termprgr", strIpAddr)
    lngErr = WmtOpenPacket(strIpAddr, "", lngID)
    If (lngErr <> 0) Then
        MsgBox "Invalid open the Communication Port.(" _
              & Str(lngErr) & ")", vbOKOnly
    Else
        lngErr = WmtCalc1CAveCoun(lngID, 32)
    End If
End Sub
```

5.2.1.5 WmtClosePacket

Function name	long WmtClosePacket
Function	Releasing the communication pathway to the measuring instrument.
Argument	[IN] long lngID // The connection identifier obtained by using WmtOpenPacket().
Return value	0: Normal completion.
Description	Call this function to release the communication pathway with the measuring instrument when quitting the application.

Sample	`Public Declare Function WmtClosePacket Lib "mwm.dll" (ByVal lngID As Long) As Long`
	
	`Private Sub cmdClose_Click()`
	`    Dim lngErr As Long`
	
	`    lngErr = WmtClosePacket(lngID)`
	`End Sub`

5.2.2 Function Specifications (Common Commands)

5.2.2.1 WmtRST

Function name	long WmtRST
Function	Initializing the setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	The function initializes the setting.
GPIB	*RST

5.2.2.2 QryTST

Function name	long QryTST
Function	Executing self-test.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngStat // Execution result.
Return value	0: Normal/1: Error
Function description	The function executes the self-test and stores the execution results in *lngStat*.
GPIB	*TST?

5.2.2.3 QryIDN

Function name	long QryIDN
Function	Instrument Query.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] char * facturer // Company name. char * model // Product name. char * serial // Serial number. char * form_level // System version.
Return value	0: Normal/1: Error
Function description	The function stores the company name as *facturer*, model name as *model*, serial number as *serial*, and system version as *form_level*.
GPIB	*IDN?

5.2.2.4 WmtSave

Function name	long WmtSave
Function	Saving the current measurement conditions and trace data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). char * filename // File name.
Return value	0: Normal/1: Error
Function description	The function saves the current measurement conditions, trace data, and list data in the actual system by using the file name specified in *filename*. (It is possible to specify a file name in the full path which includes a folder name.) If a file name is not specified in the full path, measurement conditions and data are saved in the D:\Advantest\Q8331\SVRCL directory in the actual system.
Remark	No specification for the extension is necessary.
GPIB	:FILE:STORe

5.2.2.5 WmtLoad

Function name	long WmtLoad
Function	Loading saved data to the actual system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). char * filename // File name.
Return value	0: Normal/1: Error
Function description	The function loads the saved file, which is specified in *filename*, to the actual system. (It is possible to specify the file name in the full path which includes a folder name. If no file name is specified by using the full path, a file is searched for in the D:\Advantest\Q8331\SVRCL directory in the actual system.)
Remark	No specification for the extension is necessary.
GPIB	:FILE:LOAD

5.2.3 Function Specifications (ABORt Subsystem)

5.2.3.1 WmtAbor

Function name	long WmtAbor
Function	Interrupting the measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	The function resets the trigger system and sets the trigger state to idle. In connection with this, the measurement is interrupted and the average count is reset.
GPIB	:ABORt

5.2.4 Function Specifications (INITiate Subsystem)

5.2.4.1 WmtInitCont

Function name	long WmtInitCont
Function	Setting repetitive measurements (multiple sweeps).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: Repetitive measurements OFF. // 1: Repetitive measurements ON.
Return value	0: Normal/1: Error
Function description	The function sets whether or not repetitive measurements are performed.
GPIB	:INITiate:CONTinuous

5.2.4.2 QryInitCont

Function name	long QryInitCont
Function	Reading the repetitive measurement setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long * lngOnoff // 0: Repetitive measurements OFF. // 1: Repetitive measurements ON.
Return value	0: Normal/1: Error
Function description	The function reads the repetitive measurement setting and stores it in *lngOnoff*.
GPIB	:INITiate:CONTinuous?

5.2.4.3 WmtInitImm

Function name	long WmtInitImm
Function	Starting a measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	The function starts the trigger system. The trigger system is changed from the idling state to the trigger waiting state and waits for an even to occur.
GPIB	:INITiate:IMMediate

5.2.5 Function Specifications (TRIGger Subsystem)

5.2.5.1 WmtTrigCoun

Function name	long WmtTrigCoun
Function	Setting the maximum number of TREND measurement measuring points.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNum // The maximum number of TREND measurement // measuring points (11 to 500).
Return value	0: Normal/1: Error
Function description	The function sets the value of *lngNum* as the maximum number of TREND measurement measuring points.
GPIB	:TRIGger[:SEQuence]:COUNt

5.2.5.2 QryTrigCoun

Function name	long QryTrigCoun
Function	Reading the maximum number of TREND measurement measuring points.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // The maximum number of TREND measurement // measuring points (11 to 500).
Return value	0: Normal/1: Error
Function description	The function stores the maximum number of measuring points in the set TREND measurement in *lngNum*.
GPIB	:TRIGger[:SEQuence]:COUNt?

5.2.5.3 WmtTrigDel

Function name	long WmtTrigDel
Function	Setting the measurement interval time.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblTime // Interval time.
Return value	0: Normal/1: Error
Function description	Sets the measurement interval time.
GPIB	:TRIGger[:SEQuence]:DELay

5.2.5.4 QryTrigDel

Function name	long QryTrigDel
Function	Reading the interval time required to execute TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblTime // Interval time.
Return value	0: Normal/1: Error
Function description	Stores the interval time required to execute the set TREND measurement in *dblTime*.
GPIB	:TRIGger[:SEQuence]:DELay?

5.2.6 Function Specifications (CALCulate1 Subsystem)

5.2.6.1 WmtCalc1CAveCoun

Function name	long WmtCalc1CAveCoun
Function	Setting the averaging count for complex averaging.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNum // Averaging count.
Return value	0: Normal/1: Error
Function description	Sets the average count for complex averaging.
GPIB	:CALCulate1:CAVErage:COUNt

5.2.6.2 QryCalc1CAveCoun

Function name	long QryCalc1CAveCoun
Function	Reading the averaging count for complex averaging.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // Averaging count.
Return value	0: Normal/1: Error
Function description	Stores the averaging count for the set complex averaging in *lngNum*.
GPIB	:CALCulate1:CAVErage:COUNt?

5.2.6.3 WmtCalc1CAveStat

Function name	long WmtCalc1CAveStat
Function	Setting the complex averaging to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Sets whether or not to execute the complex averaging according to *lngOnoff*.
GPIB	:CALCulate1:CAVErage[:STATe]

5.2.6.4 QryCalc1CAveStat

Function name	long QryCalc1CAveStat
Function	Reading whether or not to execute the complex averaging.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to execute the set complex averaging and stores it in *lngOnoff*.
GPIB	:CALCulate1:CAVErage[:STATe]?

5.2.7 Function Specifications (CALCulate2 Subsystem)

5.2.7.1 QryCalc2Data

Function name	long QryCalc2Data
Function	Reading peak data that has been picked in the most recent measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: Wavelength // 1: Frequency // 2: Power [OUT] double * dblBuf // Picked peak data.
Return value	0: Normal/1: Error
Function description	Reads out peak data that has been picked in the most recent measurement by using the format specified in *lngType*. The data is stored in the array called *dblBuf*.
GPIB	:CALCulate2:DATA?

5.2.7.2 QryCalc2Poin

Function name	long QryCalc2Poin
Function	Reading the number of picked peak data items.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // The number of picked peak data items.
Return value	0: Normal/1: Error
Function description	Reads out the number of peak data items that were picked and stores the number in *lngNum*.
GPIB	:CALCulate3:POINts?

5.2.7.3 WmtCalc2PExc

Function name	long WmtCalc2PExc
Function	Setting the threshold value for a level difference between each peak and lowest point between the peak and the previous peak or next peak.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngThres // The threshold value for a level difference between each peak // and the lowest point between the peak // and the previous peak or next peak.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngThres* as the threshold value for a level difference between each peak and lowest point between the peak and the previous peak or next peak.
GPIB	:CALCulate2:PEXCursion

5.2.7.4 QryCalc2PExc

Function name	long QryCalc2PExc
Function	Reading the threshold value for a level difference between each peak and lowest point between the peak and the previous peak or next peak.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngThres // The threshold value for a level difference between each peak // land the owest point between the peak // and the previous peak or next peak.
Return value	0: Normal/1: Error
Function description	Reads out the threshold value for a level difference between each peak and lowest point between the peak and the previous peak or next peak. The threshold value is stored in *lngThres*.
GPIB	:CALCulate2:PEXCursion?

5.2.7.5 WmtCalc2PThr

Function name	long WmtCalc2PThr
Function	Setting the threshold value from the maximum peak.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngThres // The threshold value from the maximum peak.
Return value	0: Normal/1: Error
Function description	The function sets the value of *lngThres* as the threshold value from the maximum peak.
GPIB	:CALCulate2:PTHReshold

5.2.7.6 QryCalc2PThr

Function name	long QryCalc2PThr
Function	Reading the threshold value from the maximum peak level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngThres // The threshold value from the maximum peak.
Return value	0: Normal/1: Error
Function description	Reads out the threshold value from the maximum peak level and stores it in *lngThres*.
GPIB	:CALCulate2:PTHReshold?

5.2.7.7 WmtCalc2WLimStarFreq

Function name	long WmtCalc2WLimStarFreq
Function	Setting the start frequency for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The minimum frequency for peak search calculations.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the start frequency for peak search calculations.
GPIB	:CALCulate2:WLIMit:STARt:FREQuency

5.2.7.8 QryCalc2WLimStarFreq

Function name	long QryCalc2WLimStarFreq
Function	Reading the start frequency for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The minimum frequency for peak search calculations.
Return value	0: Normal/1: Error
Function description	Reads out the start frequency for peak search calculations and stores it in *dblFreq*.
GPIB	:CALCulate2:WLIMit:STARt:FREQuency?

5.2.7.9 WmtCalc2WLimStarWav

Function name	long WmtCalc2WLimStarWav
Function	Setting the start wavelength for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The minimum wavelength for peak search calculations.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the start wavelength for peak search calculations.
GPIB	:CALCulate2:WLIMit:STARt[:WAVelength]

5.2.7.10 QryCalc2WLimStarWav

Function name	long QryCalc2WLimStarWav
Function	Reading the start wavelength for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The minimum frequency for peak search calculations.
Return value	0: Normal/1: Error
Function description	Reads out the start wavelength for peak search calculations and stores it in *dblWav*.
GPIB	:CALCulate2:WLIMit:STARt[:WAVelength]?

5.2.7.11 WmtCalc2WLimStopFreq

Function name	long WmtCalc2WLimStopFreq
Function	Setting the stop frequency for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The maximum frequency for peak search calculations.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the stop frequency for peak search calculations.
GPIB	:CALCulate2:WLIMit:STOP:FREQuency

5.2.7.12 QryCalc2WLimStopFreq

Function name	long QryCalc2WLimStopFreq
Function	Reading the stop frequency for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The maximum frequency for peak search calculations.
Return value	0: Normal/1: Error
Function description	Reads out the stop frequency for peak search calculations and stores it in *dblFreq*.
GPIB	:CALCulate2:WLIMit:STOP:FREQuency?

5.2.7.13 WmtCalc2WLimStopWav

Function name	long WmtCalc2WLimStopWav
Function	Setting the stop wavelength for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The maximum wavelength for peak search calculations.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the stop wavelength for peak search calculations.
GPIB	:CALCulate2:WLIMit:STOP[:WAVelength]

5.2.7.14 QryCalc2WLimStopWav

Function name	long QryCalc2WLimStopWav
Function	Reading the stop wavelength for peak search calculations.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The maximum wavelength for peak search calculations.
Return value	0: Normal/1: Error
Function description	Reads out the stop wavelength for peak search calculations and stores it in *dblWav*.
GPIB	:CALCulate2:WLIMit:STOP[:WAVelength]?

5.2.8 Function Specifications (CALCulate3 Subsystem)

5.2.8.1 WmtCalc3BandNdb

Function name	long WmtCalc3BandNdb
Function	Setting the threshold value from the peak level at the time when the NdB bandwidth is calculated.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblNdb // The threshold value from the peak level.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblNdb* as the threshold value from the peak level when the NdB bandwidth is calculated.
GPIB	:CALCulate3:BANDwidth:NDB

5.2.8.2 QryCalc3BandNdb

Function name	long QryCalc3BandNdb
Function	Reading the threshold setting from the peak level at the time when the NdB bandwidth is calculated.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblNdb // The threshold value from the peak level.
Return value	0: Normal/1: Error
Function description	Reads out the threshold value from the peak level when the NdB bandwidth is calculated and stores it in *dblNdb.*
GPIB	:CALCulate3:BANDwidth:NDB?

5.2.8.3 WmtCalc3BandNdbStat

Function name	long WmtCalc3BandNdbStat
Function	Setting whether or not to calculate the NdB bandwidth.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Sets whether or not to calculate the NdB bandwidth according to *lngOnoff.*
GPIB	:CALCulate3:BANDwidth[:STATe]

5.2.8.4 QryCalc3BandNdbStat

Function name	long QryCalc3BandNdbStat
Function	Reading the value set to determine whether or not to calculate the NdB bandwidth.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to calculate the NdB bandwidth and stores it in *lngOnoff*.
GPIB	:CALCulate3:BANDwidth[:STATe]?

5.2.8.5 QryCalc3ChanData

Function name	long QryCalc3ChanData
Function	Reading grid table data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: Wavelength. // 1: Frequency. [OUT] double * dblBuf // Grid table data.
Return value	0: Normal/1: Error
Function description	Reads out grid table data in the unit specified for *lngType* and stores it in *dblBuf*.
GPIB	:CALCulate3:CHANnel:DATA?

5.2.8.6 QryCalc3ChanPoin

Function name	long QryCalc3ChanPoin
Function	Reading the number of grid table data items.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // Number of grid table data items.
Return value	0: Normal/1: Error
Function description	Reads out the number of grid table data items and stores the number in *lngNum*.
GPIB	:CALCulate3:CHANnel:POINts?

5.2.8.7 WmtCalc3ChanPres

Function name	long WmtCalc3ChanPres
Function	Presetting the grid table.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	The function executes the grid table preset.
GPIB	:CALCulate3:CHANnel:PRESet

5.2.8.8 WmtCalc3ChanItuRefFreq

Function name	long WmtCalc3ChanItuRefFreq
Function	Setting the reference frequency for the grid table.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The reference frequency for the grid.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the reference frequency for the grid table.
GPIB	:CALCulate3:CHANnel:ITU:REFerence:FREQuency

5.2.8.9 QryCalc3ChanItuRefFreq

Function name	long QryCalc3ChanItuRefFreq
Function	Reading the reference frequency set for the grid table.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The reference frequency for the grid.
Return value	0: Normal/1: Error
Function description	Reads out the reference frequency for the grid table and stores it in *dblFreq*.
GPIB	:CALCulate3:CHANnel:ITU:REFerence:FREQuency?

5.2.8.10 WmtCalc3ChanItuSpac

Function name	long WmtCalc3ChanItuSpac
Function	Setting the channel interval for when creating the grid table.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The channel interval (frequency).
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the channel interval for when creating the grid table.
GPIB	:CALCulate3:CHANnel:ITU:SPACing

5.2.8.11 QryCalc3ChanItuSpac

Function name	long QryCalc3ChanItuSpac
Function	Reading the channel interval used when creating the grid table.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The channel interval (frequency).
Return value	0: Normal/1: Error
Function description	Reads out the channel interval used when creating the grid table and stores it in *dblFreq*.
GPIB	:CALCulate3:CHANnel:ITU:SPACing?

5.2.8.12 QryCalc3Data

Function name	long QryCalc3Data
Function	Reading Calc3 list data in a set.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblBuf // LIST data block
Return value	0: Normal/1: Error
Function description	Reads out Calc3 list data in a set by using the LIST calculation mode and stores data in *dblBuf*.
Remark	*dblBuf* must be large enough to hold a maximum of 300 (maximum number of peaks) * 7 = 2100 data items.
GPIB	:CALCulate3:DATA?

5.2.8.13 WmtCalc3DiffStat

Function name	long WmtCalc3DiffStat
Function	Setting the DIFF channel calculation (the comparison for each channel in the grid table) to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	The function sets the DIFF channel calculation (the comparison for each channel in the grid table) to ON or OFF.
GPIB	:CALCulate3:DIFF[:STATe]

5.2.8.14 QryCalc3DiffStat

Function name	long QryCalc3DiffStat
Function	Reading the ON or OFF setting status of the DIFF channel calculation (the comparison for each channel in the grid table).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting status of the DIFF channel calculation (the comparison for each channel in the grid table) and stores the result in *lngOnoff*.
GPIB	:CALCulate3:DIFF[:STATe]?

5.2.8.15 WmtCalc3PassDFreq

Function name	long WmtCalc3PassDFreq
Function	Setting the frequency range for pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The frequency range for pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the frequency range for the pass or fail evaluation.
GPIB	:CALCulate3:PASSfail:DFREquency

5.2.8.16 QryCalc3PassDFreq

Function name	long QryCalc3PassDFreq
Function	Reading the frequency range for the pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The frequency range for pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Reads out the frequency range for the pass or fail evaluation and stores it in *dblFreq*.
GPIB	:CALCulate3:PASSfail:DFREquency?

5.2.8.17 WmtCalc3PassDPow

Function name	long WmtCalc3PassDPow
Function	Setting the power range for the pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblPow // The power range for the pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblPow* as the power range for the pass or fail evaluation
GPIB	:CALCulate3:PASSfail:DPOWer

5.2.8.18 QryCalc3PassDPow

Function name	long QryCalc3PassDPow
Function	Reading the power range for pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblPow // The power range for the pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Reads out the power range for the pass or fail evaluation and stores it in *dblPow*.
GPIB	:CALCulate3:PASSfail:DPOWer?

5.2.8.19 WmtCalc3PassDWav

Function name	long WmtCalc3PassDWav
Function	Setting the wavelength range for pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The wavelength range for pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the wavelength range for pass or fail evaluation
GPIB	:CALCulate3:PASSfail:DWAVelength

5.2.8.20 QryCalc3PassDWav

Function name	long QryCalc3PassDWav
Function	Reading the frequency range for the pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The wavelength range for pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Reads out the frequency range for the pass or fail evaluation and stores it in *dblWav*.
GPIB	:CALCulate3:PASSfail:DWAVelength?

5.2.8.21 WmtCalc3PassMode

Function name	long WmtCalc3PassMode
Function	Selecting whether to use the wavelength drift or frequency drift for wavelength (frequency) data comparison in PASS/FAIL evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: Wavelength. // 1: Frequency.
Return value	0: Normal/1: Error
Function description	Sets whether to use the wavelength drift or frequency drift for wavelength (frequency) data comparison in PASS/FAIL evaluation according to the selection specified by *lngMode*.
GPIB	:CALCulate3:PASSfail:MODE

5.2.8.22 QryCalc3PassMode

Function name	long QryCalc3PassMode
Function	Reading whether to use the wavelength drift or frequency drift for wavelength (frequency) data comparison in PASS/FAIL evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: Wavelength. // 1: Frequency.
Return value	0: Normal/1: Error
Function description	Reads out whether to use the wavelength drift or frequency drift for wavelength (frequency) data comparison in PASS/FAIL evaluation and stores it in *lngMode*.
GPIB	:CALCulate3:PASSfail:MODE?

5.2.8.23 WmtCalc3PassPow

Function name	long WmtCalc3PassPow
Function	Setting the reference level value for the pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblPow // The reference level value for the pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblPow* as the reference level value for the pass or fail evaluation.
GPIB	:CALCulate3:PASSfail:POWer

5.2.8.24 QryCalc3PassPow

Function name	long QryCalc3PassPow
Function	Reading the reference level value for pass or fail evaluation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblPow // The reference level value for the pass or fail evaluation.
Return value	0: Normal/1: Error
Function description	Reads out the reference level value for the pass or fail evaluation and stores it in *dblPow*.
GPIB	:CALCulate3:PASSfail:POWer?

5.2.8.25 WmtCalc3PassStat

Function name	long WmtCalc3PassStat
Function	Setting the pass or fail calculation (PASS evaluation for each channel in the WDM reference table) to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets the pass or fail calculation (PASS evaluation for each channel in the WDM reference table) to ON or OFF.
GPIB	:CALCulate3:PASSfail[:STATe]

5.2.8.26 QryCalc3PassStat

Function name	long QryCalc3PassStat
Function	Reading the ON or OFF setting for the pass or fail calculation (PASS evaluation for each channel in the WDM reference table).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: Calculation OFF. // 1: Calculation ON.
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting for the pass or fail calculation (PASS evaluation for each channel in the WDM reference table) and stores it in *lngOnoff*.
GPIB	:CALCulate3:PASSfail[:STATe]?

5.2.8.27 WmtCalc3Peak

Function name	long WmtCalc3Peak
Function	Selecting the PEAK calculation setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: MAXimum // 1: AVErage
Return value	0: Normal/1: Error
Function description	Selects whether to obtain the maximum peak and trace the wavelength and power at the peak or obtain the average wavelength and trace the wavelength and total power.
GPIB	:CALCulate3:PEAK

5.2.8.28 QryCalc3Peak

Function name	long QryCalc3Peak
Function	Reading the PEAK calculation selection.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: MAXimum // 1: AVErage
Return value	0: Normal/1: Error
Function description	Reads out the PEAK calculation selection and stores it in *lngType*.
GPIB	:CALCulate3:PEAK?

5.2.8.29 QryCalc3PeakData

Function name	long QryCalc3PeakData
Function	Reading the PEAK calculation results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The peak wavelength or peak frequency. double * dblPow // The peak power.
Return value	0: Normal/1: Error
Function description	Reads out the most updated PEAK calculation results and stores the wavelength or frequency result as *dblWav* and the power result as *dblPow*.
GPIB	:CALCulate3:PEAK:DATA?

5.2.8.30 QryCalc3Poin

Function name	long QryCalc3Poin
Function	Reading the number of output data items in the List data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // The number of output data items in the List data.
Return value	0: Normal/1: Error
Function description	Reads out the number of output data items in the List data and stores the number in *lngNum*.
GPIB	:CALCulate3:POINts?

5.2.8.31 WmtCalc3Pres

Function name	long WmtCalc3Pres
Function	Setting all Calc3 status to OFF (selects the MULTI PEAK list).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	Sets all Calc3 status to OFF (selects the MULTI PEAK list).
GPIB	:CALCulate3:PRESet

5.2.8.32 WmtCalc3RelaRefChan

Function name	long WmtCalc3RelaRefChan
Function	Setting reference peak number for Relative calculation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNum // The reference peak number for Relative calculation.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngNum* as the reference peak number for Relative calculation.
GPIB	:CALCulate3:RELAtive:REFerence:CHANnel

5.2.8.33 QryCalc3RelaRefChan

Function name	long QryCalc3RelaRefChan
Function	Reading the reference peak number for Relative calculation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // The reference peak number for Relative calculation.
Return value	0: Normal/1: Error
Function description	Reads out the reference peak number for Relative calculation and stores it in *lngNum*.
GPIB	:CALCulate3:RELAtive:REFerence:CHANnel?

5.2.8.34 WmtCalc3RelaStat

Function name	long WmtCalc3RelaStat
Function	Setting Relative calculation (the difference with the specified reference wavelength) to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets Relative calculation (the difference with the specified reference wavelength) to ON or OFF.
GPIB	:CALCulate3:RELAtive[:STATe]

5.2.8.35 QryCalc3RelaStat

Function name	long QryCalc3RelaStat
Function	Reading the ON or OFF setting of Relative calculation (the difference with the specified reference wavelength).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting of Relative calculation (the difference with the specified reference wavelength) and stores it in *lngOnoff*.
GPIB	:CALCulate3:RELAtive[:STATe]?

5.2.8.36 WmtCalc3SNRAuto

Function name	long WmtCalc3SNRAuto
Function	Setting the function that uses AUTO calculation for obtaining the noise level during SNR calculation to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets whether or not to use AUTO calculation to obtain the noise level during SNR calculation.
GPIB	:CALCulate3:SNR:AUTO

5.2.8.37 QryCalc3SNRAuto

Function name	long QryCalc3SNRAuto
Function	Reading the ON or OFF setting for the function that uses AUTO calculation to obtain the noise level during SNR calculation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting for the function that uses AUTO calculation to obtain the noise level during SNR calculation and stores the result in *lngOnoff*.
GPIB	:CALCulate3:SNR:AUTO?

5.2.8.38 WmtCalc3SNRRefFreq

Function name	long WmtCalc3SNRRefFreq
Function	Setting the noise level while calculating SNR to the power value of the specified frequency.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblFreq // The frequency at the time of defining the noise level // in SNR calculation.
Return value	0: Normal/1: Error
Function description	Sets the noise level while calculating SNR to the power value of the specified frequency, *dblFreq*.
GPIB	:CALCulate3:SNR:REFerence:FREQuency

5.2.8.39 QryCalc3SNRRefFreq

Function name	long QryCalc3SNRRefFreq
Function	Reading the frequency which specifies the noise level during SNR calculation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblFreq // The frequency at the time of defining the noise level // in SNR calculation.
Return value	0: Normal/1: Error
Function description	Reads out the frequency at the time of defining the noise level while calculating SNR and stores it in *dblFreq*.
GPIB	:CALCulate3:SNR:REFerence:FREQuency?

5.2.8.40 WmtCalc3SNRRefWav

Function name	long WmtCalc3SNRRefWav
Function	Setting the noise level while calculating SNR to be the power value of the specified wavelength.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The wavelength at the time of defining the noise level // while calculating SNR.
Return value	0: Normal/1: Error
Function description	Sets the noise level during an SNR calculation to the power value of the specified wavelength, *dblWav*.
GPIB	:CALCulate3:SNR:REFerence[:WAVelength]

5.2.8.41 QryCalc3SNRRefWav

Function name	long QryCalc3SNRRefWav
Function	Reading the wavelength which specifies the noise level while calculating SNR.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The wavelength at the time of defining the noise level // while calculating SNR.
Return value	0: Normal/1: Error
Function description	Reads out the wavelength at the time of defining the noise level while calculating SNR and stores it in *dblWav*.
GPIB	:CALCulate3:SNR:REFerence[:WAVelength]?

5.2.8.42 WmtCalc3SNRStat

Function name	long WmtCalc3SNRStat
Function	Setting SNR calculation to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Sets SNR calculation to ON or OFF.
GPIB	:CALCulate3:SNR[:STATe]

5.2.8.43 QryCalc3SNRStat

Function name	long QryCalc3SNRStat
Function	Reading the ON or OFF setting of SNR calculation.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting of SNR calculation and stores the result in *lngOnoff*.
GPIB	:CALCulate3:SNR[:STATe]?

5.2.8.44 WmtCalc3SortOrd

Function name	long WmtCalc3SortOrd
Function	Selecting the sorting order.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOrder // 0: Sort in the increasing order. // 1: Sort in the decreasing order.
Return value	0: Normal/1: Error
Function description	Sorts the LIST data according to the order specified by *lngOrder*.
GPIB	:CALCulate3:SORT:ORDer

5.2.8.45 QryCalc3SortOrd

Function name	long QryCalc3SortOrd
Function	Reading the sorting order.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOrder // 0: Sort in the increasing order. // 1: Sort in the decreasing order.
Return value	0: Normal/1: Error
Function description	Reads out the sorting order and stores it in *lngOrder*.
GPIB	:CALCulate3:SORT:ORDer?

5.2.8.46 WmtCalc3SortType

Function name	long WmtCalc3SortType
Function	Selecting a data type to sort.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: Wavelength or frequency sort. // 1: LEVEL sort.
Return value	0: Normal/1: Error
Function description	Sorts the LIST data for the type specified in *lngType*.
GPIB	:CALCulate3:SORT:TYPE

5.2.8.47 QryCalc3SortType

Function name	long QryCalc3SortType
Function	Reading the data type to sort.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngType // 0: Wavelength or frequency sort. // 1: LEVEL sort.
Return value	0: Normal/1: Error
Function description	Reads out the data type to sort and stores it in *lngType*.
GPIB	:CALCulate3:SORT:TYPE?

5.2.8.48 WmtCalc3TrenASavDivi

Function name	long WmtCalc3TrenASavDivi
Function	Setting whether or not to divide files when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: Not divide. // 1: Divide.
Return value	0: Normal/1: Error
Function description	Sets whether or not to divide files when using AUTO SAVE for saving TREND measurement results according to *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:DIVIde[:STATe]

5.2.8.49 QryCalc3TrenASavDivi

Function name	long QryCalc3TrenASavDivi
Function	Reading whether or not to divide files when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: Not divide. // 1: Divide.
Return value	0: Normal/1: Error
Function description	Reads out whether or not to divide files when using AUTO SAVE for saving TREND measurement results and stores it in *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:DIVIde[:STATe]?

5.2.8.50 WmtCalc3TrenASavPow

Function name	long WmtCalc3TrenASavPow
Function	Setting whether or not to save the power data when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: Not save. // 1: Save.
Return value	0: Normal/1: Error
Function description	Sets whether or not to save the power data when using AUTO SAVE for saving TREND measurement results according to *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:POWer[:STATe]

5.2.8.51 QryCalc3TrenASavPow

Function name	long QryCalc3TrenASavPow
Function	Reading whether or not to save the power data when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: Not save. // 1: Save.
Return value	0: Normal/1: Error
Function description	Reads out whether or not to save the power data when using AUTO SAVE for saving TREND measurement results and stores it in *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:POWer[:STATe]?

5.2.8.52 WmtCalc3TrenASavSNR

Function name	long WmtCalc3TrenASavSNR
Function	Sets whether or not to save the SNR data when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: Not save. // 1: Save.
Return value	0: Normal/1: Error
Function description	Sets whether or not to save the SNR data when using AUTO SAVE for saving TREND measurement results according to *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:SNR[:STATe]

5.2.8.53 QryCalc3TrenASavSNR

Function name	long QryCalc3TrenASavSNR
Function	Reading whether or not to save the SNR data when using AUTO SAVE for saving TREND measurement results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: Not save. // 1: Save.
Return value	0: Normal/1: Error
Function description	Reads whether or not to save the SNR data when using AUTO SAVE for saving TREND measurement results and stores it in *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe:SNR[:STATe]?

5.2.8.54 WmtCalc3TrenASavStat

Function name	long WmtCalc3TrenASavStat
Function	Selecting whether or not to use AUTO SAVE for saving results in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Selects whether or not to use AUTO SAVE for saving results in TREND measurement.
GPIB	:CALCulate3:TRENd:ASAVe[:STATe]

5.2.8.55 QryCalc3TrenASavStat

Function name	long QryCalc3TrenASavStat
Function	Reading the selection for whether or not to use AUTO SAVE for saving results in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to use AUTO SAVE for saving results in TREND measurement and stores it in *lngOnoff*.
GPIB	:CALCulate3:TRENd:ASAVe[:STATe]?

5.2.8.56 QryCalc3TrenData

Function name	long QryCalc3TrenData
Function	Reading TREND measurement calculation results.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // The channel number (1 to 300). [OUT] double * dblBuf // TREND measurement calculation results.
Return value	0: Normal/1: Error
Function description	Reads out TREND measurement calculation results of the channel specified with *lngCh*. Read out values are stored in the array called *dblBuf*.
Remark	The size of the *dblBuf* array must be large enough to store 3006 values [3 * 2 * 501 (measurement count + reference data)].
GPIB	:CALCulate3:TRENd:DATA[<ch>]?

5.2.8.57 WmtCalc3TrenType

Function name	long WmtCalc3TrenType
Function	Setting the TREND display data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: Wavelength or frequency. // 1: Level value. // 2: SNR
Return value	0: Normal/1: Error
Function description	Sets the value of *lngType* as the TREND display data type.
GPIB	:CALCulate3:TRENd:TYPE

5.2.8.58 QryCalc3TrenType

Function name	long QryCalc3TrenType
Function	Reading the TREND data setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngType // 0: Wavelength or frequency. // 1: Level value. // 2: SNR
Return value	0: Normal/1: Error
Function description	Reads out the TREND display data type and stores it in *lngType*.
GPIB	:CALCulate3:TRENd:TYPE?

5.2.8.59 WmtCalc3TrenMath

Function name	long WmtCalc3TrenMath
Function	Selecting the channel calculation item for TREND.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMath // 0: NON // 1: MIN // 2: MAX // 3: DIFF
Return value	0: Normal/1: Error
Function description	Sets the channel calculation item for TREND according to the specification of *lngMath*.
GPIB	:CALCulate3:TRENd:MATH

5.2.8.60 QryCalc3TrenMath

Function name	long QryCalc3TrenMath
Function	Reading the channel calculation selection in TREND.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMath // 0: NON // 1: MIN // 2: MAX // 3: DIFF
Return value	0: Normal/1: Error
Function description	Reads out the channel calculation selection in TREND and stores the selection in *lngMath*.
GPIB	:CALCulate3:TRENd:MATH?

5.2.8.61 QryCalc3TrenMathData

Function name	long QryCalc3TrenMathData
Function	Reading the channel calculation results in TREND.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // The channel number (1 to 300). [OUT] double * dblWav // Calculation result (wavelength or frequency). double * dblPow // Calculation result (power). double * dblSNR // Calculation result (SNR).
Return value	0: Normal/1: Error
Function description	The wavelength (or frequency), power, and SNR calculation results of the channel specified by *lngCh* are stored in *dblWav*, *dblPow*, and *dblSNR*, respectively,
GPIB	:CALCulate3:TRENd:MATH:DATA[<ch>]?

5.2.8.62 WmtCalc3TrenMode

Function name	long WmtCalc3TrenMode
Function	Selecting the TREND measurement calculation mode.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: ABS, 1: INIT, 2: NOMI
Return value	0: Normal/1: Error
Function description	Selects the TREND measurement calculation mode according to the specification of *lngMode*.
GPIB	:CALCulate3:TRENd:MODE

5.2.8.63 QryCalc3TrenMode

Function name	long QryCalc3TrenMode
Function	Reading the TREND measurement calculation mode selection.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: ABS, 1: INIT, 2: NOMI
Return value	0: Normal/1: Error
Function description	Reads out the TREND measurement calculation mode selection and stores the selection in *lngMode*.
GPIB	:CALCulate3:TRENd:MODE?

5.2.8.64 WmtCalc3TrenPassStat

Function name	long WmtCalc3TrenPassStat
Function	Setting the TREND measurement PASS/FAIL evaluation to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets the TREND measurement PASS/FAIL evaluation to ON or OFF.
GPIB	:CALCulate3:TRENd:PASSfail[:STATe]

5.2.8.65 QryCalc3TrenPassStat

Function name	long QryCalc3TrenPassStat
Function	Reading the TREND measurement PASS/FAIL evaluation setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0:OFF / 1:ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to execute TREND measurement PASS/FAIL evaluation and stores the decision in *lngOnoff*.
GPIB	:CALCulate3:TRENd:PASSfail[:STATe]?

5.2.8.66 QryCalc3TrenPoin

Function name	long QryCalc3TrenPoin
Function	Reading the actual number of channels in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngCh // The number of channels.
Return value	0: Normal/1: Error
Function description	Reads out the number of channels containing data in TREND measurement and stores the number in *lngNum*.
GPIB	:CALCulate3:TRENd:POINts?

5.2.8.67 WmtCalc3TrenRefPow

Function name	long WmtCalc3TrenRefPow
Function	Setting the reference POWER for when the TREND measurement calculation mode is set to NOMINAL.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblPow // The reference POWER for when the TREND measurement // calculation mode is NOMINAL.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblPow* as the reference POWER for when the TREND measurement calculation mode is set to NOMINAL.
GPIB	:CALCulate3:PASSfail:POWer

5.2.8.68 QryCalc3TrenRefPow

Function name	long QryCalc3TrenRefPow
Function	Reading the reference POWER for when the TREND measurement calculation mode is set to NOMINAL.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblPow // The reference POWER for when the TREND measurement // calculation mode is NOMINAL.
Return value	0: Normal/1: Error
Function description	The function reads out the reference POWER for when the TREND measurement calculation mode is set to NOMINAL and stores it in *dblPow*.
GPIB	:CALCulate3:PASSfail:POWer?

5.2.8.69 WmtCalc3TrenRefSNR

Function name	long WmtCalc3TrenRefSNR
Function	Setting the reference SNR for when the TREND measurement calculation mode is set to NOMINAL.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblSNR // The reference SNR for when the TREND measurement // calculation mode is NOMINAL.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblSNR* as the reference SNR for when the TREND measurement calculation mode is set to NOMINAL.
GPIB	:CALCulate3:TRENd:REFerence:SNR

5.2.8.70 QryCalc3TrenRefSNR

Function name	long QryCalc3TrenRefSNR
Function	Reading the reference SNR for when the TREND measurement calculation mode is set to NOMINAL.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblSNR // The reference SNR for when the TREND measurement // calculation mode is NOMINAL.
Return value	0: Normal/1: Error
Function description	Reads out the reference SNR for when the TREND measurement calculation mode is set to NOMINAL and stores it in *dblSNR*.
GPIB	:CALCulate3:TRENd:REFerence:SNR?

5.2.8.71 WmtCalc3TrenSNRLimiLow

Function name	long WmtCalc3TrenSNRLimiLow
Function	Setting the SNR lower limit for when the TREND measurement PASS/FAIL evaluation is set to ON.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblSNR // The SNR lower limit for when the TREND measurement // PASS/FAIL evaluation is set to ON.
Return value	0: Normal/1: Error
Function description	Sets the SNR lower limit for when the TREND measurement PASS/FAIL evaluation is set to ON.
GPIB	:CALCulate3:TRENd:SNR:LIMIt:LOWer

5.2.8.72 QryCalc3TrenSNRLimiLow

Function name	long QryCalc3TrenSNRLimiLow
Function	Reading the SNR lower limit for when PASS/FAIL evaluation is set to ON.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblSNR // The SNR lower limit for when the TREND measurement // PASS/FAIL evaluation is set to ON.
Return value	0: Normal/1: Error
Function description	Reads out the SNR lower limit for when the TREND measurement PASS/FAIL evaluation is set to ON and stores it in *dblSNR*.
GPIB	:CALCulate3:TRENd:SNR:LIMIt:LOWer?

5.2.8.73 WmtCalc3TrenStat

Function name	long WmtCalc3TrenStat
Function	Setting TREND measurement to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets TREND measurement to ON or OFF.
GPIB	:CALCulate3:TRENd[:STATe]

5.2.8.74 QryCalc3TrenStat

Function name	long QryCalc3TrenStat
Function	Reading the ON or OFF TREND measurement setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting for TREND measurement and stores the setting in *lngOnoff*.
GPIB	:CALCulate3:TRENd[:STATe]?

5.2.9 Function Specifications (FETCh Subsystem)

5.2.9.1 QryFetcTrenArrPow

Function name	long QryFetcTrenArrPow
Function	Reading the power data for each specified wavelength channel in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // A specified power channel. [OUT] float * sngPow // The power data for a specified wavelength channel.
Return value	0: Normal/1: Error
Function description	Reads out the power data for each specified wavelength channel in TREND measurement. Read out values are stored in the array called *sngPow*.
Remark	The *sngPow* array must be large enough to store a maximum of 500 values.
GPIB	:FETCh:TRENd[<ch>]:ARRay:POWer?

5.2.9.2 QryFetcTrenArrSNR

Function name	long QryFetcTrenArrSNR
Function	Reading the SNR data for each specified channel in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // A channel number (1 to 300) [OUT] float * sngSNR // The SNR data in TREND measurement.
Return value	0: Normal/1: Error
Function description	Stores the SNR data specified by *lngCh* during TREND measurement in the array called *sngSNR*.
Remark	The *dblSNR* array must have a space to store the maximum of 500 values.
GPIB	:FETCh:TRENd[<ch>]:ARRay:SNR?

5.2.9.3 QryFetcTrenArrX

Function name	long QryFetcTrenArrX
Function	Reading the wavelength or frequency data for each channel in TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // A channel number (1 to 300) [OUT] double * dblX // The wavelength or frequency data specified by lngCh in // TREND measurement.
Return value	0: Normal/1: Error
Function description	Stores the wavelength or frequency data specified by *lngCh* during TREND measurement in the array called *dblX*.
Remark	The *dblX* array must be large enough to store a maximum of 500 values.
GPIB	:FETCh:TRENd[<ch>]:ARRay:X?

5.2.10 Function Specifications (SENSe Subsystem)

5.2.10.1 WmtSensCorrMed

Function name	long WmtSensCorrMed
Function	Selecting a medium.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: Vacuum. // 1: Air.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngType* as the medium.
GPIB	:SENSe:CORRection:MEDium

5.2.10.2 QrySensCorrMed

Function name	long QrySensCorrMed
Function	Reading the selection for medium.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngType // 0: Vacuum. // 1: Air.
Return value	0: Normal/1: Error
Function description	Reads the selection for medium and stores the selection in *lngType*.
GPIB	:SENSe:CORRection:MEDium?

5.2.10.3 WmtSensCorrOffsMagn

Function name	long WmtSensCorrOffsMagn
Function	Setting the magnitude offset value.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblOffs // The magnitude offset value.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblOffs* as the magnitude offset.
GPIB	:SENSe:CORRection:OFFSet[:MAGNitude]

5.2.10.4 QrySensCorrOffsMagn

Function name	long QrySensCorrOffsMagn
Function	Reading the magnitude offset value.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblOffs // The magnitude offset value.
Return value	0: Normal/1: Error
Function description	Reads out the magnitude offset value and stores it in *dblOffs*.
GPIB	:SENSe:CORRection:OFFSet[:MAGNitude]?

5.2.10.5 WmtSensSwePoin

Function name	long WmtSensSwePoin
Function	Setting the measurement sensitivity.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngType // 0: NORMal // 1: HIGH
Return value	0: Normal/1: Error
Function description	Sets the value of *lngType* as the measurement sensitivity.
GPIB	:SENSe:SWEep:POINts

5.2.10.6 QrySensSwePoin

Function name	long QrySensSwePoin
Function	Reading the measurement sensitivity.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngType // 0: NORMal // 1: HIGH
Return value	0: Normal/1: Error
Function description	Reads the measurement sensitivity and stores it in *lngType*.
GPIB	:SENSe:SWEep:POINts?

5.2.11 Function Specifications (UNIT Subsystem)

5.2.11.1 WmtUnitPow

Function name	long WmtUnitPow
Function	Selecting the Y-axis display unit.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: LOG // 1: LIN
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMode* as the Y-axis display unit.
GPIB	:UNIT:POWer

5.2.11.2 QryUnitPow

Function name	long QryUnitPow
Function	Reading the Y-axis display unit.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: LOG // 1: LIN
Return value	0: Normal/1: Error
Function description	Reads out the Y-axis display unit and stores it in *lngMode*.
GPIB	:UNIT:POWer?

5.2.11.3 WmtUnitWav

Function name	long WmtUnitWav
Function	Selecting the X-axis display unit.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: Wavelength // 1: Frequency
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMode* as the X-axis display unit.
GPIB	:UNIT:WAV

5.2.11.4 QryUnitWav

Function name	long QryUnitWav
Function	Reading the X-axis display unit.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: Wavelength // 1: Frequency
Return value	0: Normal/1: Error
Function description	Reads out the X-axis display unit and stores it in *lngMode*.
GPIB	:UNIT:WAV?

5.2.12 Function Specifications (MARKer Subsystem)

5.2.12.1 QryMarkData

Function name	long QryMarkData
Function	Reading marker data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblX1X // The X-axis of the X1 marker. double * dblX1Y // The Y-axis of the X1 marker. double * dblX2X // The X-axis of the X2 marker or the difference // in X-axes of X1 and X2 markers. double * dblX2Y // The Y-axis of the X2 marker or the Y-axes comparison value // for X1 and X2 markers. double * dblY1Y // The Y-axis of the Y1 marker.
Return value	0: Normal/1: Error
Function description	Reads out the X-axes and Y-axes information from X1, X2, and Y1. Then, stores the information in 5 variables such as *dblX1X*, *dblX1Y*, *dblX2X*, *dblX2Y*, and *dblY1Y*.
GPIB	:DISPlay:MARKer:DATA?

5.2.12.2 WmtMarkAOff

Function name	long WmtMarkAOff
Function	Setting all markers to OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	Sets all markers to OFF.
GPIB	:DISPlay:MARKer:AOFF

5.2.12.3 WmtMarkMax

Function name	long WmtMarkMax
Function	Searching the maximum peak and moving the X1 or X2 cursor to the position.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker.
Return value	0: Normal/1: Error
Function description	Searches for the maximum peak and moves the marker, which is specified by *lngNo*, to the position.
GPIB	:DISPlay:MARKer[1|2]:MAXimum

5.2.12.4 WmtMarkMaxLeft

Function name	long WmtMarkMaxLeft
Function	Searching for detected peak points to the left.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker.
Return value	0: Normal/1: Error
Function description	Moves the marker specified by *lngNo* to a detected peak point on the left of the current value.
GPIB	:DISPlay:MARKer[1|2]:MAXimum:LEFT

5.2.12.5 WmtMarkMaxNext

Function name	long WmtMarkMaxNext
Function	Searching for detected peak points toward the lower level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker.
Return value	0: Normal/1: Error
Function description	Moves the marker specified by *lngNo* to a detected peak point at a lower level than the current value.
GPIB	:DISPlay:MARKer[1|2]:MAXimum:NEXT

5.2.12.6 WmtMarkMaxPrev

Function name	long WmtMarkMaxPrev
Function	Searching for detected peak points toward the higher level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker.
Return value	0: Normal/1: Error
Function description	Moves the marker specified by *lngNo* to a detected peak point at a higher level than the current value.
GPIB	:DISPlay:MARKer[1|2]:MAXimum:PREVious

5.2.12.7 WmtMarkMaxRigh

Function name	long WmtMarkMaxRigh
Function	Searching for detected peak points to the right.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker.
Return value	0: Normal/1: Error
Function description	Moves the marker specified by *lngNo* to a detected peak point on the right of the current value.
GPIB	:DISPlay:MARKer[1|2]:MAXimum:RIGHt

5.2.12.8 WmtMarkMode

Function name	long WmtMarkMode
Function	Setting the marker mode.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: NORMAL // 1: DELTA
Return value	0: Normal/1: Error
Function description	Sets the marker mode specified by *lngMode*.
GPIB	:DISPlay:MARKer:MODE

5.2.12.9 QryMarkMode

Function name	long QryMarkMode
Function	Reading the marker mode.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: NORMAL // 1: DELTA
Return value	0: Normal/1: Error
Function description	Reads out the marker mode and stores it in *lngMode*.
GPIB	:DISPlay:MARKer:MODE?

5.2.12.10 WmtMarkFreq

Function name	long WmtMarkFreq
Function	Setting the marker frequency.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. double dblFreq // The marker frequency.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblFreq* as the marker frequency for the marker specified by *lngNo*.
GPIB	:DISPlay:MARKer{1|2}:FREQuency

5.2.12.11 QryMarkFreq

Function name	long QryMarkFreq
Function	Reading the marker frequency.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. [OUT] double * dblFreq // The marker frequency.
Return value	0: Normal/1: Error
Function description	Reads out the frequency of the marker specified by *lngNo* and stores it in *dblFreq*.
GPIB	:DISPlay:MARKer{1|2}:FREQuency?

5.2.12.12 WmtMarkWav

Function name	long WmtMarkWav
Function	Setting the marker wavelength.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. double dblWav // The marker wavelength.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the marker wavelength for the marker specified by *lngNo*.
GPIB	:DISPlay:MARKer{1|2}:WAVelength

5.2.12.13 QryMarkWav

Function name	long QryMarkWav
Function	Reading the marker wavelength.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. [OUT] double * dblWav // The marker wavelength.
Return value	0: Normal/1: Error
Function description	Reads out the wavelength of the marker specified by *lngNo* and stores it in *dblWav*.
GPIB	:DISPlay:MARKer{1|2}:WAVelength?

5.2.12.14 WmtMarkPow

Function name	long WmtMarkPow
Function	Setting the level marker.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 3: The Y1 marker only. double dblPow // The marker level.
Return value	0: Normal/1: Error
Function description	Sets the marker level of *dblPow* for the marker specified by *lngNo*.
GPIB	:DISPlay:MARKer3:POWer

5.2.12.15 QryMarkPow

Function name	long QryMarkPow
Function	Reading the marker level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. // 3:Y1 marker. [OUT] double * dblPow // The marker level.
Return value	0: Normal/1: Error
Function description	Reads out the level information of the marker specified by *lngNo* and stores it in *dblPow*.
GPIB	:DISPlay:MARKer{1|2|3}:POWer?

5.2.12.16 WmtMarkStat

Function name	long WmtMarkStat
Function	Setting the marker to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. // 3: Y1 marker. long lngOnoff // 0: OFF // 1: ON
Return value	0: Normal/1: Error
Function description	Sets the marker specified by *lngNo* to ON or OFF.
GPIB	:DISPlay:MARKer{1|2|3}[:STATs]

5.2.12.17 QryMarkStat

Function name	long QryMarkStat
Function	Reading the ON or OFF marker setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNo // 1: X1 marker. // 2: X2 marker. // 3: Y1 marker. [OUT] long * lngOnoff // 0: OFF // 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting for the marker specified by *lngNo* and stores it in *lngOnoff*.
GPIB	:DISPlay:MARKer{1|2|3}[:STATs]?

5.2.13 Function Specifications (DISPlay Subsystem)

5.2.13.1 WmtDispListAll

Function name	long WmtDispListAll
Function	Setting the list display mode for the entire window to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets the list display mode for the entire window to ON or OFF.
GPIB	:DISPlay[:WINDow]:LIST:ALL[:STATe]

5.2.13.2 QryDispListAll

Function name	long QryDispListAll
Function	Reading the ON or OFF list display mode setting for the entire window.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF list display setting for the entire window and stores it in *lngOnoff*.
GPIB	:DISPlay[:WINDow]:LIST:ALL[:STATe]?

5.2.13.3 WmtDispListCurr

Function name	long WmtDispListCurr
Function	Setting the current peak number for the list data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngNum // The current peak number.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngNum* as the current peak number for the list data.
GPIB	:DISPlay[:WINDow]:LIST:CURRent

5.2.13.4 QryDispListCurr

Function name	long QryDispListCurr
Function	Reading the current peak number for the list data.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngNum // The current peak number.
Return value	0: Normal/1: Error
Function description	Reads out the current peak number for the list data and stores it in *lngNum*.
GPIB	:DISPlay[:WINDow]:LIST:CURRent?

5.2.13.5 WmtDispListStat

Function name	long WmtDispListStat
Function	Setting the list display mode to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets the list display mode to ON or OFF.
GPIB	:DISPlay[:WINDow]:LIST[:STATe]

5.2.13.6 QryDispListStat

Function name	long QryDispListStat
Function	Reading the ON or OFF setting for the list display mode.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF setting for the list display mode and stores it in *lngOnoff*.
GPIB	:DISPlay[:WINDow]:LIST[:STATe]?

5.2.13.7 WmtDispText

Function name	long WmtDispText
Function	Setting the label.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). char * strLabel // Label.
Return value	0: Normal/1: Error
Function description	Sets the label.
GPIB	:DISPlay[:WINDow]:TEXT:DATA

5.2.13.8 QryDispText

Function name	long QryDispText
Function	Reading the label.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] char * strLabel // Label.
Return value	0: Normal/1: Error
Function description	Reads out the label characters string and stores it in the array called *strLabel*.
GPIB	:DISPlay[:WINDow]:TEXT:DATA?

5.2.13.9 WmtDispTracGrapGrid

Function name	long WmtDispTracGrapGrid
Function	Setting the grid display to ON or OFF.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets the grid display to ON or OFF.
GPIB	:DISPlay[:WINDow]:TRACe:GRAPhics:GRID[:STATs]

5.2.13.10 QryDispTracGrapGrid

Function name	long QryDispTracGrapGrid
Function	Reading the ON or OFF grid display setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out the ON or OFF grid display setting and stores it in *lngOnoff*.
GPIB	:DISPlay[:WINDow]:TRACe:GRAPhics:GRID[:STATs]?

5.2.13.11 WmtDispTracAllAuto

Function name	long WmtDispTracAllAuto
Function	The automatic scaling function for the waveform data display.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured).
Return value	0: Normal/1: Error
Function description	The function automatically scales and displays waveform data.
GPIB	:DISPlay[:WINDow]:TRACe:ALL[:SCALe]:AUTO

5.2.13.12 WmtDispTracXCent

Function name	long WmtDispTracXCent
Function	Setting the waveform (or frequency) for the display center.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The wavelength (or frequency) for the display center.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the wavelength (or frequency) display center.
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:CENTer

5.2.13.13 QryDispTracXCent

Function name	long QryDispTracXCent
Function	Reading the wavelength (or frequency) for the display center.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The wavelength (or frequency) for the display center.
Return value	0: Normal/1: Error
Function description	Reads out the waveform (or frequency) for the display center and stores it in *dblWav.*
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:CENTer?

5.2.13.14 WmtDispTracXLeft

Function name	long WmtDispTracXLeft
Function	Setting the display start wavelength (or frequency).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The minimum display wavelength (or frequency).
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the display start wavelength (or frequency).
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:LEFT

5.2.13.15 QryDispTracXLeft

Function name	long QryDispTracXLeft
Function	Reading the display start wavelength (or frequency).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The minimum display wavelength (or frequency).
Return value	0: Normal/1: Error
Function description	Reads out the display start wavelength (or frequency) and stores it in *dblWav.*
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:LEFT?

5.2.13.16 WmtDispTracXRigh

Function name	long WmtDispTracXRigh
Function	Setting the display stop wavelength (or frequency).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The maximum display wavelength (or frequency).
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the display stop wavelength (or frequency).
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:RIGHt

5.2.13.17 QryDispTracXRigh

Function name	long QryDispTracXRigh
Function	Reading the display stop wavelength (or frequency).
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The maximum display wavelength (or frequency).
Return value	0: Normal/1: Error
Function description	Reads out the display stop wavelength (or frequency) and stores it in *dblWav*.
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:RIGHt?

5.2.13.18 WmtDispTracXSpan

Function name	long WmtDispTracXSpan
Function	Setting the display span.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblWav // The display span.
Return value	0: Normal/1: Error
Function description	Sets the value of *dblWav* as the display span.
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:SPAN

5.2.13.19 QryDispTracXSpan

Function name	long QryDispTracXSpan
Function	Reading the display span.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblWav // The display span.
Return value	0: Normal/1: Error
Function description	Reads out the display span and stores it in *dblWav*.
Remark	The display unit (wavelength or frequency) switches depending on the display mode (WmtUnitWav).
GPIB	:DISPlay[:WINDow]:TRACe:X[:SCALe]:SPAN?

5.2.13.20 WmtDispTracYPdiv

Function name	long WmtDispTracYPdiv
Function	Setting the level scale /Div.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dblYPdiv // The level scale /Div (10|5|2|1|0.5).
Return value	0: Normal/1: Error
Function description	Sets the value of *dblYPdiv* as the level scale /Div.
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:PDIVision

5.2.13.21 QryDispTracYPdiv

Function name	long QryDispTracYPdiv
Function	Reading the level scale /Div setting.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblYPdiv // The level scale /Div (10|5|2|1|0.5)
Return value	0: Normal/1: Error
Function description	Reads out the level scale /Div and stores it in *dblYPdiv*.
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:PDIVision?

5.2.13.22 WmtDispTracYRlev

Function name	long WmtDispTracYRlev
Function	Setting the reference level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). double dbl // The reference level.
Return value	0: Normal/1: Error
Function description	Sets the value of *dbl* as the reference level.
Remark	The unit (LIN[W] or LOG[dBm]) of the input value switches depending on the display mode (WmtUnitPow).
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:RLEVel

5.2.13.23 QryDispTracYRlev

Function name	long QryDispTracYRlev
Function	Reading the reference level.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] double * dblPow // The reference level.
Return value	0: Normal/1: Error
Function description	Reads out the reference level and stores it in *dblPow*.
Remark	The unit (LIN[W] or LOG[dBm]) of the input value switches depending on the display mode (WmtUnitPow).
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:RLEVel?

5.2.13.24 WmtDispTracYSpac

Function name	long WmtDispTracYSpac
Function	Setting the Log/Lin level display.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // The 0:Log/1:Lin level display specification.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMode* as the Log/Lin level display.
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:SPACing

5.2.13.25 QryDispTracYSpac

Function name	long QryDispTracYSpac
Function	Reading the Log/Lin level display.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // The 0:Log/1:Lin level display specification.
Return value	0: Normal/1: Error
Function description	Reads out the Log/Lin level display and stores it in *lngMode*.
GPIB	:DISPlay[:WINDow]:TRACe:Y[:SCALe]:SPACing?

5.2.13.26 WmtDispTrenList

Function name	long WmtDispTrenList
Function	Setting a moving mode for TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 0: Time // 1: Channel
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMode* as the moving mode for TREND LIST.
GPIB	:DISPlay[:WINDow]:TRENd:LIST

5.2.13.27 QryDispTrenList

Function name	long QryDispTrenList
Function	Reading the moving mode for TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMode // 0: Time // 1: Channel
Return value	0: Normal/1: Error
Function description	Reads out the moving mode for TREND LIST and stores it in *lngMode*.
GPIB	:DISPlay[:WINDow]:TRENd:LIST?

5.2.13.28 WmtDispTrenListAll

Function name	long WmtDispTrenListAll
Function	Setting whether or not to display TREND LIST in the entire window.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets whether or not to display TREND LIST in the entire window.
GPIB	:DISPlay[:WINDow]:TRENd:LIST:ALL[:STATe]

5.2.13.29 QryDispTrenListAll

Function name	long QryDispTrenListAll
Function	Reading whether or not to display TREND LIST in the entire window.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to display TREND LIST in the entire window and stores it in *lngOnoff*.
GPIB	:DISPlay[:WINDow]:TRENd:LIST:ALL[:STATe]?

5.2.13.30 WmtDispTrenListChanCurr

Function name	long WmtDispTrenListChanCurr
Function	Setting the current channel using TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngCh // The current channel number.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngCh* as the current channel using TREND LIST.
GPIB	:DISPlay[:WINDow]:TRENd:LIST:CHAN:CURRent

5.2.13.31 QryDispTrenListChanCurr

Function name	long QryDispTrenListChanCurr
Function	Reading the current channel using TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). |OUT| long * lngCh // The current channel number.
Return value	0: Normal/1: Error
Function description	Reads out the current channel using TREND LIST and stores it in *lngCh*.
GPIB	:DISPlay|:WINDow|:TRENd:LIST:CHAN:CURRent?

5.2.13.32 WmtDispTrenListTimeCurr

Function name	long WmtDispTrenListTimeCurr
Function	Setting the current TIME using TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngTime // The current TIME number.
Return value	0: Normal/1: Error
Function description	Sets the value of *lngTime* as the current TIME using TREND LIST.
GPIB	:DISPlay[:WINDow]:TRENd:LIST:TIME:CURRent

5.2.13.33 QryDispTrenListTimeCurr

Function name	long qryDispTrenListTimeCurr
Function	Reading the current TIME using TREND LIST.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). |OUT| long * lngTime // The current TIME number.
Return value	0: Normal/1: Error
Function description	Reads out the current TIME using TREND LIST and stores it in *lngTime*.
GPIB	:DISPlay|:WINDow|:TRENd:LIST:TIME:CURRent?

5.2.13.34 WmtDispTrenTracAll

Function name	long WmtDispTrenTracAll
Function	Setting whether or not to display all channels data in the graph display during TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Sets whether or not to display all channels data in the graph display during TREND measurement.
GPIB	:DISPlay[:WINDow]:TRENd:TRACe:ALL[:STATe]

5.2.13.35 QryDispTrenTracAll

Function name	long QryDispTrenTracAll
Function	Reading whether or not to display all channels data in the graph display during TREND measurement.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngOnoff // 0: OFF / 1: ON
Return value	0: Normal/1: Error
Function description	Reads out whether or not to display all channels data in the graph display during TREND measurement and stores it in *lngOnoff*.
GPIB	:DISPlay[:WINDow]:TRENd:TRACe:ALL[:STATe]?

5.2.14 Function Specifications (SYSTem Subsystem)

5.2.14.1 WmtSystDate

Function name	long WmtSystDate
Function	Setting the date in the system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngYear // Year. long lngMon // Month. long lngDay // Day.
Return value	0: Normal/1: Error
Function description	Sets the date in the system by setting values of *lngYear*, *lngMon*, and *lngDay* as the year, month, and day, respectively.
GPIB	:SYSTem:DATE

5.2.14.2 QrySystDate

Function name	long QrySystDate
Function	Reading the date set in the system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngYear // Year. long * lngMon // Month. long * lngDay // Day.
Return value	0: Normal/1: Error
Function description	Reads out the date set in the system and stores the year in *lngYear*, month in *lngMon*, and day in *lngDay*.
GPIB	:SYSTem:DATE?

5.2.14.3 WmtSystTime

Function name	long WmtSystTime
Function	Setting the time in the system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngHour // Hour. long lngMin // Minute.
Return value	0: Normal/1: Error
Function description	Sets the time in the system by setting values of *lngHour* and *lngMin* as the hour and minute, respectively.
GPIB	:SYSTem:TIME

5.2.14.4 QrySystTime

Function name	long QrySystTime
Function	Reading the date set in the system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngHour // Hour. long * lngMin // Minute.
Return value	0: Normal/1: Error
Function description	Reads out the time set in the system and stores the hour in *lngHour* and minute in *lngMin*.
GPIB	:SYSTem:TIME?

5.2.14.5 QrySystErr

Function name	long QrySystErr
Function	Reading error information from the error cue.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngCode // error code char * strErr // error string
Return value	0: Normal/1: Error
Function description	Reads out error information from the error cue and stores the error code in *lngCode* and error characters string in the array called *strErr*.
Remark	The *strErr* array must be large enough to store 512 values.
GPIB	:SYSTem:ERRor?

5.2.14.6 WmtSystHalt

Function name	long WmtSystHalt
Function	Turning off the system.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMode // 1: Turn off the power after closing Windows. // 2: Closing Windows. // 3: Restarting.
Return value	0: Normal/1: Error
Function description	Turns off the system by using the mode specified by *lngMode*.
GPIB	:SYSTem:HALT

5.2.15 Function Specifications (STATus Subsystem)

5.2.15.1 WmtStatDevEnab

Function name	long WmtStatDevEnab
Function	Setting an enable register for the device status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMask* as the enable register for the device status.
GPIB	:STATus:DEVice:ENABle

5.2.15.2 QryStatDevEnab

Function name	long QryStatDevEnab
Function	Reading the enable register for the device status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	Reads out the enable register for the device status and stores it in *lngMask*.
GPIB	:STATus:DEVice:ENABle?

5.2.15.3 QryStatDevEven

Function name	long QryStatDevEven
Function	Reading the device status register.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngStat // The register reading.
Return value	0: Normal/1: Error
Function description	Reads out the device status register and stores it in *lngStat*.
GPIB	:STATus:DEVice[:EVENt]?

5.2.15.4 WmtStatOperEnab

Function name	long WmtStatOperEnab
Function	Setting an enable register for the operation status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	The function sets the value of *lngMask* as the enable register for the operation status.
GPIB	:STATus:OPERation:ENABle

5.2.15.5 QryStatOperEnab

Function name	long QryStatOperEnab
Function	Reading the enable register for the operation status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	Reads out the enable register for the operation status and stores it in *lngMask*.
GPIB	:STATus:OPERation:ENABle?

5.2.15.6 QryStatOperEven

Function name	long QryStatOperEven
Function	Reading the operation status register.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngStat // The register reading.
Return value	0: Normal/1: Error
Function description	Reads out the operation status register and stores it in *lngStat*.
GPIB	:STATus:OPERation[:EVENt]?

5.2.15.7 WmtStatQuesEnab

Function name	long WmtStatQuesEnab
Function	Setting an enable register for the questionable status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). long lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	Sets the value of *lngMask* as the enable register for the questionable status.
GPIB	:STATus:QUEStionable:ENABle

5.2.15.8 QryStatQuesEnab

Function name	long QryStatQuesEnab
Function	Reading the enable register for the questionable status.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngMask // A valid bit setting for the relevant register (0 to 65535)
Return value	0: Normal/1: Error
Function description	Reads out the enable register for the questionable status and stores it in *lngMask*.
GPIB	:STATus:QUEStionable:ENABle?

5.2.15.9 QryStatQuesEven

Function name	long QryStatQuesEven
Function	Reading the questionable status register.
Argument	[IN] long lngID // The identifier for the relevant instrument (the ID obtained // when the connection was secured). [OUT] long * lngStat // The register reading.
Return value	0: Normal/1: Error
Function description	Reads out the questionable status register and stores it in *lngStat*.
GPIB	:STATus:QUEStionable[:EVENt]?

5.2.16 Communication Control Function Sample Programs

This section describes program examples used when remotely controlling the Q8331 through a LAN.

5.2.16.1 Sample Programs for Setting or Reading Measurement Conditions

CAUTION: ***Visual Basic 6.0 (referred to as VB henceforth) is used in the sample programs shown here.***

- VB Program

  Example VB-4: Sets required measurement parameters, measures in the Multi Peak mode of the LIST, and reads the frequency data.

```
Dim strIpAddr As String * 16
Dim ID As Long
Dim lngErr As Long, lngbuff As Long
Dim frequency(1 To 300) As Double

lngErr = WmtGetIpStr("Q8331", strIpAddr)          ' Obtains an IP address from the measuring instrument name.
lngErr = WmtOpenPacket(strIpAddr, "", ID)         ' Secures a communication pathway to the measuring instrument.

lngErr = WmtRST(ID)                               ' Resets the Q8331.

lngErr = WmtSensCorrMed(ID, 0)                    ' Sets the wavelength display in vacuum.
lngErr = WmtSensSwePoin(ID, 1)                    ' Sets the resolution to High.
lngErr = WmtCalc2PExc(ID, 5)                      ' Sets the Peak Excursion to 5 dB.
lngErr = WmtCalc2PThr(ID, 20)                     ' Sets the Peak Threshold to 20 dB.
lngErr = WmtUnitWav(ID, 1)                        ' Sets the horizontal axis to Frequency.
lngErr = WmtUnitPow(ID, 0)                        ' Sets the vertical axis to LOG.

lngErr = WmtDispTracXCent(ID, 193550000000000#)   ' Sets the spectrum display range to 191.05 THz - 196.05 THz.
lngErr = WmtDispTracXSpan(ID, 5000000000000#)

lngErr = WmtDispListStat(ID, 1)                   ' Sets the peak list and spectrum wavelength display.
lngErr = WmtDispListAll(ID, 0)
lngErr = WmtCalc3Pres(ID)                         ' Sets the list mode to the Multi Peak mode.

lngErr = WmtInitImm(ID)                           ' Starts the measurement in Single.

Do
   lngErr = QryStatOperEven(ID, lngbuff)          ' Reads the operation status register.
   lngbuff = lngbuff And 16                       ' Obtains whether or not the end of the measurement bit (4) is set to 1.
Loop Until lngbuff <> 0                           ' Determines whether or not the measurement is complete.

Erase frequency()

lngErr = QryCalc2Data(ID, 1, frequency(1))        ' Reads the frequency data in the list.

lngErr = WmtClosePacket(ID)                       ' Releases the communication pathway with the measuring instrument.
```

Example VB-5: Sets required measurement parameters and performs the measurement five times in the Pass/Fail mode of the LIST.

```
Dim strIpAddr As String * 16
Dim ID As Long
Dim lngErr As Long, lngbuff As Long
Dim i As Long, j As Long, NUM As Long

Dim Dat() As Double, PF() As Double, GRID() As Double, Pk() As Double
Dim Lvl() As Double, Spac() As Double, Diff() As Double
lngErr = WmtGetIpStr("Q8331", strIpAddr)                ' Obtains an IP address from the measuring instrument name.
lngErr = WmtOpenPacket(strIpAddr, "", ID)               ' Secures a communication pathway to the measuring instrument.

lngErr = WmtRST(ID)                                     ' Resets the Q8331.

lngErr = WmtSensCorrMed(ID, 0)                          ' Sets the wavelength display in vacuum.
lngErr = WmtSensSwePoin(ID, 1)                          ' Sets the resolution to High.
lngErr = WmtCalc2PExc(ID, 5)                            ' Sets the Peak Excursion to 5 dB.
lngErr = WmtCalc2PThr(ID, 20)                           ' Sets the Peak Threshold to 20 dB.
lngErr = WmtUnitWav(ID, 0)                              ' Sets the horizontal axis to wavelength.
lngErr = WmtUnitPow(ID, 0)                              ' Sets the vertical axis to LOG.
lngErr = WmtCalc3ChanPres(ID)                           ' Sets the GRID TABLE to the GRID ITU.

lngErr = WmtDispTracXCent(ID, 0.00000155)               ' Sets the spectrum display range to 1530 nm - 1570 nm.
lngErr = WmtDispTracXSpan(ID, 0.00000004)

lngErr = WmtDispListStat(ID, 1)                         ' Sets the peak list and spectrum wavelength display.
lngErr = WmtDispListAll(ID, 0)
lngErr = WmtCalc3PassStat(ID, 1)                        ' Sets the list mode to the Pass/Fail mode.

lngErr = WmtCalc3PassMode(ID, 0)                        ' Selects the drift wavelength for the Pass/Fail judgement.
lngErr = WmtCalc3PassDWav(ID, 0.00000000001)            ' Sets the λ Drift Limit to 0.01 nm.
lngErr = WmtCalc3PassDPow(ID, 5)                        ' Sets the Level Drift Limit to 5 dB.
lngErr = WmtCalc3PassPow(ID, -5)                        ' Sets the Reference Level to -5 dB.

For i = 1 To 5                                          ' Repeats the measurement five times.

    lngErr = WmtInitImm(ID)                             ' Starts the single sweep.


    Do
        lngErr = QryStatOperEven(ID, lngbuff)           ' Reads the operation status register.
        lngbuff = lngbuff And 16                        ' Obtains whether or not the end of the measurement bit (4) is set to 1.
    Loop Until lngbuff <> 0                             ' Determines whether or not the measurement is complete.

    lngErr = QryCalc3Poin(ID, NUM)                      ' Reads the amount of the output data of the list.

    ReDim Dat(1 To NUM * 6), PF(1 To NUM), GRID(1 To NUM), Pk(1 To NUM)
    ReDim Lvl(1 To NUM), Spac(1 To NUM), Diff(1 To NUM)
    lngErr = QryCalc3Data(ID, Dat(1))                   ' Reads the list data set.

    For j = 1 To NUM

        PF(j) = Dat((j - 1) * 6 + 1)                    ' Stores Pass/Fail results in PF().
        GRID(j) = Dat((j - 1) * 6 + 2)                  ' Stores the grid wavelength data closest to the peaks in GRID().
        Pk(j) = Dat((j - 1) * 6 + 3)                    ' Stores peak wavelength data in Pk().
        Lvl(j) = Dat((j - 1) * 6 + 4)                   ' Stores level data in Lvl().
        Spac(j) = Dat((j - 1) * 6 + 5)                  ' Stores distance data between the grids and peak wavelengths in Spac().
        Diff(j) = Dat((j - 1) * 6 + 6)                  ' Stores a level difference between the peak level and the reference level in
                                                        Diff().

    Next j

Next i

lngErr = WmtClosePacket(ID)                             ' Releases the communication pathway with the measuring instrument.
```

5.2.16 Communication Control Function Sample Programs

Example VB-6: Sets required measurement parameters and measures in the TREND mode. Sets the data level on the screen to the NOMINAL mode.

```
Dim strIpAddr As String * 16
Dim ID As Long
Dim lngErr As Long, lngbuff As Long
Dim i As Long, j As Long, NUM As Long
Dim Dat() As Double, Pk() As Double, Lvl() As Double, SNR() As Double

lngErr = WmtGetIpStr("Q8331", strIpAddr)            ' Obtains an IP address from the measuring instrument name.
lngErr = WmtOpenPacket(strIpAddr, "", ID)           ' Secures a communication pathway to the measuring instrument.

lngErr = WmtRST(ID)                                 ' Resets the Q8331.

lngErr = WmtSensCorrMed(ID, 0)                      ' Sets the wavelength display in vacuum.
lngErr = WmtSensSwePoin(ID, 1)                      ' Sets the resolution to High.
lngErr = WmtCalc2PExc(ID, 5)                        ' Sets the Peak Excursion to 5 dB.
lngErr = WmtCalc2PThr(ID, 20)                       ' Sets the Peak Threshold to 20 dB.
lngErr = WmtUnitWav(ID, 0)                          ' Sets the horizontal axis to wavelength.
lngErr = WmtUnitPow(ID, 0)                          ' Sets the vertical axis to LOG.
lngErr = WmtCalc3ChanPres(ID)                       ' Sets the GRID TABLE to the GRID ITU.

lngErr = WmtDispTracXCent(ID, 0.00000155)           ' Sets the spectrum display range to 1530 nm - 1570 nm.
lngErr = WmtDispTracXSpan(ID, 0.00000004)

lngErr = WmtCalc3TrenStat(ID, 1)                    ' Sets the mode to TREND.
lngErr = WmtDispTrenTracAll(ID, 1)                  ' Displays all peak trend data.
lngErr = WmtDispTrenListAll(ID, 0)                  ' Displays the trend list and monitor graph.

lngErr = WmtTrigDel(ID, 10)                         ' Sets the Interval Time to 10s.
lngErr = WmtTrigCoun(ID, 20)                        ' Sets the Measurement Times to 20.
lngErr = WmtCalc3TrenType(ID, 1)                    ' Sets the Data Type to LEVEL.
lngErr = WmtCalc3TrenMode(ID, 2)                    ' Sets the Data Mode to NOMINAL.
lngErr = WmtCalc3TrenPassStat(ID, 0)                ' Sets Pass/Fail to OFF.

lngErr = WmtCalc3SNRAuto(ID, 1)                     ' Sets the noise calculation method to AUTO.
lngErr = WmtCalc3TrenRefPow(ID, -5)                 ' Sets the reference level to -5 dBm.

lngErr = WmtInitImm(ID)                             ' Starts the single sweep.

Do
   lngErr = QryStatOperEven(ID, lngbuff)            ' Reads the operation status register.
   lngbuff = lngbuff And 16                         ' Obtains whether or not the end of the measurement bit (4) is set to 1.
Loop Until lngbuff <> 0                             ' Determines whether or not the measurement is complete.

lngErr = QryCalc3TrenPoin(ID, NUM)                  ' Reads the number of TREND channels.

ReDim Dat(0 To 20 * 3 + 2)
ReDim Pk(1 To NUM, 0 To 20), Lvl(1 To NUM, 0 To 20), SNR(1 To NUM, 0 To 20)

For i = 1 To NUM

    lngErr = QryCalc3TrenData(ID, i, Dat(0))        ' Reads data for each channel.

    For j = 0 To 20

        Pk(i, j) = Dat(j * 3)                       ' Stores peak wavelength data in Pk(). (The reference data is stored as the 0th
                                                    data measurement.)
        Lvl(i, j) = Dat(j * 3 - 1)                  ' Stores level data in Lvl(). (The reference data is stored as the 0th measurement
                                                    data.)
        SNR(i, j) = Dat(j * 3 - 2)                  ' Stores SNR data in SNR(). (The reference data is stored as the 0th measure-
                                                    ment data.)

    Next j

Next i

lngErr = WmtClosePacket(ID)                         ' Releases the communication pathway with the measuring instrument.
```

6. TECHNICAL DOCUMENTS

6.1 Principal of Operation

This section describes the principal of operation by using a block diagram of the Q8331.

The block diagram in Figure 6-1 shows an outline for the Q8331 system inside. The Q8331 consists of 3 large blocks.

1. Interferometer block
2. Measurement control block
3. Calculation / display process block

The following describes the principal of operation based on the block diagram.

1. Interferometer block (Michaelson Interferometer)

   Light input to the interferometer is turned into parallel light by the collimator. When this light enters the beam splitter, it is split into 2 parts. Each beam is reflected by a mirror (one fixed and the other movable) and reenters the beam splitter to combine again. The different paths taken by these optical lights create a light interference.

   Displacing the movable mirror consecutively and providing an interferogram can create the optical path difference. This interferogram is a Fourier conversion of the input light spectrum. Therefore, taking combined light data samples at a constant distance interval using the AD converter and performing an FFT process on the samples provides the input light spectrum.

   The Q8331 has the He-Ne gas laser (wavelength 632.991 nm) built-in. The laser obtains an interferogram by passing through a different optical path from the measuring light, but within the same optical system.

   The He-Ne laser generates a very stable wavelength mono spectrum. Using the He-Ne laser interferogram as the ADC sampling clock enables the constant distance interval sampling without a worry of movable mirror displacement errors. The He-Ne laser optical signal enables high accuracy wavelength measurements with no calibration necessary.

   Including the pressure sensor and temperature sensor in the interferometer eliminates error causes from the environment change and measures wavelengths more accurately.

2. Measurement control block

   This block controls the movable mirror drive, measurement range, and measurements for conditions set in the GPIB.

   An interferogram obtained from the reference light is pulse formed and is used as the sampling clock to convert the measuring light interferogram from analog to digital. The digital converted signal data passes through the digital filter and is stored in the buffer memory. Then, the signal is transmitted to the CPU though the PCI bus to be processed.

   A coupler used for observing the level change in real time removes a part of the input signal. The signal amp gain is adjusted using this observation data. Monitoring the input light change constantly allows measurements with an adequate sensitivity.

3. Calculation / display process block

   This block analyzes sample data, finds conditions set using the panel buttons and keys and outputs measurement data (displays and GPIB).

   The PCI bus is used to communicate with the measurement control block. Sends necessary measurement conditions such as the center wavelength or span information and receives the sample measurement data. Performs window, FFT calculation, and power calculation processes and obtains spectrum data. Adjusts sensitivity and sets scales for displaying output. The cursor process analysis is also made.

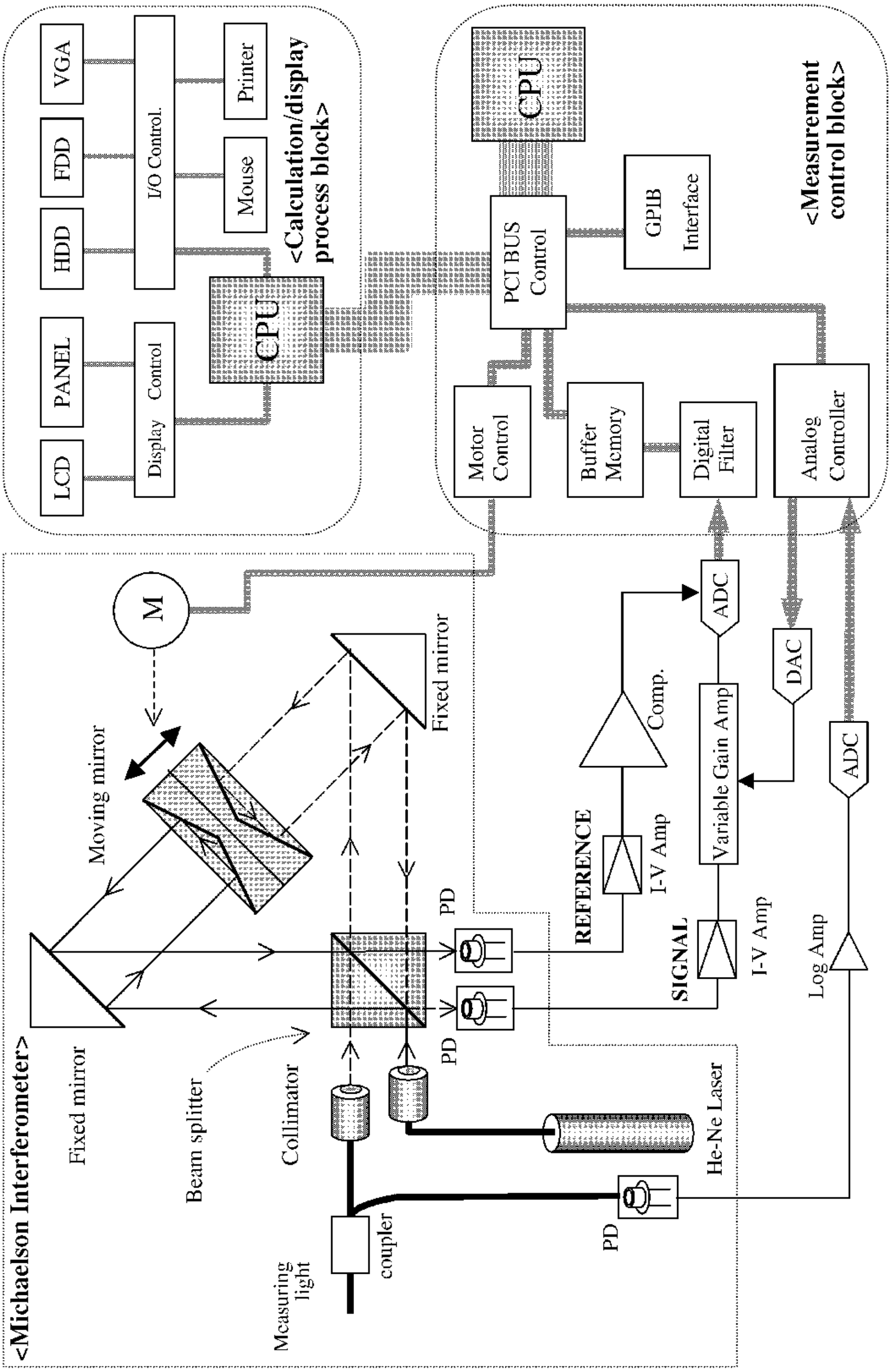


Figure 6-1 Inside Unit Outline Block Diagram

6.2 SNR Calculation

The SNR is a signal to noise ratio. To obtain an SNR, the signal power and noise power needs to be found first. This section describes how to calculate signal power and noise power.

6.2.1 Signal Power Calculation

The signal power, P_s is a signal integrated in the wavelength range which satisfies the conditions given in the Peak excursion.

$$P_s = \int_a^b P(\lambda)$$

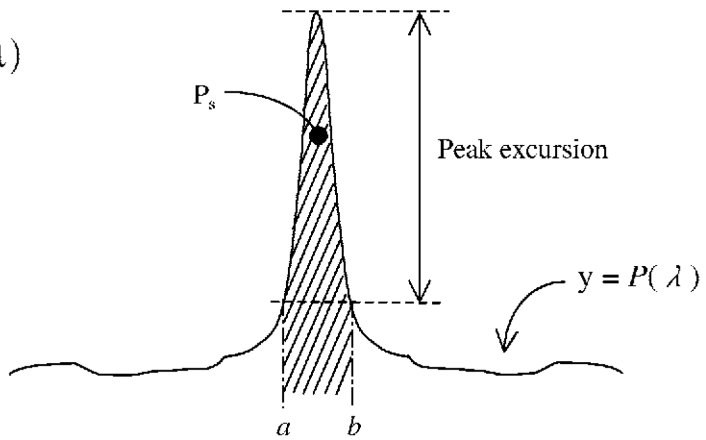


Figure 6-2 Signal Power Calculations

6.2.2 Noise Level Calculation

The noise level calculation has AUTO and MANUAL settings.

- AUTO

  Depending on the input signal condition, different method is used to find the noise level.

  <Condition 1>

  The neighboring channel does not exist or the distance to the nearest channel is 200 GHz or more.

  The noise power, P_n has a density of Hz per 0.1 nm.

  As shown in Figure 6-3, noise power integration values (P_{n1}, and P_{n2}) are found in the range not below 0.2 nm at the location ± 100 GHz away from the peak wavelength, λ_c. Find the power density per 0.1 nm from P_{n1} and P_{n2}. This is the noise power, P_n.

$$P_{n1} = \int_{\alpha}^{\beta} P(i) \quad , \quad P_{n2} = \int_{\gamma}^{\delta} P(i)$$

$$P_n = (P_{n1} + P_{n2}) \frac{0.1nm}{\text{Integration range}}$$

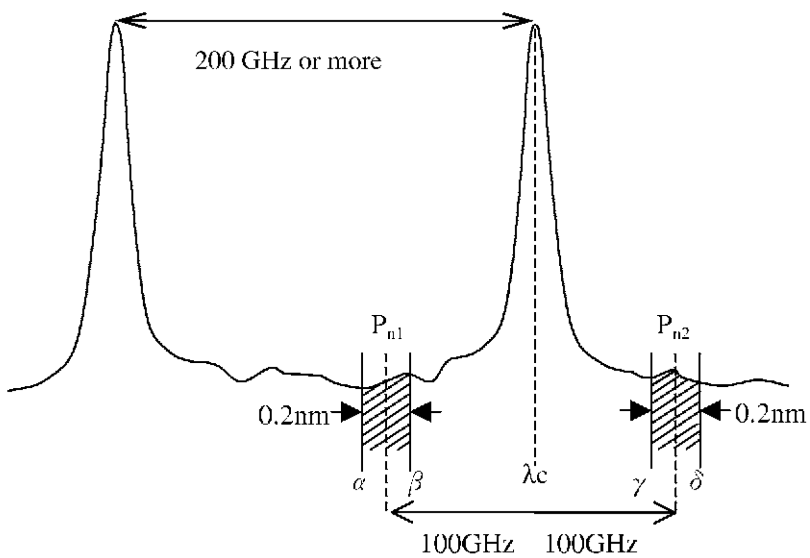


Figure 6-3 Noise Power Calculation 1

<Condition 2>
A case in which the distance to the nearest channel is less than 200 GHz.

As shown in Figure 6-4, noise power integration values (P_{n1}, and P_{n2}) are found in the range not below 0.2 nm at the mid point between 2 adjacent peak wavelengths. The noise power, P_n has a density measured in Hz per 0.1 nm.

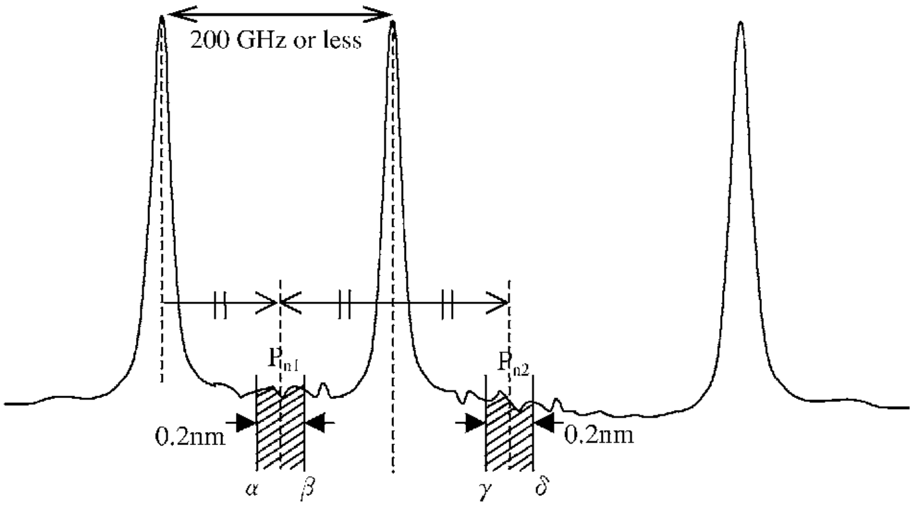


Figure 6-4 Noise Power Calculation 2

<Condition 3>
Adjacent channels are very close to each other and connected at a level above the noise floor.
The noise power, P_n has a density measured in Hz per 0.1 nm at the point X shown in Figure 6-5.

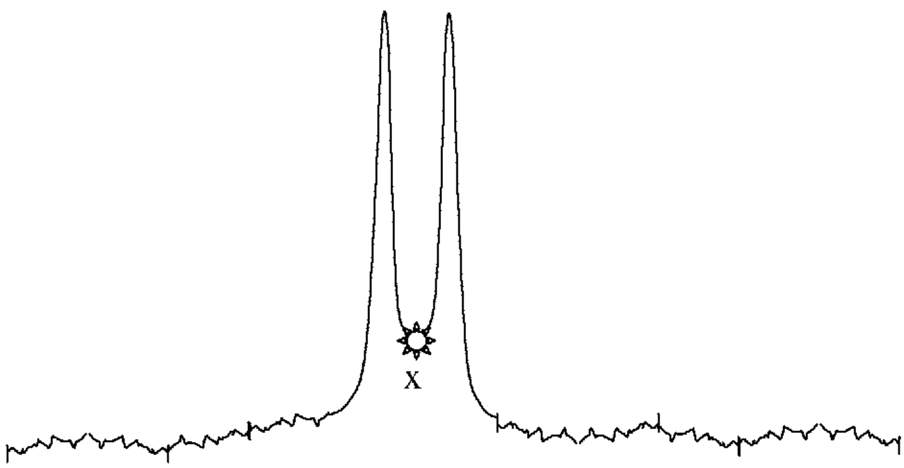


Figure 6-5 Noise Power Calculation 3

- MANUAL

  For any signal condition, the SNR is calculated with the set wavelength level as the noise level (see Figure 6-6).

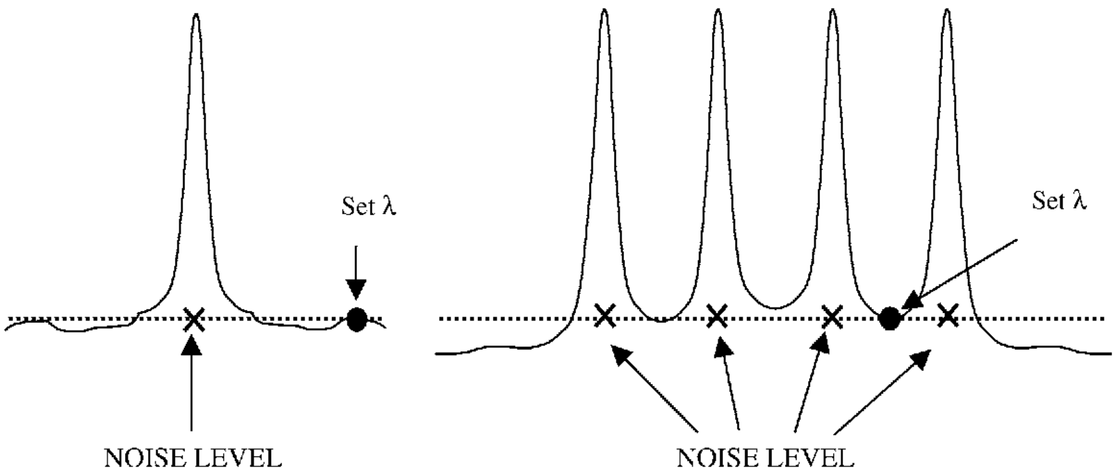


Figure 6-6 Defining the Noise Level (MANUAL)

6.3 Peak Wavelength in the List Display and Cursor Display

The LIST display peak wavelength and CURSOR display peak wavelength are obtained differently. Therefore, a peak value displayed in the LIST may be different from the peak value obtained by the cursor.

The following describes different methods for obtaining a peak wavelength.

1. LIST display

   The peak wavelength, λ_0 in the LIST display is obtained by taking the weighted average of all wavelengths in a peak neighborhood for each peak above the level specified in the THRESHOLD (see Figure 6-7).

$$\lambda_0 = \frac{\sum \lambda_i \chi_i}{\sum \chi_i}$$

λ_i : Wavelength at each point, Xi: Level at each point

2. CURSOR display

   The cursor selects a measured data point which has the highest level as the peak wavelength.

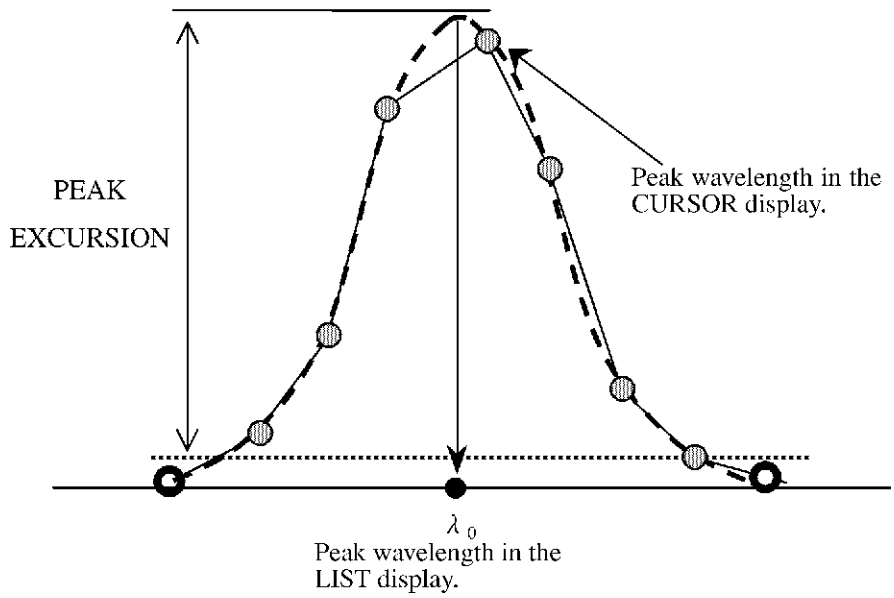


Figure 6-7 Peak Wavelength

7. PERFORMANCE TEST

This section describes how to test the Q8331 performance. The test items are as follows.

- Wavelength accuracy
- Level accuracy
- Input sensitivity
- Polarity dependency
- Dynamic range (S/N)

7.1 Test Equipment

Equipment such as the light generator and optical power meter are necessary in testing performance. Equipments necessary for each test are listed in Table 7-1.

Table 7-1 Equipment Necessary in Performance Tests

Testing item	Equipment used
Wavelength accuracy	Reference wavelength optical signal (1523 nm He-Ne laser) *1
Level accuracy	DFB-LD (1.31 μm) *2
	DFB-LD (1.55 μm) or variable wavelength optical signal *2
	Light variation attenuator
	Optical power meter (calibrated) *3
Input sensitivity	DFB-LD (1.31 μm) *2
	DFB-LD (1.55 μm) or variable wavelength optical signal *2
	Light variation attenuator
	Optical power meter (calibrated) *3
Polarity dependency	DFB-LD (1.31 μm) *2
	DFB-LD (1.55 μm) or variable wavelength optical signal *2
	Polarized wave scrambler *4
Dynamic range	DFB-LD (1.31 μm) *2
	DFB-LD (1.55 μm) or variable wavelength optical signal *2

*1: Wavelength accuracy ± 0.5 pm or less.
*2: Level stability ± 0.03 dB or lower, signal and noise ratio 45 dB or higher.
*3: Measurement accuracy ± 4.5%
*4: Polarity dependency loss 0.1 dB_{p-p}.

7.2 Test Methods

This section describes how to run each performance test.

7.2.1 Before Testing the Performance

To evaluate the Q8331 performance correctly, follow the procedure below when testing.

1. Clean the Q8331 light input and optical fiber thoroughly.

NOTE: ***For how to clean the Q8331 system, refer to 1.7.3.1, "Operation and Cleaning Methods for the Light Input Part".***

---

2. Install the unit on a stable even floor.
3. Operate the unit in the specified temperature range.
4. Warm up the unit for 30 minutes or longer after the power is turned on.

7.2.2 Wavelength Accuracy Test

To test the wavelength accuracy, an optical signal of a known wavelength value is input to the unit. By measuring the reference wavelength with the Q8331, a measurement error can be found. For the equipments necessary for this test, see Table 7-1.

Turning the power on.

1. Turn on the **POWER** switch located in the front panel.

   Windows is started and the self-test is executed. The measurement window is displayed.

Initializing the setting conditions.

Set the unit to the initial conditions.

2. Press **SYSTEM** and select ***PRESET***.

   The initial setting condition is loaded.

Connecting the light generator.

Connect the optical signal to measure.

3. Connect the light generator output and the unit input by using a single mode optical fiber cable.

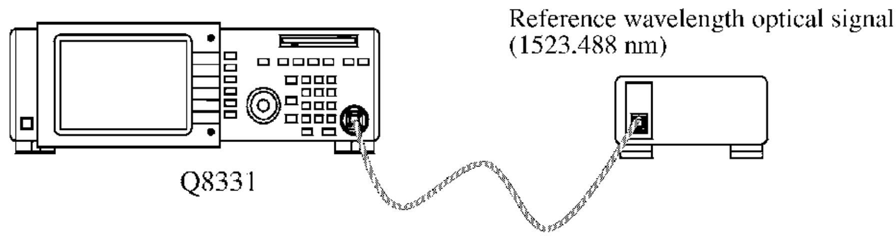


Figure 7-1 Wavelength Accuracy Test Equipment Connection

Executing the measurement.

4. Press **MEASURE** and select ***SINGLE.***

   A measurement is taken and the result is displayed in the list.

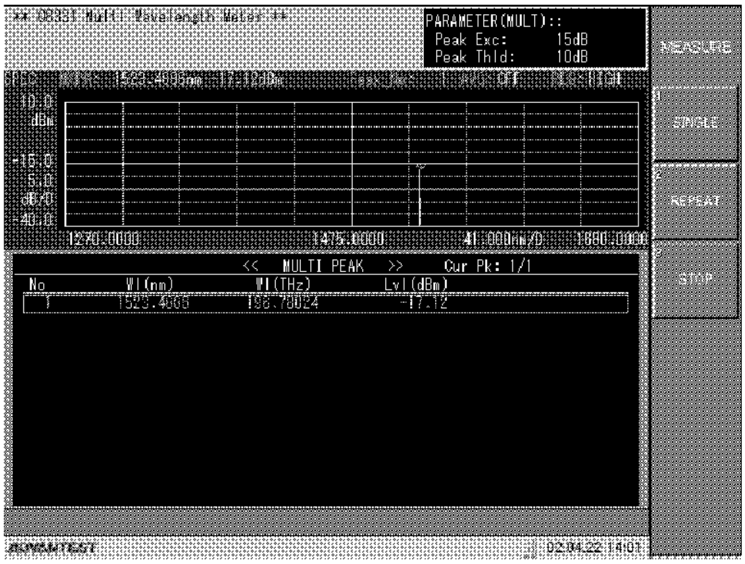


Figure 7-2 Reference Wavelength Optical Signal Measurement Result

5. The peak wavelength is scanned from the list and recorded in the performance test result sheet.

7.2.3 Level Accuracy Test

To test the level accuracy, 1.31 μm and 1.55 μm DFB-LD optical signals are used. By comparing the Q8331 level measurement value with the calibrated optical power meter measurement value, the unit level measurement error can be found. For the equipments necessary for this test, see Table 7-1.

Initializing the setting conditions.

Set the unit to the initial conditions.

1. Press **SYSTEM** and select ***PRESET***.
   The initial setting condition is loaded.

Connecting the light generator.

Connect the optical signal to measure.

2. Connect the light generator, light variation attenuator, and optical power meter using a single mode optical fiber cable.

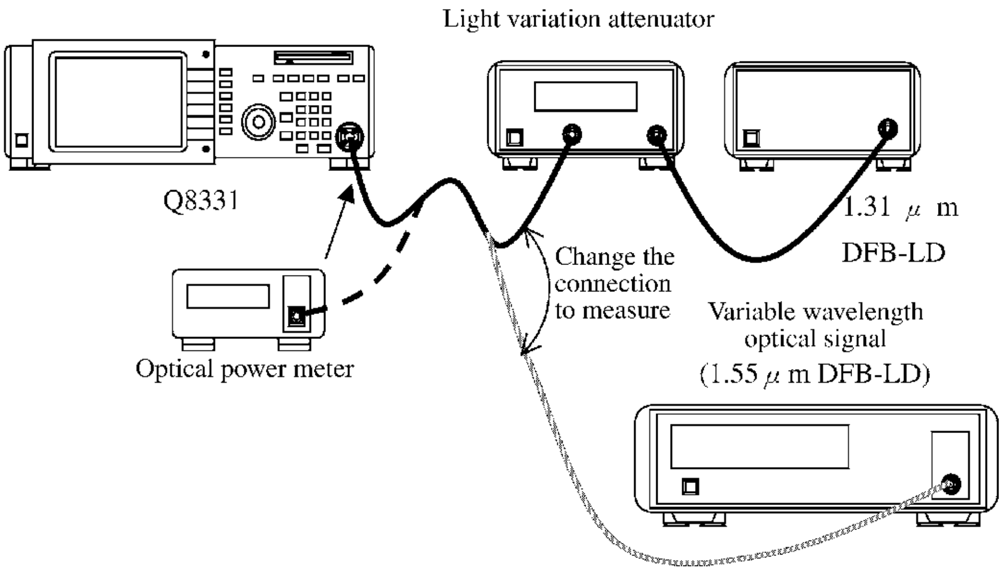


Figure 7-3 Level Accuracy Test Equipment Connection

3. Adjust the light attenuator to set the optical power meter display to -10 dBm. For the variable wavelength optical signal, adjust the output level.
4. Input the adjusted light to the Q8331.

Executing the measurement.

5. Press **MEASURE** and select ***SINGLE***.

   A measurement is taken and the result is displayed in the list.

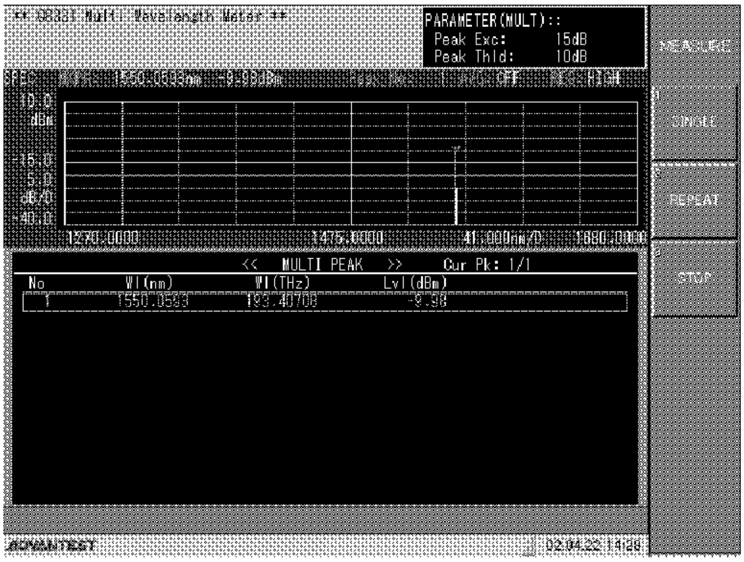


Figure 7-4 Level Accuracy Measurement(λ=1550 nm)

6. The peak level is scanned from the list and recorded in the performance test result sheet.

7.2.4 Input Sensitivity Test

To test the input sensitivity, 1.31 μm and 1.55 μm DFB-LD optical signals are used. Whether or not the Q8331 can take a measurement with its lowest sensitivity level is checked. For the equipments necessary for this test, see Table 7-1.

Initializing the setting conditions.

Set the unit to the initial conditions.

1. Press **SYSTEM** and select ***PRESET.***
   The initial setting condition is loaded.

Connecting the light generator.

Connect the optical signal to measure.

2. Connect the light generator, light variation attenuator, and optical power meter using a single mode optical fiber cable.

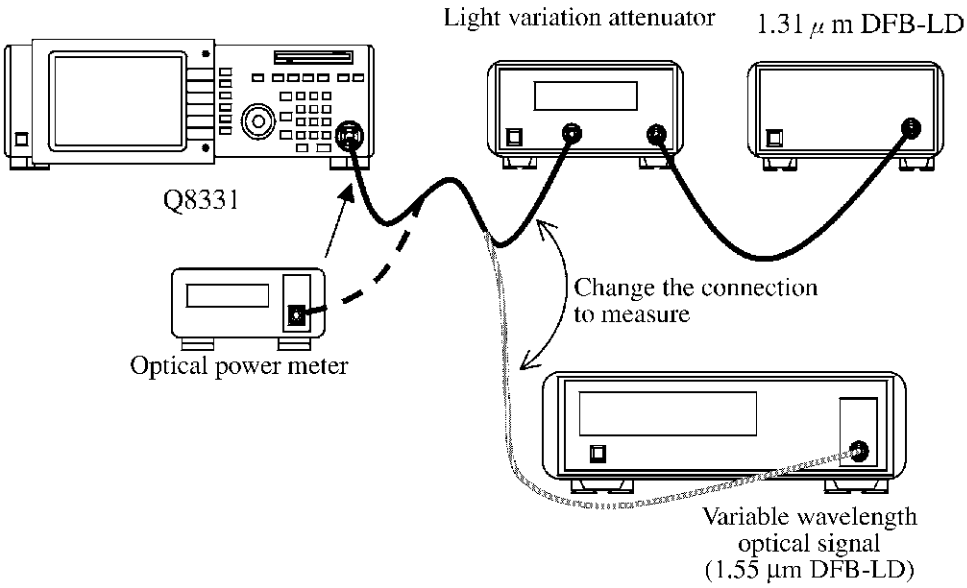


Figure 7-5 Input Sensitivity Level Check Test

3. Adjust the light attenuator to set the optical power meter display to -42 dBm.
4. Input the adjusted light to the Q8331.
5. Set the measurement conditions for easy input signal monitoring.

Executing the measurement.

6. Press **MEASURE** and select ***SINGLE.***

   A measurement is taken and the spectrum is displayed.

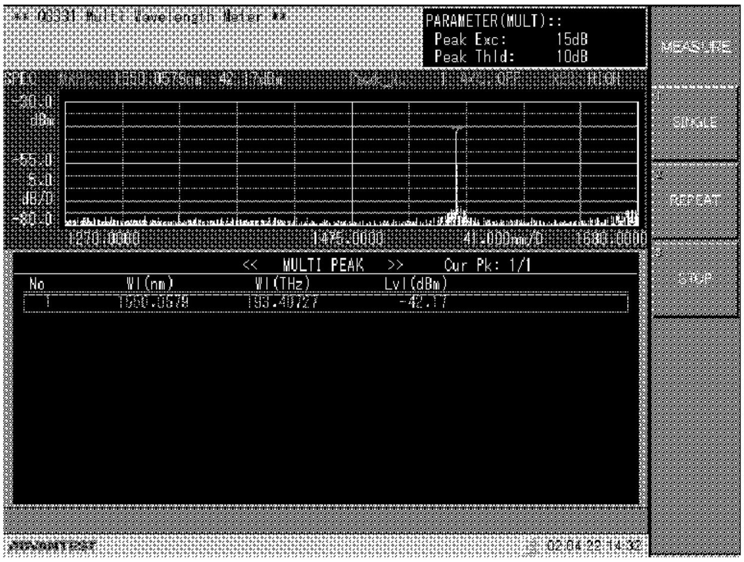


Figure 7-6 Input Sensitivity Level Measurement(1.55 μm)

7. Confirm that only the input signal is displayed in the list. Read the signal level from the measurement results and record it in the performance test result sheet.

7.2.5 Polarity Dependency Test

In this test, 1.31 μm and 1.55 μm DFB-LD optical signals are measured repeatedly as the polarized wave scrambler changes their polarity conditions continuously. The polarity dependency loss is measured from the level change caused during the process. For the equipments necessary for this test, see Table 7-1.

Initializing the setting conditions.

Set the unit to the initial conditions.

1. Press **SYSTEM** and select ***PRESET.***
   The initial setting condition is loaded.

Connecting the light generator.

Connect the optical signal to measure.

2. Connect the light generator, polarized wave scrambler, and optical power meter using a single mode optical fiber cable.

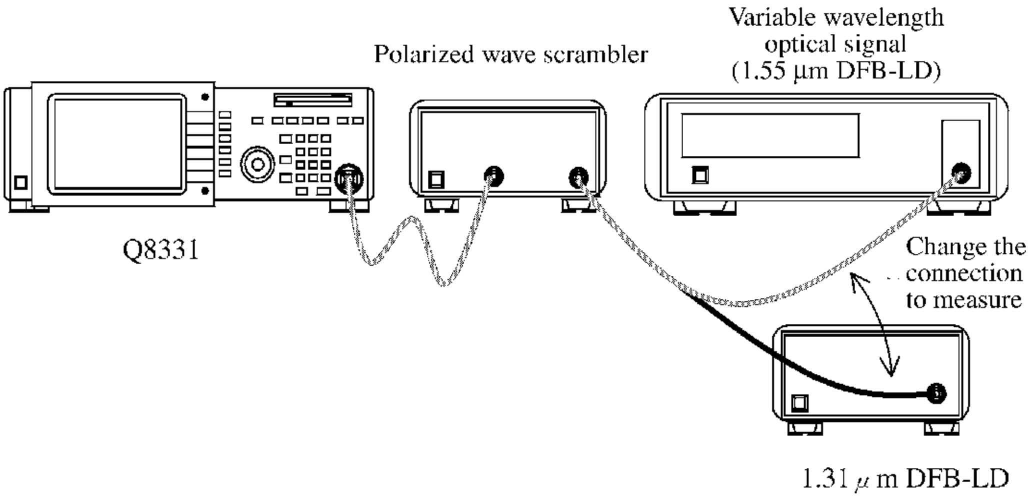


Figure 7-7 Polarity Dependency Test

The TREND function is used to measure the polarity dependency. For details on how to set up the TREND function, refer to 2.5.2.4, "Setting the Trend Parameter (PARAMETER)". The setting conditions are as follows.

Data type: Level
Measurement times: 70

Use initial values for other settings.

3. Activate the polarized wave scrambler.

NOTE: ***When using a polarized wave scrambler which can switch the modulation frequency, test with the low frequency mode.***

Executing the measurement.

4. Press **MEASURE** and select ***SINGLE***.

   A measurement is taken and the level time changes are displayed in a list and graph.

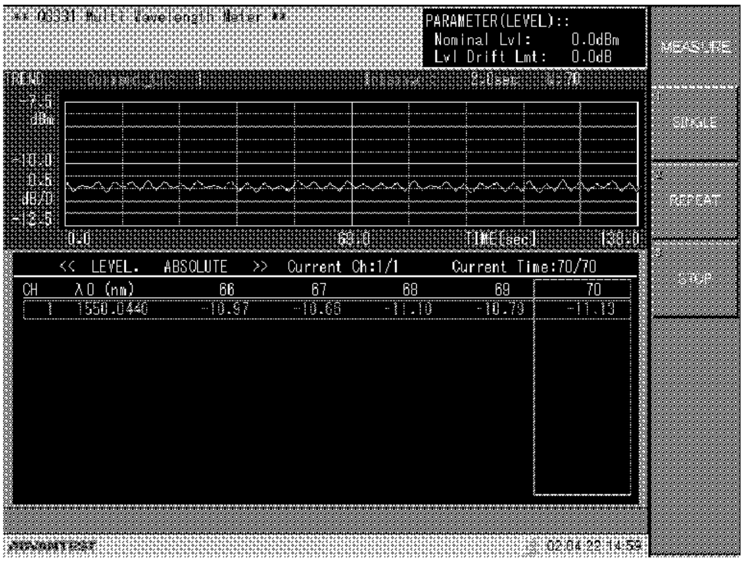


Figure 7-8 Polarity Dependency Loss Measurement

5. The level fluctuation is scanned from the list and recorded in the performance test result sheet.

7.2.6 Dynamic Range Test

For this test, a mono spectrum optical signal is input and the level difference between the signal and a neighboring noise which is generated by the signal is measured. For the equipments necessary for this test, see Table 7-1.

Initializing the setting conditions.

Set the unit to the initial conditions.

1. Press **SYSTEM** and select ***PRESET.***
   The initial setting condition is loaded.

Connecting the light generator.

Connect the optical signal to measure.

2. Connect the light generator and unit input using a single mode optical fiber cable.

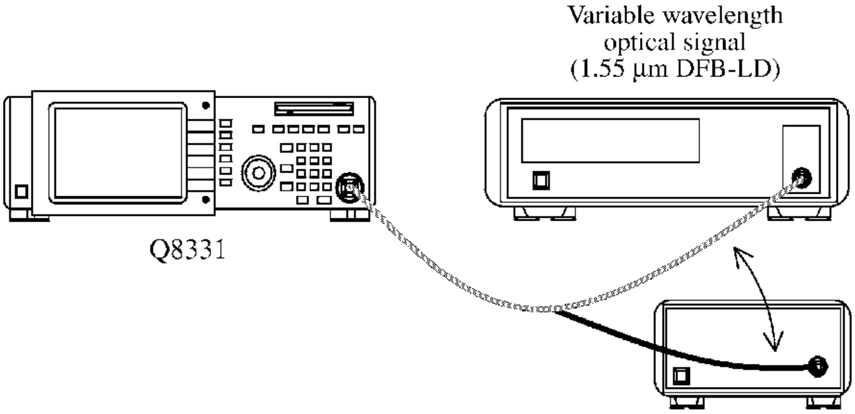


Figure 7-9 Dynamic Range Test

The LIST function is used to measure the dynamic range. For details on how to set up the LIST function, refer to 2.5.1.5, "Setting the List Parameter (PARAMETER)". The setting conditions are as follows.

List mode: SNR
Use initial values for all other settings.

3. Confirm that the light generator output level is set to -15 dm or higher.

Executing the measurement.

4. Press **MEASURE** and select ***SINGLE.***

   A measurement is taken and both the list and spectrum results are displayed.

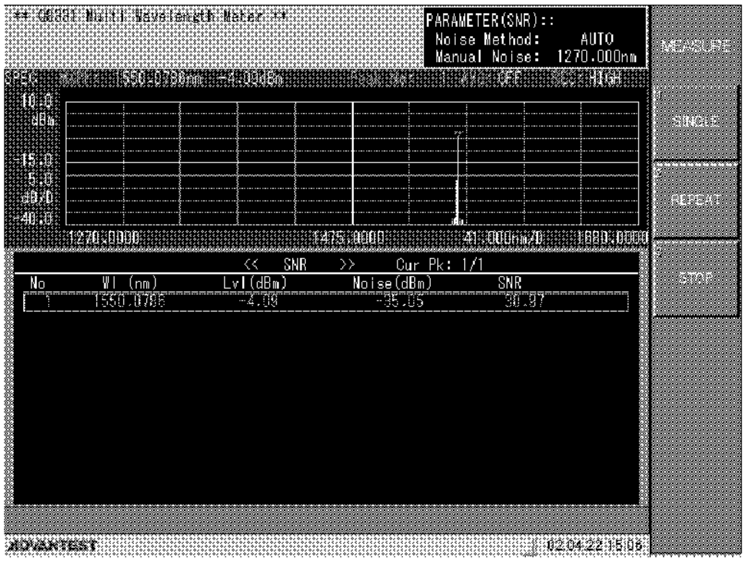


Figure 7-10 Dynamic Range Measurement

5. The SNR value is scanned from the list and recorded in the performance test result sheet.

7.3 Test Evaluations

The results recorded in the test evaluation sheet are compared with the upper and lower specification limits. If a comparison result of any performance test does not satisfy the specified performance conditions, calibration or repair is necessary for the Q8331. Contact he ADVANTEST Sales Office for a service.

7.3.1 Performance Test Result Sheet

Customer name			
Test date and time		Person in charge	

Product name	Q8331		
Serial No.		Firmware Rev.	
Ambient temperature	°C	Humidity	%

Remarks

Test equipments used	Model No	Calibration validity
Reference wavelength light generator		
DFB-LD (1.33 μm)		
DFB-LD (1.55 μm) or variable wavelength light generator		
Light variation attenuator		
Polarized wave scrambler		
Optical power meter		

Performance test results						
Measurement item	Optical signal wavelength	Test value	Lower limit specification	Measured value	Upper limit specification	Unit
Wavelength accuracy	1523.488 nm (vac)	1523.4876	1523.4861		1523.4891	[nm]
Level accuracy	1.31 μm	-10	-10.5		-9.5	[dBm]
	1.55 μm	-10	-10.5		-9.5	[dBm]
Input sensitivity	1.31 μm	-42			-40	[dBm]
	1.55 μm	-42			-40	[dBm]
Polarity Dependency	1.31 μm		-0.3	± *1	0.3	[dB]
	1.55 μm		-0.3	± *1	0.3	[dB]
Dynamic range	1.31 μm		35			[dB]
	1.55 μm		35			[dB]

*1: Finds ± values with maximum and minimum value centers as references.

8. SPECIFICATIONS

This chapter describes the Q8331 system performance.

Item		Specification
Wave-length	Measurement range	1270 nm to 1680 nm (178THz to 236THz)
	Accuracy	± 1 ppm (1.5pm@1550 nm)
	Separating resolution	10 GHz *1
	Display resolution	0.0001 nm
	Unit	nm (vac/air), THz
Level	Accuracy	± 0.5 dB (1310 nm, 1550 nm)
	Linearity	± 0.3 dB (-30 dBm or more, 1550 nm)
	Flatness	± 0.2 dB (1520 nm to 1600 nm)
	Sensitivity	-40 dBm (1270 nm to 1600 nm)
		-30 dBm (1600 nm to 1680 nm)
	Maximum input	+10 dBm (input line total)
	Polarity dependency	± 0.3 dB (1270 nm to 1600 nm)
	Display resolution	0.01 dB
	Unit	Log, Linear
Maximum input line number		300
Measurement time		0.5 s (time interval for consecutive measurements) *2
Signal to noise ratio		35 dB
Function	Memory function	3.5 inch 2HD built-in floppy disk
		Built-in hard disk (Preserves measurement data and settings)
	Display	LIST display, TREND display, waveform display, and cursor display
	Others	Automatic temperature and humidity adjustments
Optical input	Conforming fiber	9.5/125 μm SM fiber
	Reflection attenuation	35 dB
	Connectors (User replaceable)	FC (standard), ST, and SC (sold separately)

*1: For a high resolution. 20 GHz for a normal resolution.
*2: For a normal resolution. Approximately 1 s for a high resolution.

Item		Specification
Input and output	GPIB	Complied with IEEE.488.2
	Mouse	PS/2
	VGA output	D-SUB 15pin
	PARALLEL	D-SUB 25pin *3
	Ethernet	10 BASE-T
Display		6.5 inch color LCD display (640 × 480 dot)
General specifica-tions	Operating environment	+10°C to +40°C, relative humidity 85% or less (not to condense)
	Storing environment	-10°C to +50°C, relative humidity 90% or less (not to condense)
	Power supply	AC 100 to 120 V / 220 to 240 V, 50 / 60 Hz, 120 VA or below.
	External dimensions	Approximately 424 (W) × 132 (H) × 500 (D) mm
	Weight	17 kg or less

*3: The present Q8331 is not compatible with the interface function.

APPENDIX

A.1 Trouble Shooting

If a problem occurs with the system, check the items in the table below for possible causes and solutions before requesting assistance. If the problem is not resolved, contact the Advantest Sales Office or our service representative. The locations and telephone numbers are listed in the back of this manual. Fees apply for he servicing and repair of problems listed in the table.

Problem	Possible cause	Solution
The system does not turn ON.	The POWER switch is OFF.	Set the front panel **POWER** switch to ON.
	The Cable connection to the power supply is incomplete.	Turn the front panel **POWER** switch OFF and plug the connector cable into the AC power supply connector. Then, plug the connector cable into the power receptacle (refer to Section 1.6.1).
	Blown fuse	Check the power fuse (refer to Section 1.4.3). A blown fuse is caused by a system problem. Contact the ADVANTEST Sales Office for repair.
The ADVANTEST logo screen is not displayed when the system is turned ON.	There is a problem in the BIOS setting or system malfunction.	Contact the ADVANTEST Sales Office for repair.
Nothing appears after the ADVANTEST logo display.	The back up lithium battery life span has expired.	Contact the ADVANTEST Sales Office for servicing.
	A floppy disk was left in the disk drive.	Turn the system OFF and remove the floppy disk from the disk drive. Turn the system ON again.
An error message is displayed after the ADVANTEST logo and the system stop.	A floppy disk was left in the disk drive.	Turn the system OFF and remove the floppy disk from the disk drive. Turn the system ON again.
The start up screen is not displayed for more than 5 minutes after the system is turned ON.	There is a problem with the hard disk or Windows NT system file damage.	Contact the ADVANTEST Sales Office for repair.

Problem	Possible cause	Solution
The system and power-off procedure was performed correctly, but the system power does not turn OFF.	Windows was not closed correctly.	Wait 5 minutes and force the system to shut down by setting the **POWER** switch to OFF. Turn the system ON with the procedure in 1.6.2. If the system starts normally, turn OFF and ON the system again using correct procedures.
Panel buttons (keys) are not functionable.	GPIB remote control mode is set.	Stop all operating programs and press the LOCAL button.
Data cannot be read from a floppy disk.	There is a problem with the floppy disk.	Check the system performance using another floppy disk.
	There is a problem with the disk drive.	Contact the ADVANTEST Sales Office for a repair.
Data cannot be saved onto a floppy disk.	The disk is write-protected.	Write protect the floppy disk.
	The floppy disk is not formatted.	Format the floppy disk.
	There is insufficient space on the floppy disk.	Use another floppy disk.

A.2 SAVE Data Contents

The SAVE function in the Q8331 stores spectrum, list, trend, and setting conditions in separate files. The following files are saved.

Table A-1 Saved Files

Items to save	Extension	Save file name
Spectrum	csv	Setting file name .csv
List	csv	Setting file name L.csv
Trend	csv	Setting file name T.csv
Setting conditions	SAV	Setting file name .SAV

1. Spectrum data (.csv)

   The wavelength (frequency) and level in the display span wavelength (frequency) range are saved in the spectrum data file.

Table A-2 Spectrum Data Display Example

	0	**2533:4:1:107**	**2535:3:1:107**
Measurement data	1.5519619E-06	1.134E-04	
	1.5519765E-06	1.205E-04	
	1.5519910E-06	1.049E-04	
	1.5520055E-06	9.240E-05	
	1.5520200E-06	1.116E-04	
	1.5520345E-06	1.398E-05	
	1.5520490E-06	2.497E-04	

NOTE: ***The numeric value saved in the first data row is not measurement data. This numeric value is necessary when loading data. Do not delete the information if loading data is necessary. The data cannot be displayed without this information.***

2. List Data (L.csv)

   The data displayed in the list is saved in the list data file. The data saved may be different depending on the list mode set. Table A-3 describes the data saved by each mode in the order they are saved.

Table A-3 Data Saved by Each Mode

LIST Mode	1	2	3	4	5	6	7	8
MULTI PEAK	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	-	-	-	-
SNR	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	SNR (dB)	-	-	-
RELATIVE	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	Spacing (m/Hz)	Wl-Ref (m/Hz)	Lvl-Ref (dB)	-
DIFF CH	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	Pk Wl (m/Hz)	Diff Wl (m/Hz)	-	-
PASS/FAIL	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	P/F	Ref Wl (m/Hz)	Diff Wl (m/Hz)	Diff Lvl
BAND WIDTH	Wl (m)	Wl (Hz)	Lvl (dBm)	Noise (dBm)	λc/fc (m/Hz)	Δλ/Δf (m/Hz)	-	-

Table A-4 List Data Display Example

	0	**1522:4:1:4**	**1523:4:1:4**	**1519:3:1:4**	**1515:3:1:4**	**1529:3:1:4**
Measurement data	1.5521312E-06	1.9314892E+14	-6.532E+00	-4.565E+01	3.911E+01	
	1.5525167E-06	1.9310096E+14	-8.046E+00	-4.565E+01	3.760E+01	
	1.5529308-E06	1.9304947E+14	-6.993E+00	-4.138E+01	3.438E+01	
	1.5533256E-06	1.9300039E+14	-6.501E+00	-4.138E+01	3.488E+01	

NOTE:

1. ***The numeric value saved in the first data row is not a measurement data. This numeric value is necessary when loading the data. Do not delete the information if data loading is necessary. The data cannot be displayed without this information.***
2. ***In the PASS/FAIL mode, the reference level value (Ref Lvl), drift limit value of the wavelength and frequency (λ•Drift Limit), and drift limit value of the level (Lvl Drift Limit), those of which are used for the Pass/Fail evaluation, are saved at the end of the list data file.***

3. Trend data (T.csv)

   Measurement data (wavelength or frequency), LEVEL and SNR data are saved. This function is used to save only measurement data. The ABS, INIT, and NOMI calculation results are not saved. The number of saved measurement data items vary depending on the setting of the number of measurements (Measurement Times) and the number of measurements when the data is saved.

   When NOMI is selected, the reference data is saved to T_REF.csv.

Table A-5 Saved Trend Data

Example: When the number of peaks is 300, the number of Measurement Times is 20, and the number of measurements when the data is saved is 200:

The 181st λ or f of channel 1	The 181st LEVEL of channel 1	The 181st SNR of channel 1	The 181st λ or f of channel 2	The 181st LEVEL of channel 2	The 181st SNR of channel 2	..	The 181st λ or f of channel 300	The 181st LEVEL of channel 300	The 181st SNR of channel 300
The 182nd λ or f of channel 1	The 182nd LEVEL of channel 1	The 182nd SNR of channel 1	The 182nd λ or f of channel 2	The 182nd LEVEL of channel 2	The 182nd SNR of channel 2	..	The 182nd λ or f of channel 300	The 182nd LEVEL of channel 300	The 182nd SNR of channel 300
The 183rd λ or f of channel 1	The 183rd LEVEL of channel 1	The 183rd SNR of channel 1	The 183rd λ or f of channel 2	The 183rd LEVEL of channel 2	The 183rd SNR of channel 2	..	The 183rd λ or f of channel 300	The 183rd LEVEL of channel 300	The 183rd SNR of channel 300
:	:	:	:	:	:	:	:	:	:
The 200th λ or f of channel 1	The 200th LEVEL of channel 1	The 200th SNR of channel 1	The 200th λ or f of channel 2	The 200th LEVEL of channel 2	The 200th SNR of channel 2	..	The 200th λ or f of channel 300	The 200th LEVEL of channel 300	The 200th SNR of channel 300

Table A-6 Trend Data Display Example

Example: When the number of peaks is 300, the number of Measurement Times is 20, and the number of measurements when the data is saved is 200:

Number of measurements	0	1833:4:1:20	613:3:1:20	1533:3:1:20	..	2132:4:1:20	912:3:1:20	1832:3:1:20
		1.4814631E-06	-6.423E+00	3.925E+01	..	1.6255332E-06	-5.321E+00	4.325E+01
		1.4815226E-06	-6.325E+00	3.982E+01	..	1.6242369E-06	-5.553E+00	4.522E+01
		:	:	:		:	:	:
		1.4813518E-06	-6.281E+00	4.012E+01	..	1.6225432E-06	-5.364E+00	4.384E+01

Number of peaks

CAUTION:

1. ***The numeric value saved in the first data row is not a measurement data.***
2. ***If the actual number of measurements exceeds the set number of measurements (Measurement Times), the data from the previously measured data according to the setting numbers of measurements (Measurement Times) up to the last measured data is saved.***
3. ***The trend data cannot be loaded from the Q8331.***
4. ***If the data of measurement channels 86 CH and higher is opened in the spreadsheet software, the channel data is not displayed due to restrictions in the spreadsheet software.***

4. Setting Conditions (.SAV)

   The setting conditions are saved in this file. This file is necessary for reading data. If loading data is necessary, save this file with the data in the same directory.

   When reading data, the data file which has the same file name as the setting conditions file is read. When changing data file names, the corresponding setting condition file name must also be changed to the same name.

A.3 Files Saved by Using the Trend Data Logging Function

When the trend data logging function is selected and the number of measurements is twice the number set in the Measurement Times during the measurement, the measurement data is automatically saved as files in the D:\MyData\ directory.

This section describes the details about saved files.

1. File types and names.

   <When File Divide is set to ON.>

   - Measurement conditions files: The file is saved in a format such as Trend0001.SAV. (Only when the file is saved for the first time.)
   - When NOMI is selected, the reference data is saved to Trend0001_REF.csv. (Only when the file is saved for the first time.)
   - Data file: The file is automatically named in a format such as Trend0001_00D.csv. Maximum number of measurements

     File ID   Number of measurements

     00 → Measurement data from 1st to 100th measurements.
     01 → Measurement data from 101st to 200th measurements.
     02 → Measurement data from 201st to 300th measurements.
     03 → Measurement data from 301st to 400th measurements.
     04 → Measurement data from 401st to 500th measurements.
     :

   - When measurements are performed in REPEAT, measurement data from the 1st to 1000th measurement is saved. Any remaining measurement data is not saved.

   <When File Divide is set to OFF.>

   - Measurement condition files: The file is saved in a format such as Trend0001.sav. (Only when the file is saved for the first time.)
   - When NOMI is selected, the reference data is saved to Trend0001_REF.csv. (Only when the file is saved for the first time.)
   - Data file: The file is automatically named in a format such as Trend0001_00.csv.
   - When measurements are performed in REPEAT, data is saved when the measurement in one cycle (double the number of measurement set in the Measurement Times) is complete. The data is continuously saved in the same file.
   - A maximum of 500 Mbyte of data can be saved in one file. When saving data, which exceeds the memory size, save in separate incremented files by using the file ID and "_XX".

CAUTION: ***The maximum file ID is 9999. Files with an ID that exceeds that limit cannot be saved.***

2. Saved data file information

Measurement data of number of N measurements (wavelength or frequency) is saved. The LEVEL and SNR data can be saved as options.

This function is used to save only measurement data. The ABS, INIT, and NOMI calculation results are not saved. The number of measurement data saved depends on the setting regarding separating files.

Example: When saving all 300 peaks, λ•f, LEVEL, and SNR data.

The first λ or f of channel 1	The first LEVEL of channel 1	The first SNR of channel 1	The first λ or f of channel 2	The first LEVEL of channel 2	The first SNR of channel 2	..	The first λ or f of channel 300	The first LEVEL of channel 300	The first SNR of channel 300
The second λ or f of channel 1	The second LEVEL of channel 1	The second SNR of channel 1	The second λ or f of channel 2	The second LEVEL of channel 2	The second SNR of channel 2	..	The second λ or f of channel 300	The second LEVEL of channel 300	The second SNR of channel 300
The third λ or f of channel 1	The third LEVEL of channel 1	The third SNR of channel 1	The third λ or f of channel 2	The third LEVEL of channel 2	The third SNR of channel 2	..	The third λ or f of channel 300	The third LEVEL of channel 300	The third SNR of channel 300
:	:	:	:	:	:	:	:	:	:

<Reference data file information>

The number of channels is determined according to the number of peaks at the first measurement.

Reference λ•f of channel 1	Reference Level	Reference SNR
Reference λ•f of channel 2		
Reference λ•f of channel 3		
:		

CAUTION:

1. ***Unlike conventional save or load data, automatically saved data files of the trend measurement cannot be loaded by using the Q8331.***
2. ***If the data of measurement channels 257 CH and higher is opened in the spreadsheet software, the channel data is not displayed due to restrictions in the spreadsheet software. If either LEVEL or SNR is selected as an option, the data of 129 CH and higher is not displayed. If both LEVEL and SNR are selected, the data of 86 CH and higher is not displayed.***

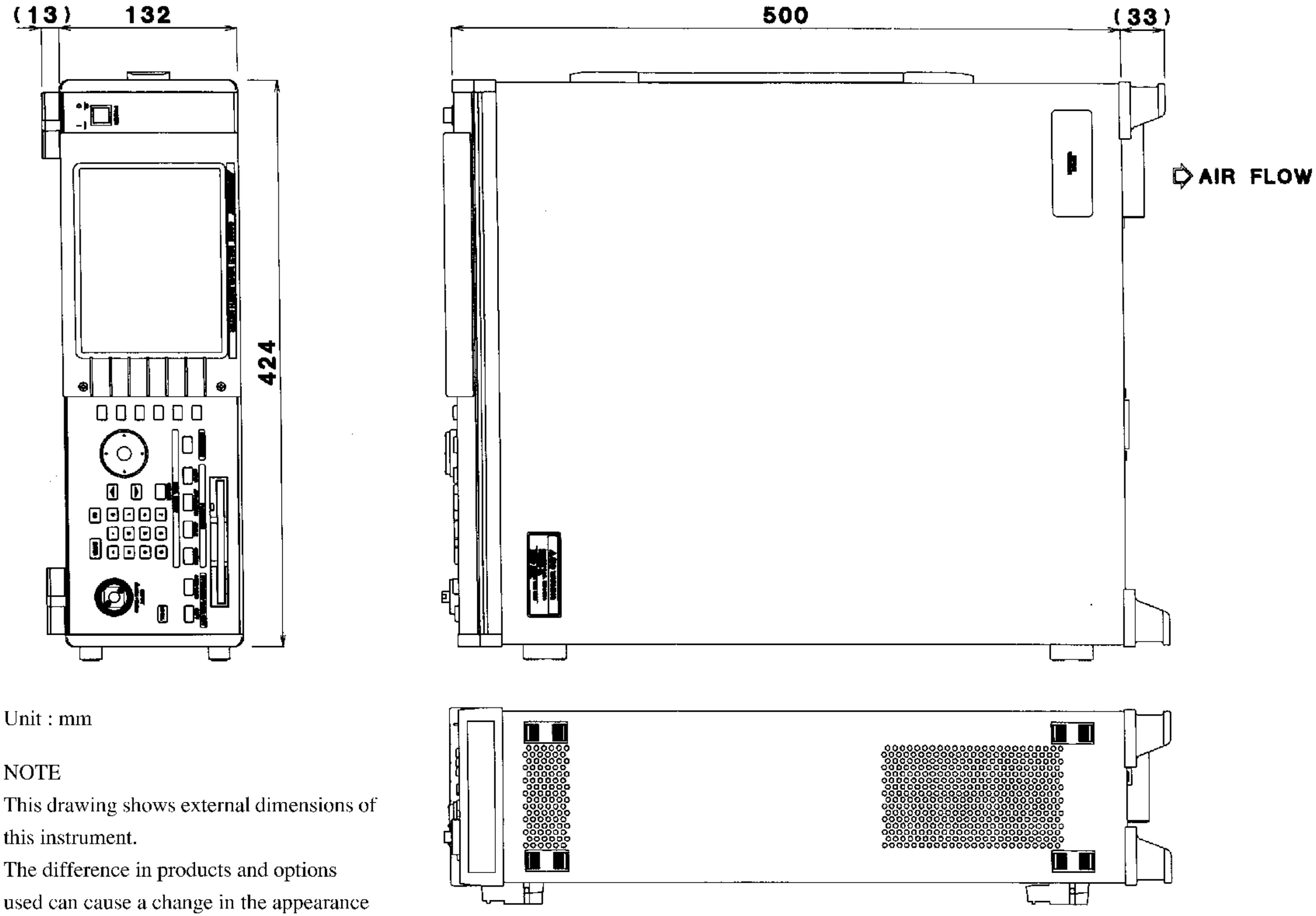
A.4 Error Message

This section describes error messages displayed by the Q8331.

CAUTION: ***If any message from error numbers 1000 to 1010, 1012 to 1015, and 1100 to 1104 are displayed, stop the measurement immediately and contact the Advantest Sales Office for service.***

Error number	Message	Description
1000	PCI communication problem	A self-test error (PCI communication disability) has occurred.
1001	FPGA/DRAM read check error	A self-test error (FPGA/DRAM breakdown) has occurred.
1002	PDC buffer RAM check error	A self-test error (PDC Buffer RAM trouble) has occurred.
1003	PDC data out check error	A self-test error (PDC breakdown) has occurred.
1004	EEPROM sum check error	A self-test error (EEPROM breakdown) has occurred.
1005	Sensor ADC check error	A self-test error (sensor ADC breakdown) has occurred.
1006	Pressure sensor check error	A self-test error (air pressure sensor breakdown) has occurred.
1007	Temperature sensor check error	A self-test error (interferometer internal temperature sensor breakdown) has occurred. The unit stops controlling the measurement.
1008	IFR temperature is too high. System goes down.	A self-test error (interferometer internal temperature rise) has occurred. The unit shuts down automatically.
1009	Motor initialized error	A self-test error (movable mirror trouble) has occurred.
1010	He-Ne level is too low.	A self-test error (He-Ne laser trouble) has occurred.
1011	He-Ne tube is cold. Allow the system to warm up before restart.	A self-test error (He-Ne laser) has occurred. Restart the unit after warming up.
1012	PDC end check error	A self-test error (malfunctioning due to the PDC breakdown) has occurred.
1013	Motor end check error	A self-test error (movable mirror malfunctioning) has occurred.
1014	PDC/Motor end timing check error	A self-test error (PDC/movable mirror motion timing error) has occurred.
1015	Motor speed check error	A self-test error (movable mirror motion speed error) has occurred.

Error number	Message	Description
1100	Error detected in motor driver	A movable mirror driver unit error has occurred.
1101	Motor position limit failed	A movable mirror motion error has occurred.
1102	DSM temperature is too high. System goes down.	An abnormal temperature rise has occurred in the vicinity of the CPU board and DSM board. The unit shuts down automatically.
1103	IFR temperature is too high. System goes down.	An abnormal temperature rise is detected in the interferometer. The unit shuts down automatically.
1104	The He-Ne laser level is too low. Execute the self test again.	The He-Ne laser level is too low. Execute the self test again.
1800	Overload	An overloaded signal input error has occurred.
2000	No measurement data to save	No measurement data is available. The input signal may be missing or the level is too low.
2001	Permission denied	Permission denied
2002	No such file or directory	A file or directory cannot be found.
2003	Disk is full.	The disk is full.
2004	Illegal data format	The data format is incorrect.
2005	Incorrect model name is listed in the file.	The model information in the file does not match with the unit. The file may be a save file of another product.
2006	Read/Write operation failed	A read or write file error has occurred.
2007	Measurement data was not loaded.	The waveform data or list data is unloadable.
2008	Illegal file name	The file name is not specified or inappropriate.
2009	Cannot delete this file or directory.	This file or directory cannot be deleted.
2010	Cannot overwrite with the same name.	Cannot be overwritten by a file with the same name.
2011	Too many files! Can't save any more.	The directory is full. No more files can be saved.
2100	Not allowed in TREND mode	Cannot be changed when the TREND measurement is set to ON.
2101	Cannot execute: peak not found	Cannot be executed. The AUTO SCALE function cannot be executed. The signal peak may not be detected.
2102	Cannot execute: self test error	Cannot be executed. An error has occurred in the self test.
2103	Cannot execute: load data	Cannot be executed. The data may be load data.



Unit : mm

NOTE
This drawing shows external dimensions of this instrument.
The difference in products and options used can cause a change in the appearance of the instrument.

DIMENSIONAL OUTLINE DRAWING

ALPHABETICAL INDEX

[Symbol]

[Numerics]

[A]

[B]

[C]

[D]

[R]

[S]

[T]

[U]

[W]

[X]

[Y]

Liability for the Spread of Computer Viruses

Customer acknowledges that Advantest Software may not operate properly on a computer system or in a computer network containing software viruses, worms, or other third-party computer code, files, or programs designed to interrupt, destroy, or limit the functionality of computer software, hardware, or networks. Customer further acknowledges that it bears sole responsibility for securing its computer systems, software, hardware, and networks from any such malicious third-party computer code. Advantest shall have no responsibility for, and hereby disclaims any liability arising from, any failures, errors, damage to data or systems, or any other losses caused by any such malicious third-party computer code.

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LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.

2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.

3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.

4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:

   (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest 's instructions;

   (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);

   (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

   (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;

   (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);

   (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

   (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or

   (h) any negligent act or omission of the Purchaser or any third party other than Advantest.

5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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