AQ6140
Multi-Wavelength Meter
Instruction Manual

ANDO ELECTRIC CO., LTD. JAPAN

AS-62527-1 Rev. 2.0

Introduction

Thank you for purchasing the AQ6140 wavelength meter. The AQ6140 has been developed as a measuring instrument compatible for the characteristic evaluation of WDM (wavelength divided multiplex) systems and Fabry-Perot laser multiplexing.
Always read through this manual before using the AQ6140 (hereinafter, device).
Always read through and comprehend the "Safety Precautions" given at the beginning of this manual before using this device.
Keep this manual near the device for future reference.

This manual

This manual describes the handling and maintenance of the AQ6140 wavelength meter (hereinafter, device).

- Always read the "Precautions" given before Chapter 1 before using this device.
- Read "Chapter 1 Outline" to find the features and functions of this device.
- First-time users of this device, should start from "Chapter 2 Preparing for Use".
- The basic functions are described in "Chapter 3 Explanation of Basic Functions".
- The menu configuration of this device is described in "Chapter 4 Menu Configuration".
- Operation examples for using this device are given in "Chapter 5 Operation Methods".
- Remote operation of this device is described in "Chapter 6 Remote Functions".
- Periodic inspection of this device is indispensable for maintaining the correct operation of this device. The periodic maintenance items and procedures, etc., are described in "Chapter 7 Maintenance".

Guarantee

- The gratuitous guarantee term is for one year after the date of purchase.
- Any accidents that occur during the guarantee term shall be repaired free of charge according to Ando Electric's assurance policy.
- Even during the guarantee term, Ando Electric shall not be liable for any accidents caused by incorrect operations or modifications made by the user, and for any accidents or damages caused by force de majeure.
- A Seal of Passing is enclosed with Ando Electric products to assure the product quality.
- Ando Electric products have been shipped after strict inspections based on Ando Electric's quality assurance system. However, if any accidents occur due to the manufacturing, or if any accidents occur due to the transportation, please contact the Service Department, Headquarter Main Sales Department, or your nearest branch or office.

☞ The Ando Electric Service Department and Headquarter Sales Department, and the list of branches and offices is given at the end of this manual.

Precautions regarding backup battery

- A lithium battery is used for this device's calendar and clock backup circuit.
- Even when this device is used correctly, the file time control may not be possible if the battery is consumed. Replace the battery after approx. seven years of use.
- The battery must be replaced by Ando Electric, so please contact Ando Electric (headquarters, branch, sales office).

Precautions for Safety and Handling

○ Always read this "Instruction Manual" and the "Precautions for Safety and Handling" before starting to ensure correct usage.
○ After reading, store this manual where it can be referred to easily.

Items to be observed to ensure correct and safe usage of this product, and to prevent injury to the operator or people in the area, and to prevent property damage are explained with the following illustrations. The displays and meanings are as follow.
Read the contents thoroughly before starting use.

◎The types of matters that must be observed are identified with the following illustrations and explained.

	This illustration indicates "Notice" matters that must be observed (including warnings and danger). (The actual precautions are indicated in the triangle.)
	This illustration indicates "Mandatory" matters that must be implemented. (The actual mandatory matter symbol is indicated in the●.)
	This illustration indicates "Prohibited" items that must not be carried out.

Example of illustration

⚠Warning
Indicates matters that could cause fatal accidents or severe injury if ignored and handling is mistaken.

⚠Caution
Indicates matters that could cause severe injury or physical damage if ignored and handling is mistaken.

	Indicates matters that could lead to smoke or fire if handling is mistaken.
	Indicates matters that could lead to electric shock if handling is mistaken.
	Indicates matters that could lead to injury if handling is mistaken.
	Indicates to always disconnect the power cable from the plug for safety purposes.
	Indicates unspecified general operator actions.

Precautions related to Working Environment and Conditions

Limitations to working environment

	Make sure that water does not enter or contact this device. →Failure to observe this could lead to fires, electric shocks or accidents. Always connect the grounding when using in highly humid areas.

Limitations to working conditions

	Do not use a voltage other than the indicated power voltage. →Failure to observe this could lead to fires, electric shocks or accidents.
	When connecting with a commercial power supply, directly connect to a dedicated socket. →Do not use an extension cord as there is a risk of heating and fires.

Precautions related to installation

Precautions for persons carrying out installation

	When installing on a product with casters (dolly, etc.), always lock the casters. →Failure to observe this could lead to injuries if product moves or tilts over.
	Do not use branched wiring when connecting the power supply. →Failure to observe this could lead to the cables heating and a fire starting.
	Securely insert the power plug into the socket. →Contact of metals, etc., against the power plug could lead to fire or electric shock.

Limitations and prohibited matters related to installation environment and conditions

	Do not install the device in areas with high levels of humidity or dust. →Failure to observe this could lead to electric shock or trouble.
	Do not place the device on an unstable place such as an unstable table or inclined surface. →Failure to observe this could lead to injuries if the product drops or tilts over.
	Do not install the device in places with high levels of vibration or impact. →Failure to observe this could lead to injuries if the product drops or tilts over.
	Do not insert or drop metal rods into the device from the openings. →Failure to observe this could lead to fires, electric shocks or accidents.
	Do not place the power cord near heating appliances. Failure to observe this could lead to the cord sheath tearing, fires and electric shocks.
	Always hold the plug when disconnecting the power plug. →Pulling on the power cord could damage the cord and lead to fires and electric shocks.
	Do not connect/disconnect the power plug with wet hands. →Failure to observe this could lead to electric shocks.
	Do not place the device in areas with high temperatures, such as in direct sunlight, or an automobile subject to direct sunlight. →Failure to observe this could cause the internal temperature to rise and trouble to occur.

Prohibited matters related to installation methods

	Before moving the device, always disconnect the power plug from the socket, and confirm that the external connection wires have been disconnected. →Failure to observe this could lead to cord damage, fires and electric shocks.
	Do not scratch, damage or treat the power cord. →Placing heavy items on the cord, heating the cord or pulling on the cord could damage the cord and lead to fires and electric shocks.
	Do not block this device's ventilation holes. →Blocking the ventilation holes could cause heat to build up inside and lead to fires.

Precautions related to handling

Follow the procedures given in the instruction manual when handling this device.
If there are warning marks ("Warning", "Caution"), always follow the instructions given in the instruction manual.

	Do not place a container containing fluids or small metallic items on or near this device. →If the fluids spill or the items enter the device, fires, electric shocks or trouble could occur.
	Do not treat, excessively bend, twist or pull on the power cord. →Failure to observe this could lead to fires or electric shocks.
	Do not disassemble or modify this device. →Failure to observe this could lead to fires, electric shocks or trouble.
	When not using this device for a long time, disconnect the power plug from the socket for safety purposes. →Failure to observe this could lead to fires, electric shocks or trouble caused by lightning.
	When closing the openings, take care not to pinch or injure fingers.
	Do not use this device at 0℃ or less. →The display operation cannot be guaranteed.
	Always turn the power OFF before connecting/disconnecting the connectors to and from this device. →Failure to observe this could lead to fires, electric shocks or trouble.

Precautions related to maintenance and inspection

Periodically service and inspect the device.
Consult your nearest Sales Office, listed at the back of this manual, if you have any questions.

	If dust accumulates inside this device and is not cleaned out, fires or trouble could occur.

Remedies for in case of trouble

	Contact Ando Electric to have the power cable replaced if damaged. →Use in the damaged state could lead to fires or electric shocks.
	If foreign matter enters the device, first turn OFF the power switch and disconnect the power plug from the socket. Then contact Ando Electric. →Use in this state could lead to fires or electric shocks.
	Using the device in an abnormal state, such as when smoke is apparent or there is a strange odor, could lead to fires, electric shock or trouble. If an abnormal state occurs, turn the power switch OFF immediately, and always disconnect the power plug from the socket. Confirm that the smoke has stopped, and then contact Ando Electric for repairs. The user must not carry out the repairs as a hazardous state could be created.
	If the device has been dropped or is damaged, turn OFF the power switch and disconnect the power plug from the socket. Then contact Ando Electric. →Use in this state could lead to fires or electric shocks.
	The user must not carry out repairs even if the device is faulty. →Failure to observe this could lead to electric shocks or injuries. Unauthorized repairs are not covered by the guarantee.。
	If the fan motor has heated up due to an increase in the temperature, turn OFF the power switch and disconnect the power plug from the socket. Then contact Ando Electric. →Use in this state could lead to fires or electric shocks.

Precautions for disposal

	Do not dispose of this product by incinerating it. →Failure to observe this could lead to explosions, fires and burns.
	The TFT color LCD panel of AQ6140 contains cold cathode fluorescent lamps. Please follow local ordinances or regulations for its disposal.

Safety of laser

The AQ6140 does not have an output laser aperture.

However, light less than 1nW escapes out of the mainframe.

A harmful radiation is not discharged into the human body by the AQ6140.

Laser Class : AQ6140 contains the laser of FDA LASER CLASS I (IEC Laser Class 1).

Contents

Chapter1
Outline

The outline of this device is described in this section.

1.1 Outline of device

The device has been developed as a measuring instrument compatible for the characteristic evaluation of WDM (wavelength divided multiplex) systems and Fabry-Perot laser multiplexing. The wavelength measurement range is 1270 to 1650nm, and up to 256 laser beams can be measured simultaneously.
The GP-IB and RS-232-C interfaces are provided as a standard allowing remote control.

1.2 Specifications

Applicable fiber	SM
Optical connector	FC
Wavelength range[1)]	1270 to 1650nm (182 to 236THz)
Wavelength accuracy	±2ppm (1550nm,1310nm;±0.003nm)
Minimum resolvable separation	10GHz or less (1550nm;80pm,equal powerline input)
Power accuracy	±0.5dB(1310/1550 ±30nm,typ.)
Level linearity	1270 to 1600nm;±0.3dB (input –30dBm or more)
Polarization depending loss	1270 to 1600nm;±0.5dB
	1600 to 1650nm;±1.0dB
Maximum number of line input	256
Minimum input level	1270 to 1600nm; -40dBm (1 line input)
	1600 to 1650nm; -30dBm (1 line input)
Maximum input level	+10dBm (total of all lines)
Safe max. input level	+18dBm (total of all lines)
Return loss	35dB(PC)
Dynamic range	35dB or more (noise band width: 0.1nm.input:-25dBm or more. spacing ≧100GHz
Measurement time[2)]	1.5 sec (typ.)
Display	6.5-inch color LCD (640×480 dots)
Interfaces	GP-IB,RS-232C,VGA,printer port(centronics),FDD
Power requirements	AC 100 to 120V/200 to 240V(Automatic selection), 50/60Hz(47 to 63Hz).150VA
Environmental conditions	Operation Temperature: 5 to 40℃, storage tenperature: -20 to +60℃, humidity: 80% RH or less (at 40℃)
Dimensions and mass	Approx. 425(W)×132.5(H)×450(D)mm. approx. 14kg
Accessories	Power cord:1, insutruction manual:1

1) 30 minutes after warming up. For lines that are separated by less than 30GHz, wavelength accuracy is reduced.

2) in REPEAT measurement

1.3 Configuration

As a standard, this device is configured of the main body and the accessories shown in the standard accessories list

Standard accessories list

Part name	Qty.	Remarks
Power cord	1 pc.	Approx. 3m
Instruction manual	1 copy	

Chapter2
Preparing for Use

The methods for unpacking and repacking the device, carrying out the acceptance inspection, and the general precautions are given in this chapter. Always read this chapter before starting to ensure correct use.

2.1 Unpacking and acceptance inspection

This device has undergone inspections before shipment from the factory, and the correct operation is guaranteed.
When the device arrives, unpack it immediately and check for any damage that may have occurred during transportation. When unpacking, take care not to damage the materials other than the outer paper, such as the interior cardboard box and cushioning material. Save these materials for future repacking.

Mechanical inspection

Check the appearance of the device, switch operations and connectors for any damage or faults that may have occurred during transportation. Check the types and quantities of accessories with the enclosed part list.

2.2 When damage or abnormality is found

If any damage is found on the device during the acceptance inspection or if any abnormality is found when using the device, notify Ando Electric (headquarters, sales office) of the details immediately.

2.3 Preparation and general precautions

Power voltage

Use a power supply with a voltage of 100 to 240VAC and power frequency within 48 to 63Hz. Prepare a cable with a rating voltage that satisfies the working voltage.

Power cable

The power cable is a 3-pin plug type, and the round pin at the center is the ground. Use a 3-pin socket when possible.

Fuse

When using with a power voltage of 100 to 120V/200 to 240V, use a 3.15A (quick action type) fuse.

Power voltage	Fuse
AC100 to 120V	F3.15A 250V
AC200 to 240V	

2.4 Safety measures for power system

This device will operate normally when connected to a 100 to 240VAC, 48 to 63Hz power supply. However, the following matters must be observed to prevent personal injuries from electric shock, damage inside the device caused by abnormal voltage, and trouble caused by the grounding current.

Power cord polarity

The 3-pole (grounding type 2-pole) power socket having a grounding E (Earth) terminal is connected to the voltage pole side wire L (Live Line), grounding side wire (Neutral) and protective grounding wire (grounding: Earth) as shown in Fig. 2-1. Thus the enclosed 3-core wire cord has been designed so that the wire polarity matches just by connecting the plug to a 3-pole (grounding type 2-pole) socket.

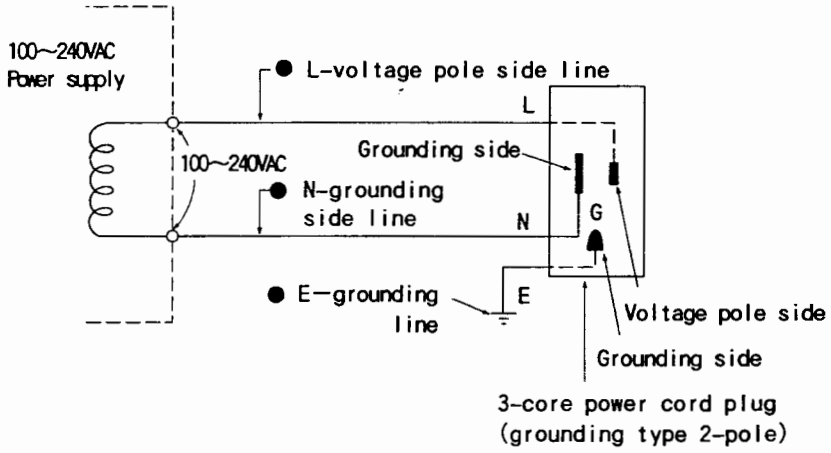


Fig. 2-1 3-core power cord plug and socket

Protective grounding

Grounding with 3-pole power socket

When the 3-pole (grounding type 2-pole) socket is used, the polarity of the 3-core power cord plugs and power supply will match. Thus, when this device's power cord is connected to the socket it is grounded to the ground.

Replacing the fuse

A "F3.15A 250V" fuse is mounted as a standard.

If the fuse needs to be replaced because of any trouble, pinpoint and remove the cause of the trouble, and then replace the fuse.

⚠WARNING

Before replacing the fuse, turn OFF the device's power switch, and disconnect the power plug from the socket. Replacing the fuse with the power ON could lead to personal injuries from electric shocks.

Before turning ON the power after replacing the fuse, carry out the protective grounding, and confirm that the AC power voltage is adequate. Then turn the power switch ON. Turning ON the power without protective grounding could lead to personal injuries from electric shocks. If the AC power voltage is inadequate, the inside of the device could be damaged by an abnormal voltage.

2.5 Precautions for storage

Precautions to be observed when storing this device for a long time are described below.

Precautions before storage

(1) Wipe off any dust, contamination (fingerprints) and stains, etc., on the device.

(2) Confirm that the device operates normally.

(3) Avoid storing the device for a long time in the following places:

- Where the device will be subject to direct sunlight, and where there are high levels of dust
- Highly humid places where water drops could adhere or form
- Places with active gases, or where the device could oxidize.
- Places with the following temperature and humidity levels

  Temperature: >60℃, <−20℃

  Humidity: >90%

Recommended storage places

In addition to satisfying the "Precautions before storage", it is recommended that the device be stored in the following environmental conditions when storing for a long time.

- Temperature 5 to 30℃
- Humidity 40～70%
- Where the daily temperature and humidity fluctuation is low.

When reusing the device after storage, check the operation and confirm that the device operates normally.

2.6 Repacking and transportation

The methods for repacking and transporting the device for transportation or repairs are explained in this section.

Repacking

Use the packing materials provided with the initial shipment. If those packing material has been lost or damaged; pack the device with the following method.

(1) Prepare a box with 10 to 15cm or more of space larger than the outline dimensions of this device.

(2) Place protective cushions on the projecting sections of the device's front panel and back panel.

(3) Wrap the device in vinyl, etc.

(4) Fill the clearance between the device and box with cushioning material to prevent shock such as vibration.

(5) Securely fix the outside of the box with adhesive tape or packing bands, etc.

Refe rence Reusing the packing material initially delivered will make repacking simple, so save the packing material.

Transportation

Avoid vibration, and satisfy the "Recommended packing" conditions when transporting the device.

Chapter3

Explanation of Functions

3.1 Names and functions of panels

The names and explanations of this device's panels are shown in Fig. 3-1 and 3-2.

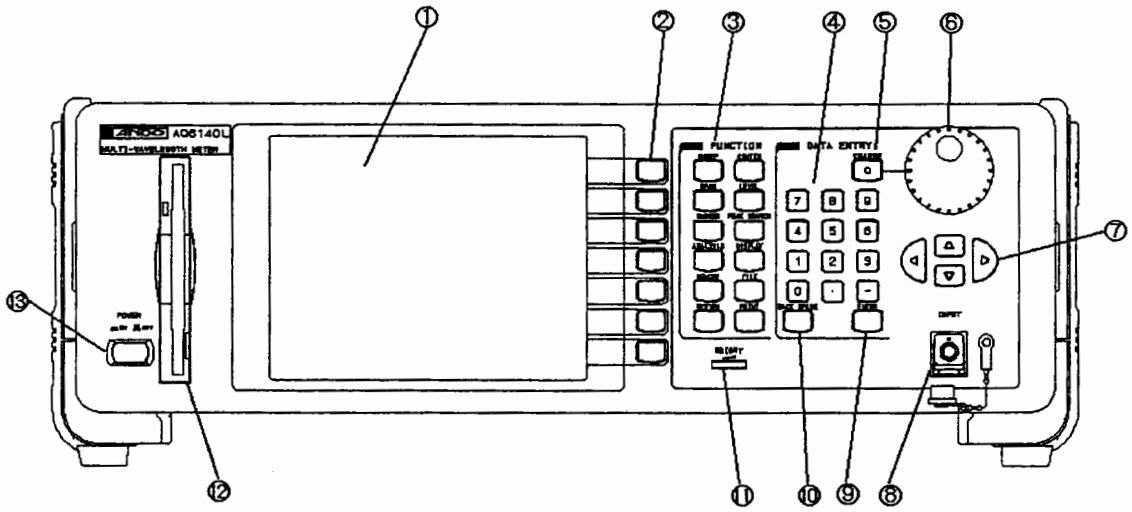


Fig. 3-1 AQ6140 wavelength meter (front view)

① LCD display	:The measured waveform, measurement conditions and measured values, etc., are displayed.
② Soft keys	:These keys are used to select the functions shown on the display. The function display will change according to the details selected with the function keys.
③ FUNCTION keys	:These keys are used to select twelve menu items. When a menu is selected, the details of the menu will appear on the LCD display.
④ 10 keys (numeric keys)	:Input the various parameter values using the twelve keys 0 to 9, ., and -.
⑤ COARSE (Course) key	:When this key is pressed, the increment/decrement width of the value will change.
⑥ Rotary encoder	:The value of each parameter will increment or decrement when the knob is turned to the left or right.
⑦ Cursor keys	:The value digit and parameter are changed with the up/down/left/right arrow keys.
⑧ Optic connector	:The optical fiber cable to be measured is connected to this connector.
⑨ ENTER key	:The value changed with the rotary encoder or numeric keys is set with this key.
⑩ BACK SPACE key	:The input value will be deleted when this key is pressed.
⑪ BRIGHT key	:This is the potentiometer for adjusting the LCD display's brightness. The display will become brighter when turned to the right, and will become darker when turned to the left.
⑫ FD (Floppy Disk) drive	:This is a 3.5-inch, 2HD type floppy disk drive. Insert a floppy disk when writing or reading the measurement data.
⑬ POWER switch	:This is the power switch. Always check the power cable, etc., before turning ON the power supply to avoid accidents, etc.

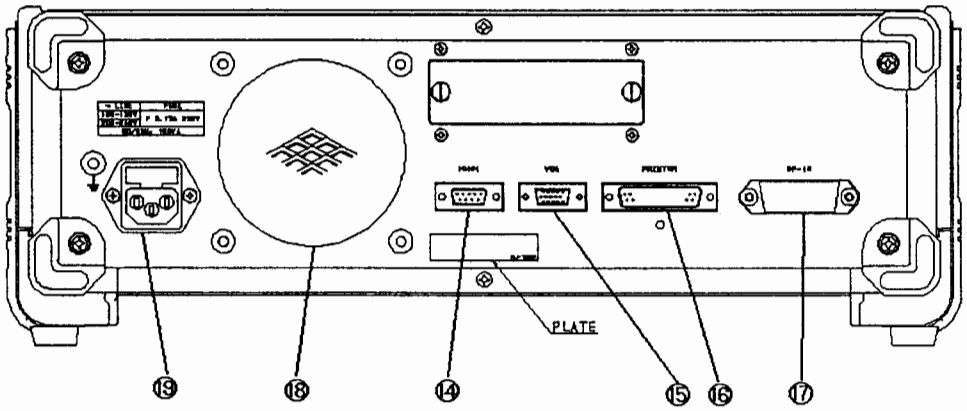


Fig. 3-2 AQ6140 wavelength meter (rear view)

⑭ SIRIAL port connector (Serial)	:This is the connector for the serial connector.
⑮ VGA connector	:This is the connector for the display connection.
⑯ PRINTER connector	:This is the connector for the printer connection.
⑰ GP-IB connector	:This is the connector for the GP-IB cable.
⑱ Fan	:This is the device's heat dissipation fan. Do not block the holes.
⑲ AC power connector	:This is the connector for connecting the enclosed dedicated power cord.

3.2 Turning the power ON and OFF

Preparing to turn the power ON

Check the following items before inserting the device's power cord into the power socket.

(1) Confirm that the power switch (POWER) is OFF.

(2) Confirm that the power socket's voltage matches the device specification power voltage.

(3) Always ground the grounding terminal on the rear panel or the power cord grounding terminal to avoid electrical shock.

⚠ Note

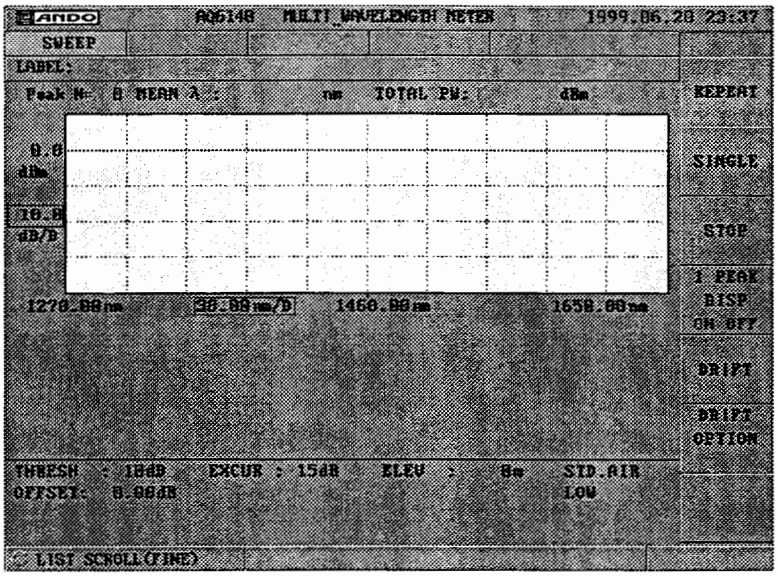
Before replacing the fuse, always turn the power switch OFF, and disconnect the power cord from the power socket. Then, replace the fuse.

Avoid use in places with great vibration, high levels of humidity or dust, places subject to direct sunlight or active gases, or inclined places where the device could tilt over.

(4) Connecting with other devices
Before connecting a printer, CRT display, RS-232-C or GP-IB device to this device, turn the OFF power switches for this device and the device to be connected, and check the wiring. Connecting devices with the power ON could damage the device.

Turning the power ON

Press the "POWER" switch to turn the power ON.
This device automatically checks the internal memory and initializes the device. The screen will appear when these are completed.
Turn the power switch for the external device ON after the screen appears.



⚠CAUTION

After the power switch is turned ON, if the waveform display screen does not appear on the LCD display even after two minutes have passed, turn the power switch OFF, and contact Ando Electric (headquarters, sales office, branch office).

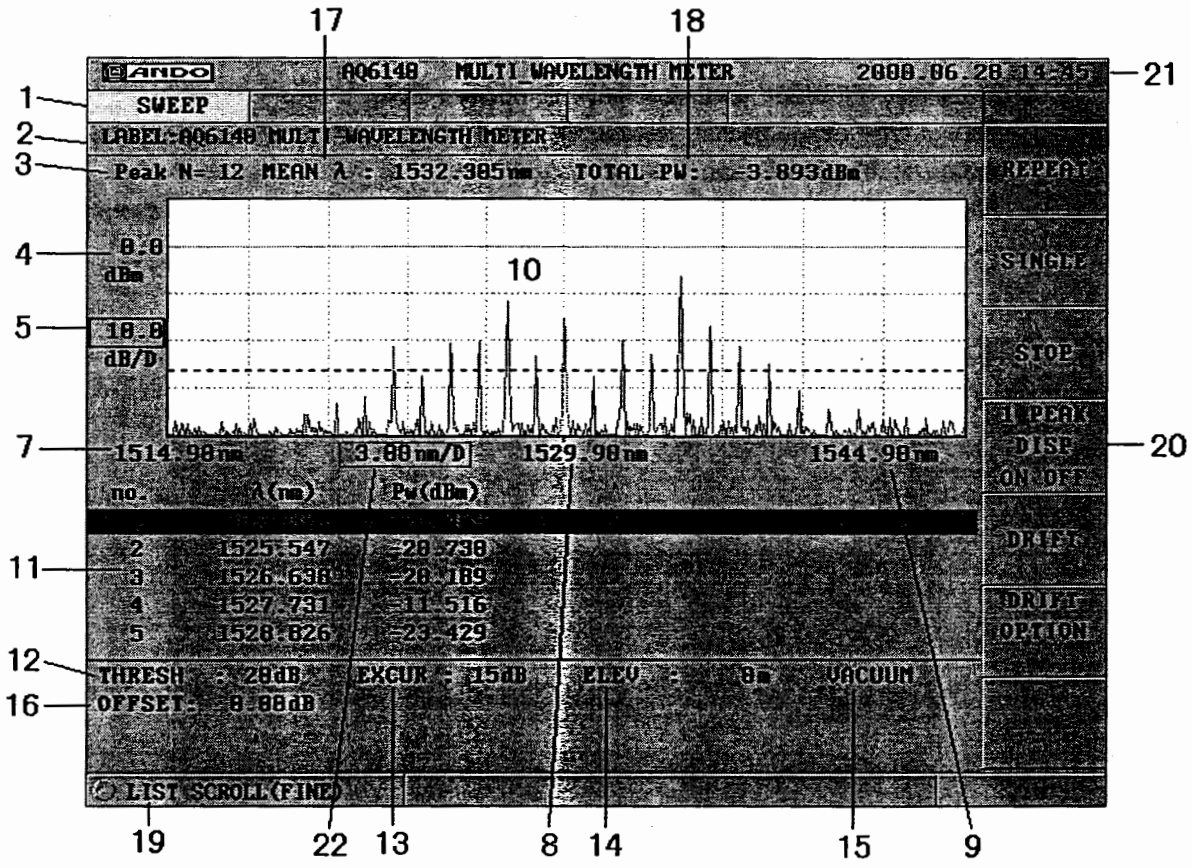
Refe rence The measurement conditions and selection status of the soft keys are saved in an involute memory, so the state when the power was turned OFF previously will appear when the power is turned ON.

Turning the power OFF

Turn OFF the "POWER" switch, and then turn the power switch for the external device OFF.
Disconnect the optical fiber cable connected tho this device's optical connector, and attach a cap. Disconnect this device's power cord from the power socket.

3.3 Explanation of screen displays

The names and explanation of this device's screen are shown in Fig. 3-3.



① Function	:The currently selected function is displayed.
② Label	:A label having up to 36 characters is displayed.
③ No. of waveforms	:The peak No. of waveforms is displayed.
④ Reference level	:The reference level value for the vertical axis is displayed.
⑤ Vertical axis scale	:The value per scale on the vertical axis is displayed.
⑥ ———	
⑦ Starting wavelength	:The starting wavelength value is displayed.
⑧ Center wavelength	:The center wavelength value is displayed.
⑨ Ending wavelength	:The ending wavelength value is displayed.
⑩ Wavelength display screen	:The measured waveform, marker and cursor, etc., are displayed.
⑪ Peak table	:The peak table of the measured waveforms is displayed.
⑫ Peak threshold	:The peak search threshold is displayed.
⑬ Peak crest/root difference	:The peak search crest/root difference is displayed.
⑭ Altitude value	:The altitude value is displayed.
⑮ Medium	:The medium (air: STD AIR/vacuum: VACUUM) is displayed.

⑯ Measurement speed :The measurement speed (LOW, MIDDLE, HIGH) is displayed.

⑰ Power offset :The power offset value is displayed.

⑱ Average wavelength :The average wavelength of the peak table wavelengths is displayed.

⑲ Total power :The total power of the peak table power is displayed.

⑳ Encoder function :The functions that the rotary encoder can currently execute are displayed.

㉑ Soft key :The soft key functions are displayed. The function will differ according to the selected function.

㉒ Date and time :The current date and time are displayed.

㉓ Horizontal scale :The value of the horizontal scale is displayed.

3.4 Basic operations

The basic operations of this device are explained in this section.

Function operations

The function is changed with the function key.

When the function is changed, the functions corresponding to the changed function key will appear on the screen.

Soft key operation

The functions that can be used with the current function are displayed on the right side of the screen.
The function is changed with the soft keys at the side of the function display.
When the soft key is pressed, the current selected display will change to "red", and the display that is not selected will change to "dark gray". The displays will be reversed when the soft key is pressed again.

Changing the parameters

Depending on the function and the soft key function, the color of the input target value at the top of the screen will change. The value with the changed color can be changed.
The parameters can be input with the numeric keys, rotary encoder or cursor keys.

1 Inputting with the numeric keys

(1) Input the value with the numeric keys, and set the value by pressing the [ENTER] key.

2 Inputting with the rotary encoder

(1) When the rotary encoder knob is turned clockwise, the value will increment, and when turned counterclockwise, will decrement. If the "COARSE" key is ON (when the lamp is lit), the value increment/decrement width will increase when the knob is turned.

3 Inputting with the cursor keys

(1) The digit of the input target parameter can be changed with the "←" and "→" (left/right) cursor keys. The value can be incremented and decremented with the "↑" and "↓" (up/down) cursor keys. This is the same operation as the rotary encoder.

Chapter4

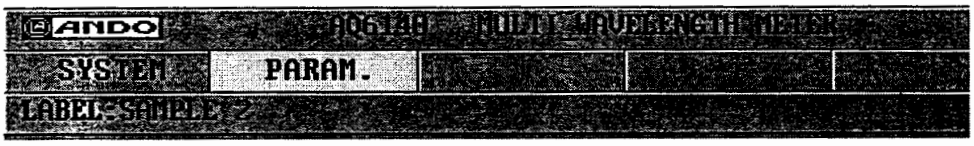
Menu Configuration

This device's functions have the following menu configuration.

Function name	Details	Reference secti
SWEEP	Sweep	4.1
CENTER	Center waveform (horizontal axis)	4.2
SPAN	Sweep span (horizontal axis)	4.3
LEVEL	Level (vertical axis)	4.4
MARKER	Marker	4.5
PEAK SEARCH	Peak search	4.6
ANALYSIS	Analysis	4.7
DISPLAY	Display	4.8
MEMORY	Memory	4.9
FILE	File	4.10
SYSTEM	System	4.11
PRINT	Print	

The soft key functions assigned to each function are displayed on the LCD screen and explained.
The soft key functions of some functions are hierarchical.
Refer to this chapter if there are any questions about the currently displayed screen.

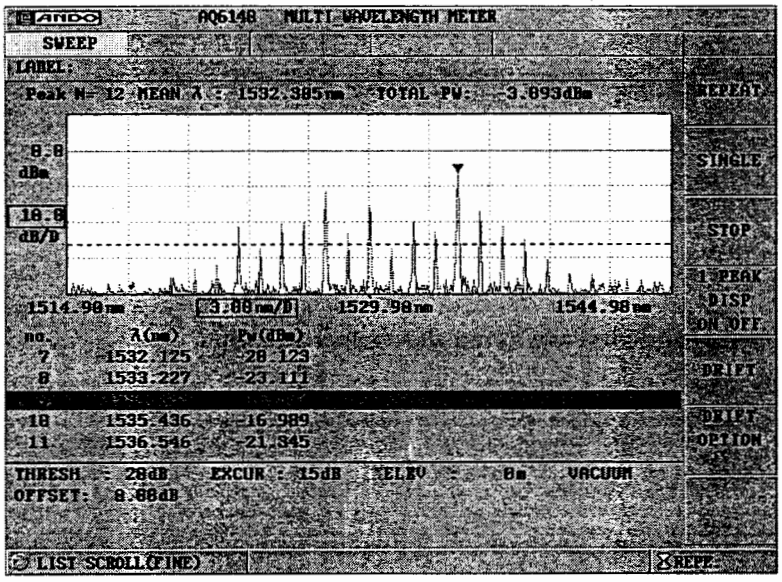
The hierarchy of the menu is displayed at the position shown in the figure below.



4.1 SWEEP

This screen is used to carry out sweeping.

1.SWEEP
- REPEAT
- SINGLE
- STOP
- 1 PEAK DISP ON OFF
- DRIFT
  - DRIFT MODE ON OFF
  - DRIFT REF SET
  - Δ MAX MIN MAX-MIN
  - REPEAT INTERVAL
  - DRIFT TIMES
  - RETURN
- DRIFT OPTION
  - TRAP Δ λ ON OFF
  - TRAP DRIFT ON OFF
  - TRAP Δ Pw ON OFF
  - RETURN



REPEAT

The sweep is repeated.
Press the "REPEAT" key to execute the repeat sweep.

To stop the sweep execution, press the "STOP" key.

SINGLE

A single sweep is carried out from the left side to right side of the screen.

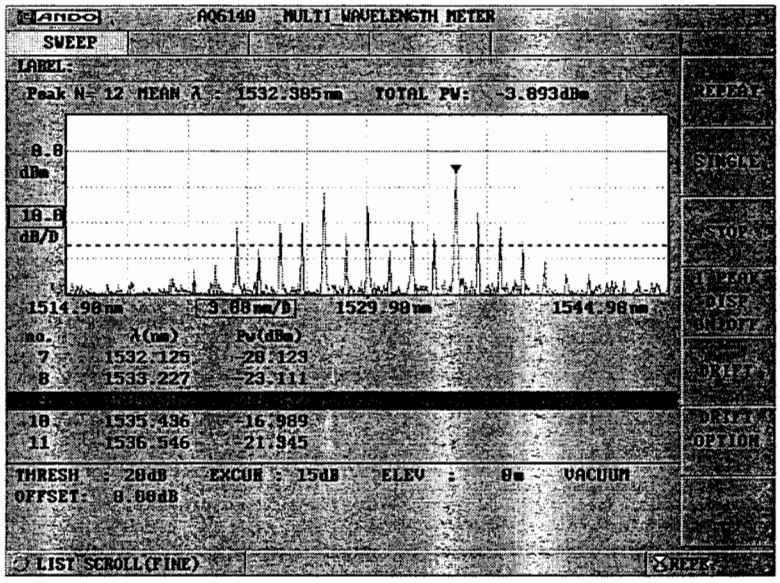
Note that the measurement cannot be stopped midway.

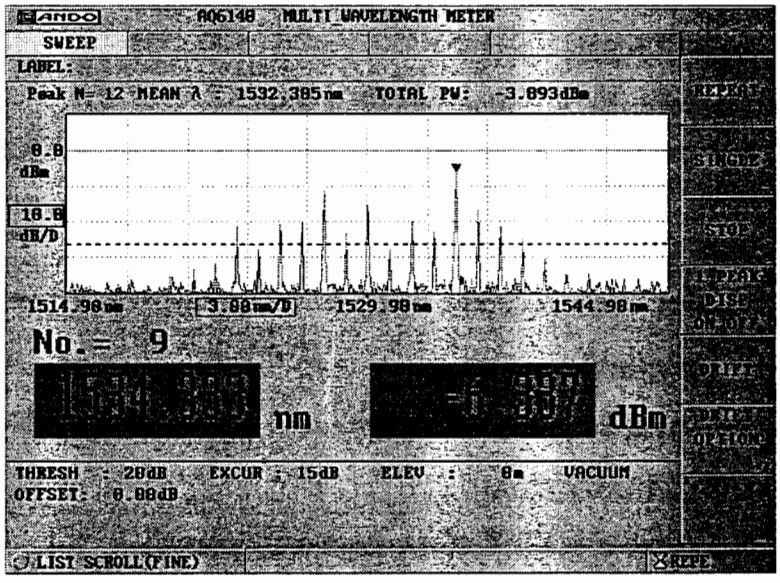
STOP

When executing repeated sweeping, the sweep will stop.

1 PEAK DISP ON／OFF

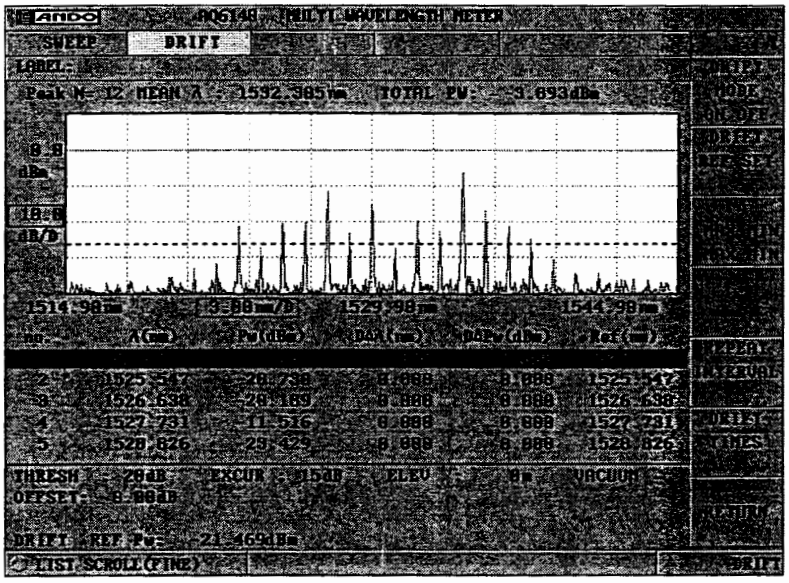
The cursor line in the peak table will be enlarged and displayed.
The current cursor line will be enlarged and displayed at "1 PEAK DISP ON".





DRIFT

This key is used to set the drift measurement. The following screen will appear when this key is pressed.



1. DRIFT MODE ON OFF

This turns the drift function ON or OFF.

Turn the drift measurement function ON, and press SINGLE or REPEAT to start the drift measurement.

2. DRIFT REF SET

This sets the current measurement value to the drift reference value.

3. Δ MAX MIN MAX-MIN

Used to select a DRIFT display format.(Δ,MAX,MIN,MAX-MIN)

4. REPEAT INTERVAL

Used to select a REPEAT measurement interval.

Setting range: FAST,2sec to 999min59sec
Default value: FAST

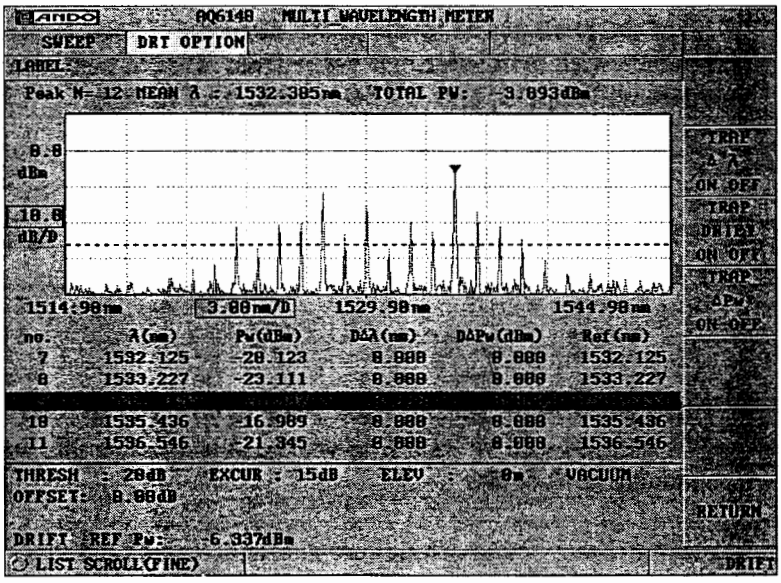
5. DRIFT TIMES

Used to select a DRIFT measurement times.

Setting range: 0(Endless),10 to 3000
Default value: 0(Endless)

DRIFT OPTION

This key is used to set the drift options. The following screen will appear when this key is pressed.



1. TRAP Δ λ ON OFF

This turns the trap function1 ON or OFF. When set to ON, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

If the peak interval of one or more peaks in all of the peaks exceeds $m, a message will appear, and the measurement will stop.

2. TRAP DRIFT ON OFF

This turns the trap function2 ON or OFF. When set to ON, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Of all of the peak wavelengths λ , if the deviation of one or more peak wavelengths (difference with drift reference value from start of measurement) exceeds Δ λ , a message will appear, and the measurement will stop.

3. TRAP ΔPw ON OFF

This turns the trap function3 ON or OFF. When set to ON, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Of all of the peak power levels, if the deviation of one or more power level (difference with drift reference value from start of measurement) exceeds ΔW, a message will appear, and the measurement will stop.

The original soft key menu will appear when the "RETURN" soft key is pressed.

If a peak exists beyond the allowable range of the trap function, measurement is stopped and "#" marking will be displayed at the right side of the peak No. in the peak table.

4.2 CENTER

This screen is used to set the center wavelength. The display unit will change according to the selected mode (wavelength, frequency, Wave number). The screen for the wavelength mode is shown below.

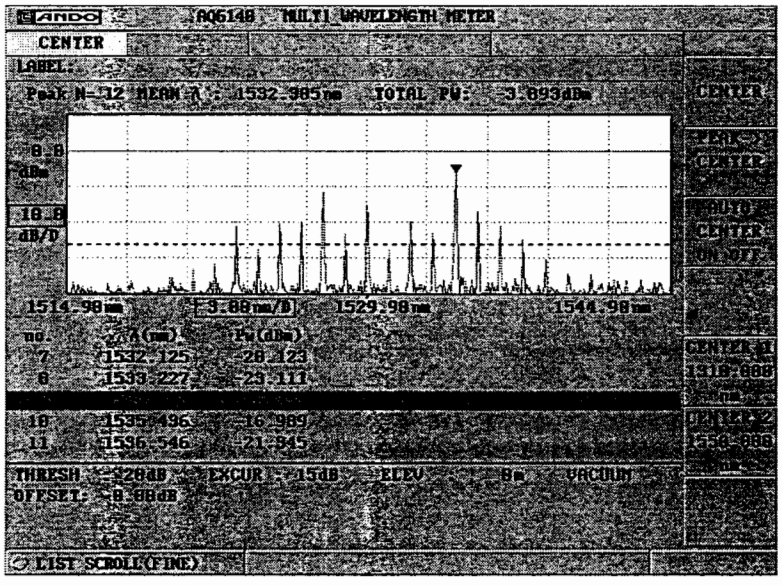
2.CENTER

[Wavelength mode]
- CENTER
- PEAK→CENTER
- AUTO CENTER ON OFF
- CENTER 1 ****.***<nm>
- CENTER 2 ****.***<nm>

[Frequency mode]
- CENTER THz
- PEAK→CENTER
- AUTO CENTER ON OFF
- CENTER 1 ***.****<THz>
- CENTER 2 ***.****<THz>

[Wavenumber mode]
- CENTER cm^{-1}
- PEAK→CENTER
- AUTO CENTER ON OFF
- CENTER 1 ****<cm^{-1}>
- CENTER 2 ****<cm^{-1}>

The display unit will change according to the selected mode.
All contents are the same.



CENTER

The center wavelength is set. When this key is pressed, the current setting value will appear in the window. Input the setting value with the rotary knob or numeric keys.

Parameter range:

For wavelength mode ····· 1270.3 to 1649.7nm (0.1nm step)

For frequency mode ····· 181.71 to 236.04THz (0.01THz step)

For cm-1 (Wave number) mode ··· 6063 to 7872cm-1 (1 step)

PEAK→CENTER

The peak wavelength is searched for and the peak wavelength is set for the center wavelength. When this key is pressed, the set value will appear in the window. The setting can be changed with the rotary knob or numeric keys.

AUTO CENTER ON OFF

Set whether to turn the PEAK ∃ CENTER function ON or OFF for each sweep. If latched, when the sweep ends, the peak wavelength will be searched for, and the peak wavelength will be set for the center wavelength.

CENTER 1 ****.***nm

The displayed setting value will be set as center wavelength 1.
The set value will appear in the window.

CENTER 2 ****.***nm

The displayed setting value will be set as center wavelength 2.
The set value will appear in the window.

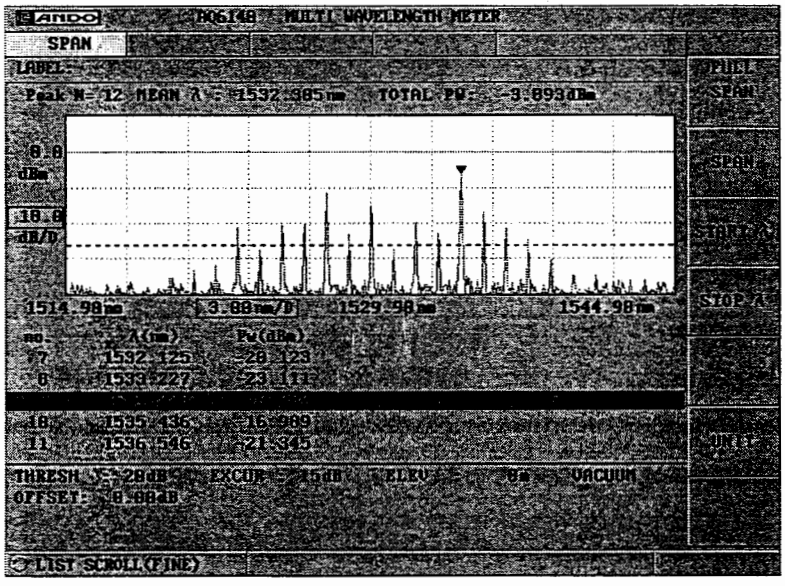
4.3 SPAN

This screen is used to set the horizontal axis' sweep span.

3.SPAN

- [Wavelength mode]
  - FULL SPAN
  - SPAN
  - START λ
  - STOP λ
  - UNIT
- [Frequency mode]
  - FULL SPAN
  - SPAN
  - START THz
  - STOP THz
  - UNIT
- [Wavenumber mode]
  - FULL SPAN
  - SPAN
  - START cm^{-1}
  - STOP cm^{-1}
  - UNIT

The display unit will change according to the selected mode.
All contents are the same.



FULL SPAN

The sweep span is set to the 1270 to 1650nm (for wavelength mode) full range.

Parameter range:

For wavelength mode ····· 1270.0 to 1650.0nm

For frequency mode ····· 181.68 to 236.07THz

For cm-1 (Wave number) mode ··· 6060 to 7875cm-1

SPAN

The speed span is set. When this soft key is pressed, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Parameter range:

For wavelength mode ····· 0.5 to 380.0nm (0.1nm step)

For frequency mode ····· 0.05 to 54.39THz (0.01THz step)

For cm-1 (Wave number) mode ··· 5 to 1815cm-1 (1 step)

START

The measurement starting frequency is set. When this soft key is pressed, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Parameter range:

For wavelength mode ····· 1270.0 to 1649.5nm (0.1nm step)

For frequency mode ····· 181.68 to 236.02THz (0.01THz step)

For cm-1 (Wave number) mode ··· 6060 to 7870cm-1 (1 step)

STOP

The measurement end frequency is set. When this soft key is pressed, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Parameter range:

For wavelength mode ····· 1270.5 to 1650.0nm (0.1nm step)

For frequency mode ····· 181.73 to 236.07THz (0.01THz step)

For cm-1 (Wave number) mode ····· 6065 to 7875cm-1 (1 step)

UNIT

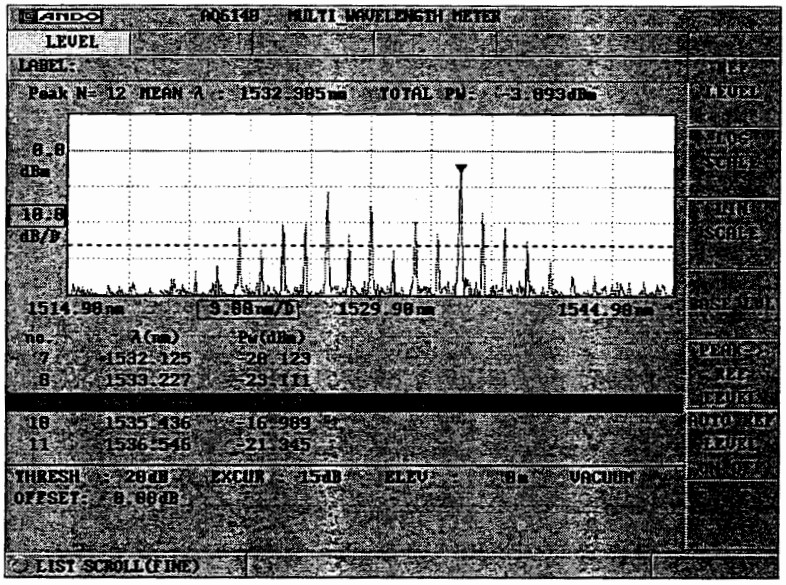
The X axis unit is selected.

The "nm", "THz" and "cm-1" windows will appear, so select the required units.

4.4 LEVEL

This screen is used to set the reference level of the vertical axis, etc.

4.LEVEL
- REF LEVEL
- LOG SCALE
- LIN SCALE
- BASE LVL
- PEAK→REF LEVEL
- AUTO REF LEVEL ON OFF



REF LEVEL

The reference level of the vertical axis is set.
After the setting is changed, the waveform will be redrawn. When this soft key is pressed, the current setting value will appear in the window. Change the setting value with the rotary knob or numeric keys.

Parameter range:

LOG SCALE ····· −40.0 to 20.0dBm (0.1nm step)

LIN SCALE ····· 0.001 to 100.000mW (0.01THz step)

LOG SCALE

The level axis scale is set in LOG SCALE. The current setting value will appear in the window. After the setting is changed, the waveform will be redrawn. Change the setting value with the rotary knob or numeric keys.

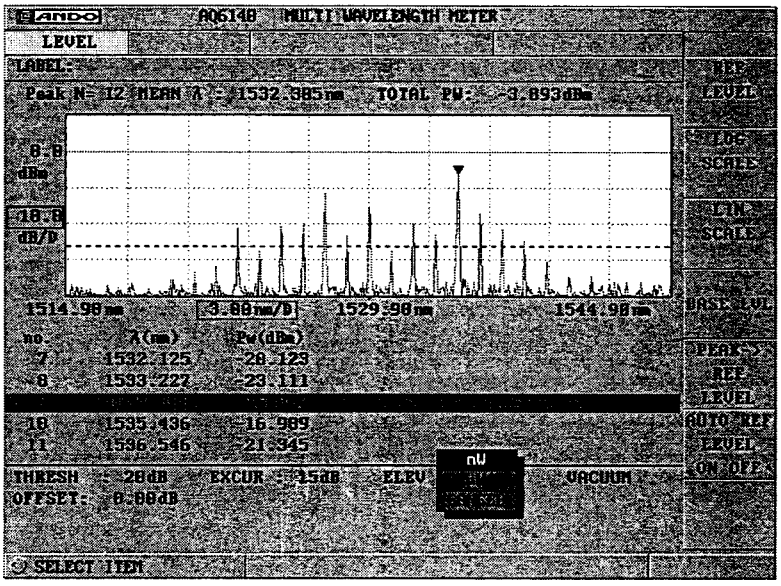
Parameter range:

LINEAR ····· 0.1 to 10.0dB/DIV (0.1nm step)

LIN SCALE

The level axis scale is set in LIN SCALE.

Used to select mW or uW for the unit.



Only the LOG SCALE or LIN SCALE can be selected.

BASE LVL

When the level axis scale is the LIN SCALE, the lower end value of the level scale is set. Note that this cannot be set for the LOG SCALE.
(The upper limit is REF level×0.9)

Parameter range: ·····0.001 to 100.000mW (0.001 step)

PEAK→REF LEVEL

The peak level is searched for, and the obtained value is set as the reference level. The waveform is then redrawn.
When this soft key is pressed, the set value will appear in the window. The setting value can be changed with the rotary knob or numeric keys.

AUTO REF LEVEL ON OFF

Set whether to turn the PEAK→REFLEVEL function ON or OFF for each sweep. If latched, when the sweep ends, the peak level will be searched for, and the peak level will be set for the reference level.

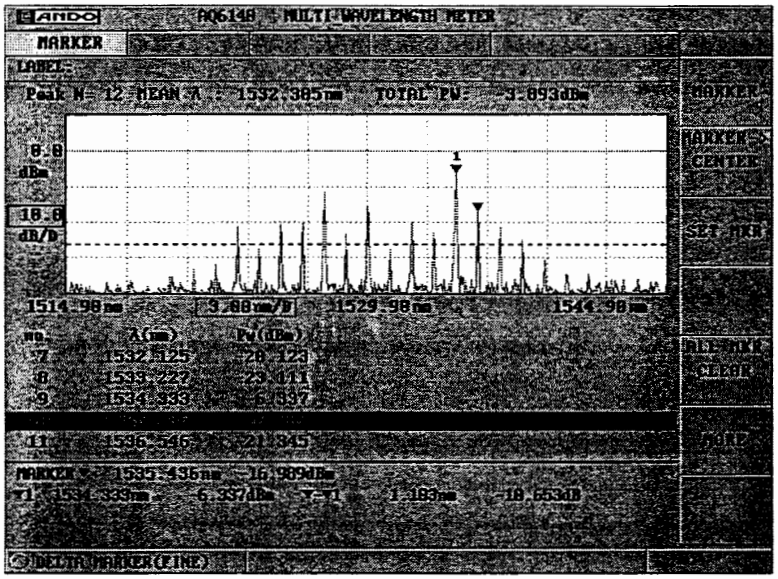
4.5 MARKER

The marker is valid for the active trace.

5.MARKER
- MARKER
- MARKER CENTER
- SET MKR
- ALL MKR CLEAR
- MORE
  - LINE MARKER 1
  - LINE MARKER 2
  - LINE MARKER 3
  - LINE MARKER 4
  - LINE MKR CLEAR
  - MKR L1-L2→SPAN
  - RETURN

MARKER

If there is no movement marker, this will appear above the peak wavelength waveform, and the marker value will appear in the data area.
When this soft key is pressed, the movement marker can be moved with the rotary knob.



MARKER→CENTER

The wavelength of the movement marker is set at the center wavelength, and the waveform is redrawn. After execution, the movement marker will move to above the waveform at the center of the screen.
When this soft key is pressed, the set value will appear in the window. The setting value can be changed with the rotary knob or numeric keys.

SET MKR

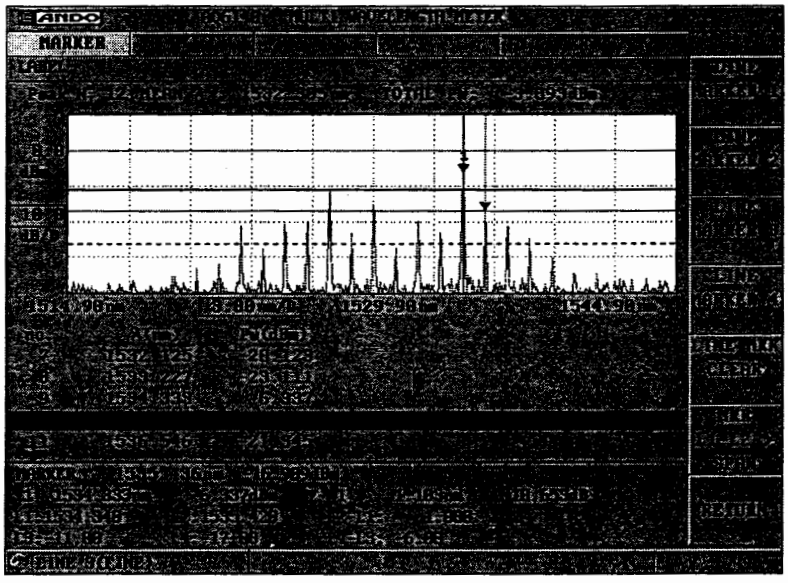
The movement marker is set as a fixed marker. The marker value will appear in the data area.
Even after fixing, the movement marker can be moved with the rotary knob.

ALL MKR CLEAR

When this soft key is pressed, the movement marker and fixed mark and line marker will be erased, and the marker values in the data area will be erased.

MORE

The remaining soft key menus will appear.



1. LINE MARKER 1

When the wavelength marker 1 is not displayed on the screen, it will appear at a position one-quarter from the left edge of the screen. When this soft key is pressed, the marker can be moved with the rotary knob.

2. LINE MARKER 2

When the wavelength marker 2 is not displayed on the screen, it will appear at a position one-quarter from the right edge of the screen. When this soft key is pressed, the marker can be moved with the rotary knob.

3. LINE MARKER 3

When the wavelength marker 3 is not displayed on the screen, it will appear at a position one-quarter from the top edge of the screen. When this soft key is pressed, the marker can be moved with the rotary knob.

4. LINE MARKER 4

When the wavelength marker 4 is not displayed on the screen, it will appear at a position one-quarter from the bottom edge of the screen. When this soft key is pressed, the marker can be moved with the rotary knob.

5. LINE MKR CLEAR

All of the line markers and line marker values displayed on the screen will be erased.

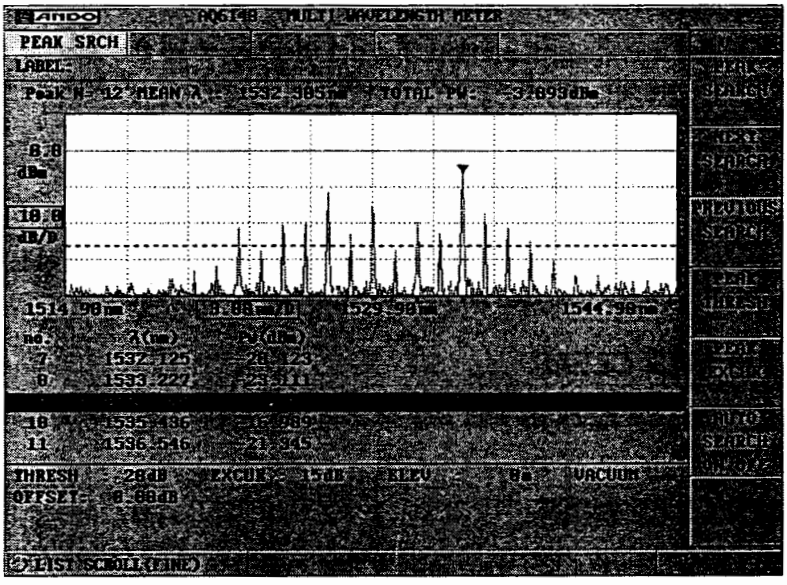
6. MKR L1-L2 SPAN

The span between the wavelength line markers 1 and 2 is set as the sweep span. When this soft key is pressed, the set value will appear in the window. The value can be changed with the rotary knob or numeric keys.

4.6 PEAK SEARCH

Peak search is valid for the active trace.

6.PEAK SEARCH
- PEAK SEARCH
- NEXT SEARCH
- PREVIOUS SEARCH
- PEAK THRESH
- PEAK EXCUR
- AUTO SEARCH ON OFF



PEAK SEARCH

The peak search is executed and the movement marker is set. The marker value appears in the data area. If the peak level exceeds the screen's upper edge or lower edge, the movement marker will appear at the upper or lower edge, but the marker value will be the correct value.

NEXT SEARCH

When this soft key is pressed, the movement marker will be set at the peak following the position where the movement marker is set. Note that the marker will not move if there is no next peak.

PREVIOUS SEARCH

When this soft key is pressed, the movement marker will be set at the peak before the position where the movement marker is set. Note that the marker will not move if there is no previous peak.

PEAK THRESH

The threshold for the peak search is set.

When this soft key is pressed, a window will appear. Input the threshold with the rotary knob or numeric keys.

Parameter range: 0 to 40dB (1 step)

Default value: 10dB

The threshold level is indicated with a solid dotted line.

PEAK EXCUR

The crest/root difference for the peak search is set.

When this soft key is pressed, a window will appear. Input the crest/root difference with the rotary knob or numeric keys.

Parameter range: 1 to 30dB (1 step)

Default value: 15dB

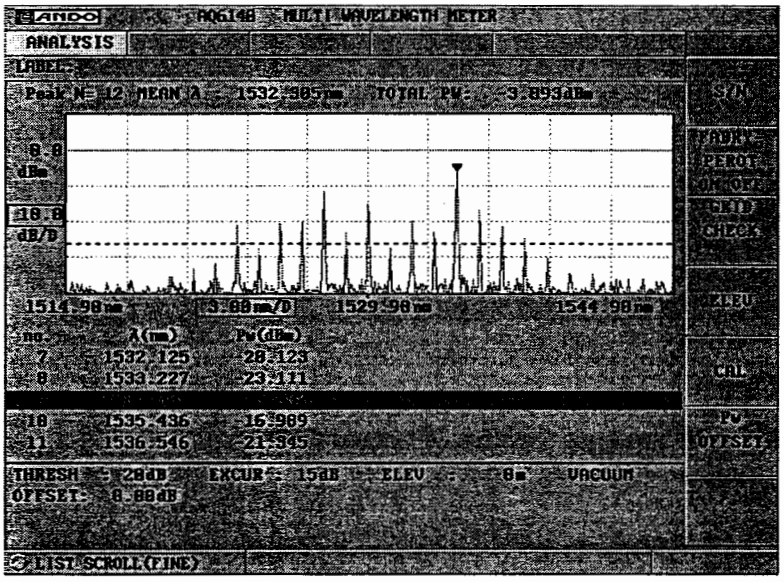
AUTO SEARCH ON OFF

Set whether to turn the peak search function ON or OFF for each sweep. If set to ON and latched, when the sweep ends, the peak will be automatically searched for, and the movement marker will be set.

4.7 ANALYSIS

Analysis is valid for the active trace. When this key is pressed, the latched algorithm will be executed.

7.ANALYSIS
- S/N
  - S/N OFF
  - S/N AUTO
  - S/N USER*
  - S/N AVG
  - AVG TIMES
- FABRY-PEROT ON OFF
- ELEV
- CAL
- Pw OFFSET

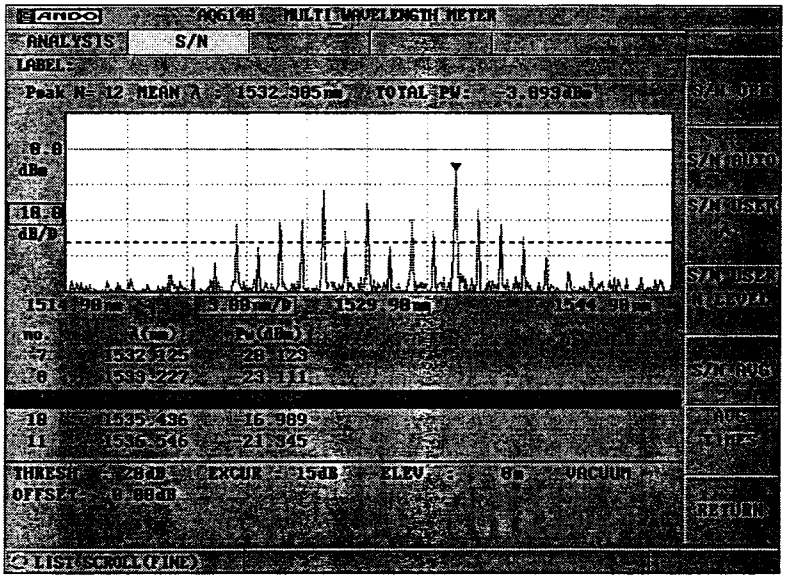


Reference

* indicates the "λ", "THz" or "cm-1" unit.

S/N

The S/N ratio is analyzed. When this soft key is pressed, the following window will appear.



1. S/N OFF

The S/N ratio analysis function is turned OFF.

2. S/N AUTO

The S/N ratio analysis is obtained with automatic interpolation.

3. S/N USER *

The S/N ratio analysis is obtained with the user-input wavelength.
Signal-Noise ratio is requested according to the noise level of the input wavelength.
When this soft key is pressed, a window will appear. Set the user-input waveform (****.***nm, ****.****THz or ****cm-1) with the rotary knob or numeric keys.

Reference

** indicates the "λ", "THz" or "cm-1" unit.

4. S/N USER N LEVEL

S/N ratio is determined based on the user input noise power volume.
You can select the user input noise power volume from the rotary knob or numerical keypad.

Parameter range: -40 to -99dBm

5. AVG TIMES

The No. of averages is set with the rotary knob or numeric keys.

6. AVG TIMES

The No. of averages is set with the rotary knob or numeric keys.

This is valid when the S/N AVG is selected.

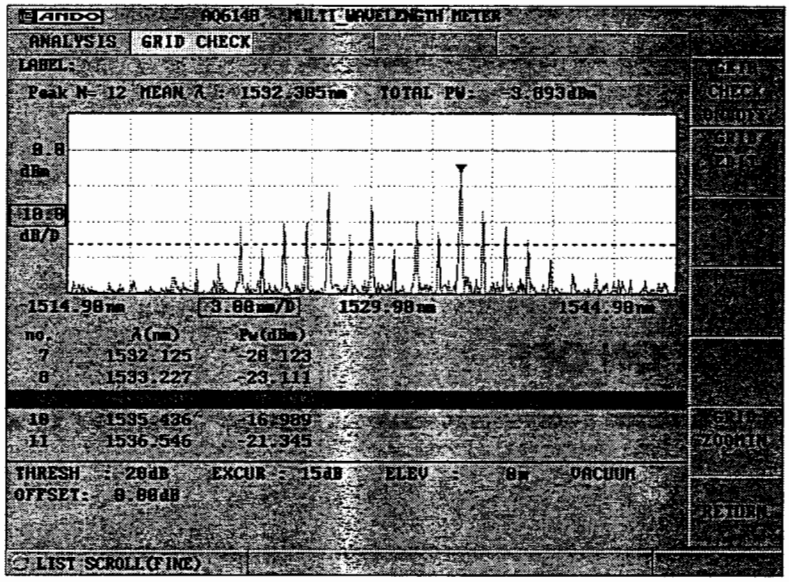
Select one of the above items and analyze the S/N ratio. Note that you cannot carry out the S/N AVG and drift measurement at the same time.

FABRY-PEROT ON OFF

Set whether to turn the Fabry-Perot analysis function ON or OFF for each sweep.

GRID CHECK

Used to turn on the GRID analysis. When this soft key is pressed, the following window will appear.

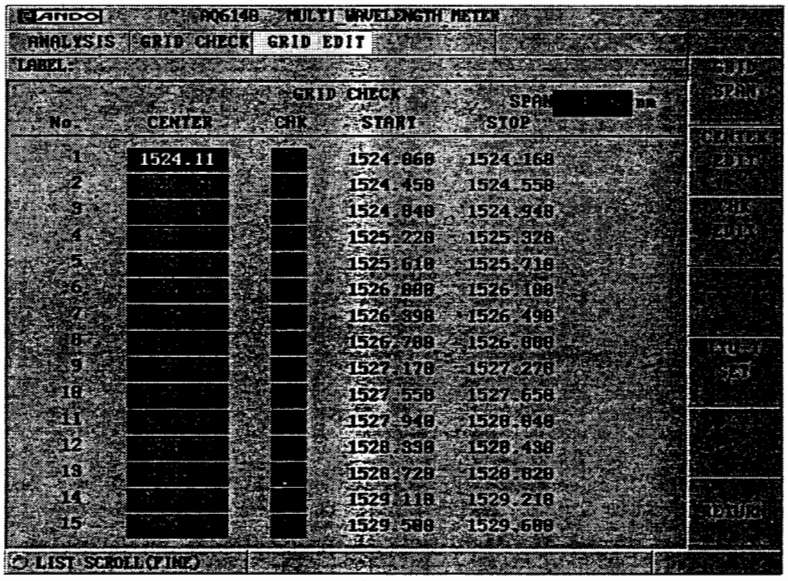


1. GRID CHECK ON OFF

Used to turn ON or OFF the GRID analysis function.

2. GRID EDIT

The GRID edit window is displayed.



2.1 GRID SPAN

Used to specify a GRID span. All GRID spans are specified with the CENTER frequency being set at the center.

Parameter range:

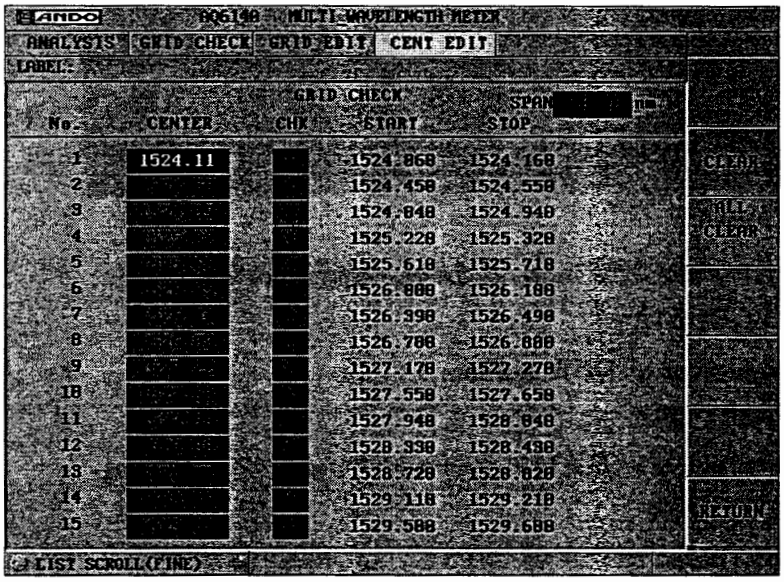
For wavelength mode···0.05～380.00nm

For frequency mode···0.01～54.39THz

For cm^{-1}(wave number) mode···0.4～181.5cm^{-1}

2.2 CENTER EDIT

A center frequency of the GRID is selected. You can enter a center frequency for GRIDs No. 1 to 256. A center frequency must be selected in the ascending order of the GRID No (in the descending order when selecting a frequency or wave number).



2.2.1 CLEAR

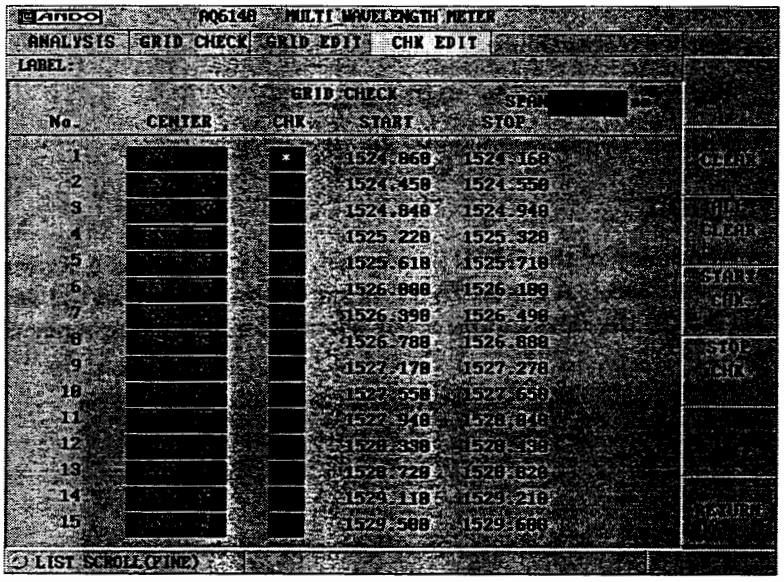
The CENTER frequency at the current cursor position is cleared.

2.2.2 ALL CLEAR

All center frequencies are cleared.

2.3 CHK EDIT

Used to select a GRID on which the GRID analysis is to take place. The analysis is performed on the GRIDs indicated with "*" marking.



2.3.1 CLEAR

Used to clear CHK mark at the current cursor position.

2.3.2 ALL CLEAR

Used to clear all CHK marks.

2.3.3 START CHK

Used to select a GRID No. from which the CHK is started.

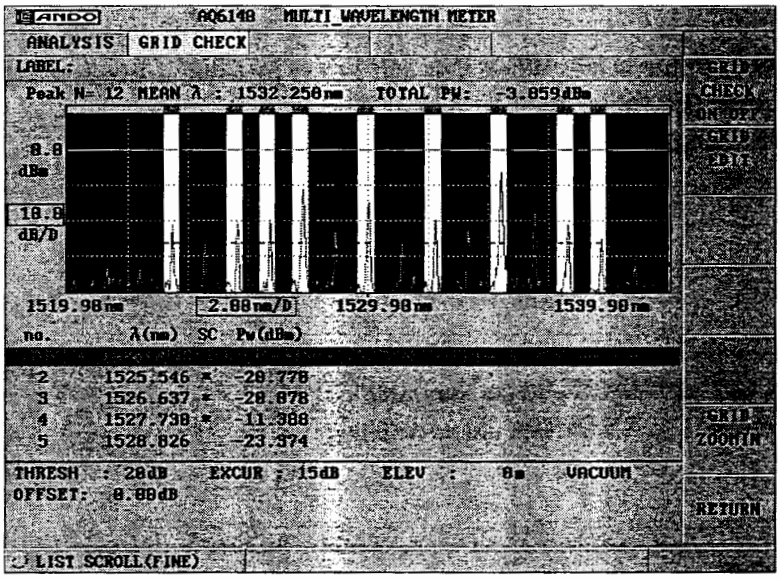
2.3.4 STOP CHK

Used to select an ending GRID No. at which the CHK mark is ended.

2.4 ITU-T EDIT

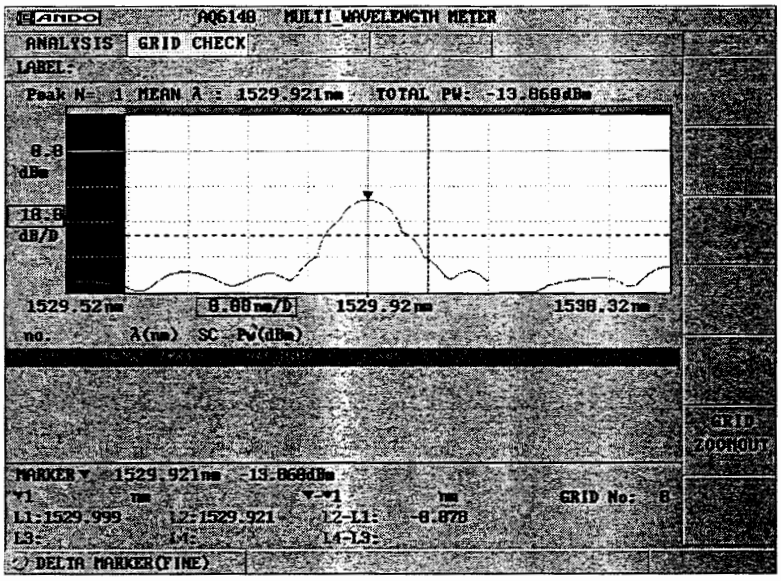
Used to set an ITU-U specification-conformed center wavelength.

An example of the screen displayed during the analysis:



3. GRID ZOOMIN

The GRID at the cursor line is zoomed up.



ELEV

The altitude value is set. When this soft key is pressed, a window will appear. Set the altitude with the rotary knob or numeric keys.
Parameter range: 0 to 5000m (1 step)

CAL

When this soft key is pressed, a window will appear. Select either "STD AIR (in standard air)" or "VACUUM (in vacuum)".
Default value: VACUUM (in vacuum)

Pw OFFSET

When this soft key is pressed, a window for setting the power offset value will appear. Input the setting value with the rotary knob or numeric keys.
Parameter range: -20.00 to 20.00dB (0.01 step)

4.8 DISPLAY

8.DISPLAY
- NORMAL DISPLAY
- TABLE ONLY
- 3D DISPLAY
  - 3D DISPLAY
  - 3D+TABLE DISPLAY
- DRIFT DISPLAY
  - λ /Pw
  - SCALE/DIV
  - START COUNT
  - STOP COUNT
- DELTA
  - λ Pw
  - Δ λ Pw
  - λ ΔPw
  - Δ λ ΔPw
  - REF
  - RETURN
- SORT
  - ** SORT
  - Pw SORT
  - RETURN

NORMAL DISPLAY

The screen is set to the normal display (Waveform+Table) mode.

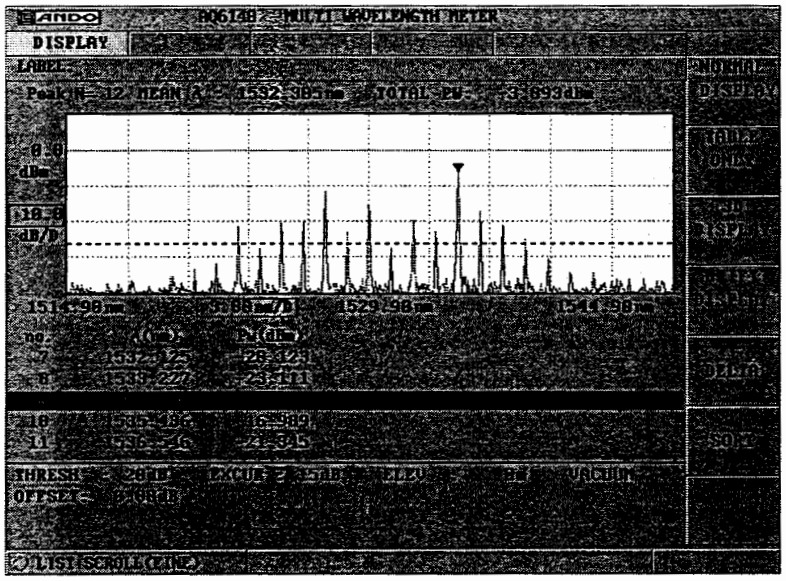
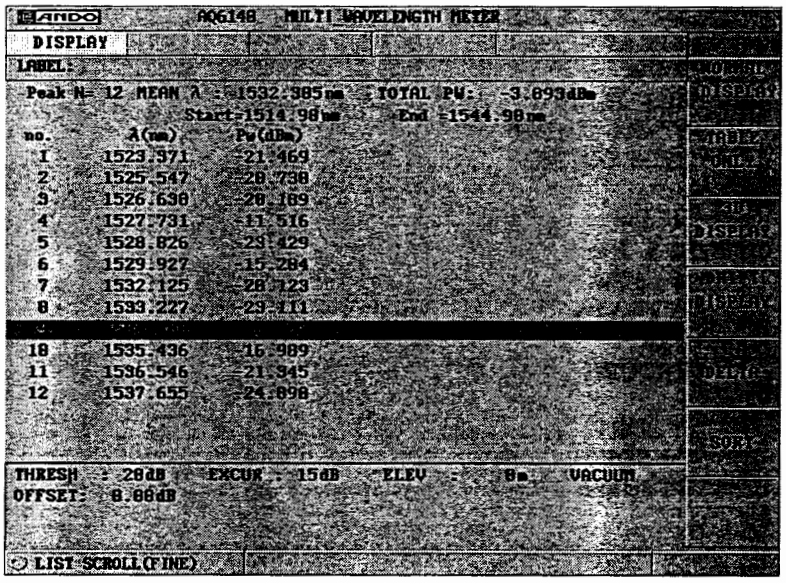


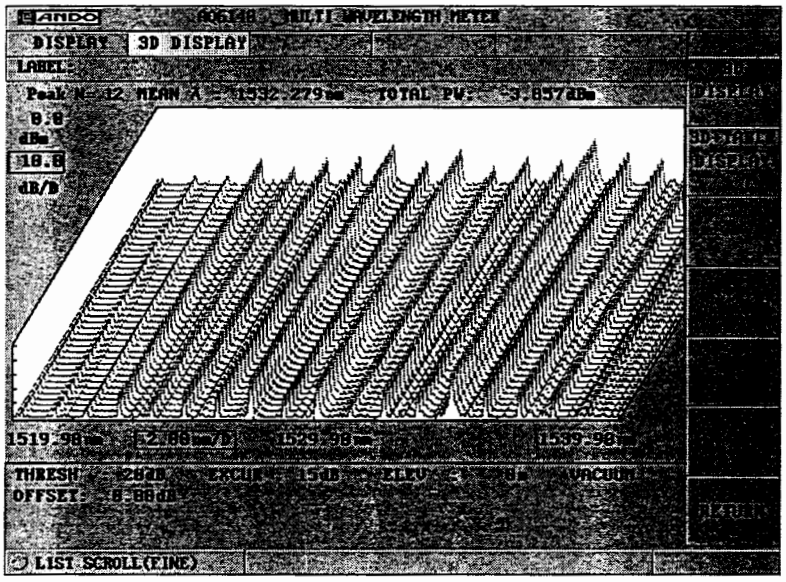
TABLE ONLY

The screen is set to the mode for displaying only the table.



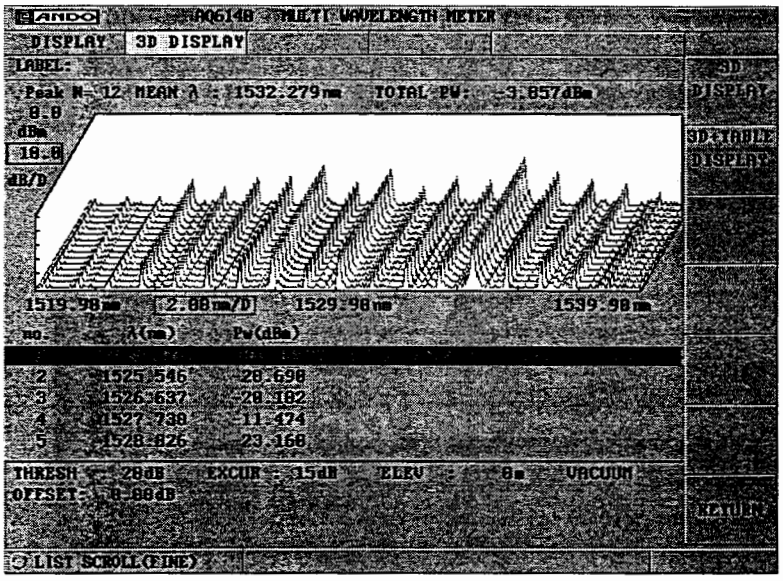
3D DISPLAY

When this soft key is pressed, the three-dimensional graph display mode will be set.



3D+TABLE DISPLAY

The screen is set to the three-dimensional graphic and table display mode.



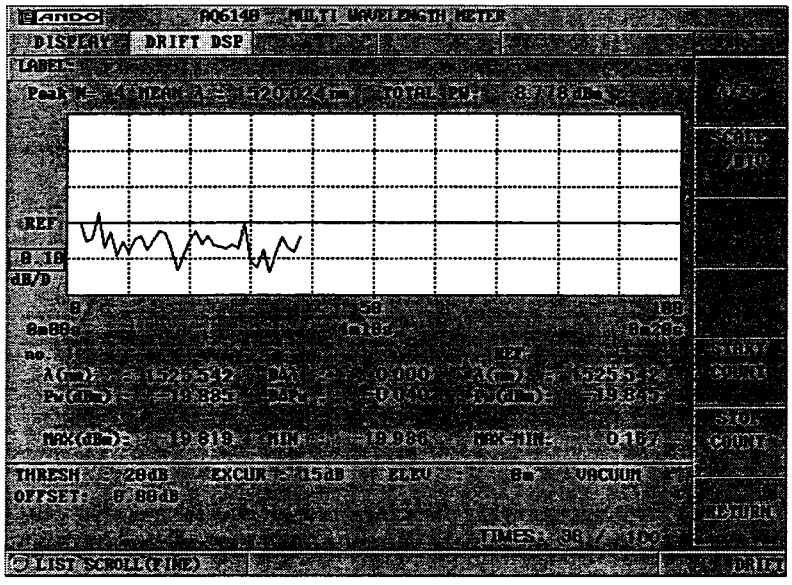
Note

Virious set changes cannot be done at "3D" screen and "3D+TABLE" screen.

DRIFT DISPLAY

Used to turn on the DRIFT display mode for the screen.
DRIFT DISPLAY can be displayed at the following conditions.

- DRIFT MODE : ON
- DRIFT TIMES : Excluding 0(Endless)



1. λ /Pw

Press this software key to switch from the DRIFT display to the wavelength or power display.

2. SCALE/DIV

Used to select the vertical scale of the DRIFT screen.

3. START COUNT

Used to specify the count from which the screen display is started.

Setting range: 0 to (Specified DRIFT count-10)
Default value: 0

4. STOP COUNT

Used to specify the count at which the screen display is ended.

Setting range: 10 to (Specified DRIFT count)
Default value: Specified DRIFT count

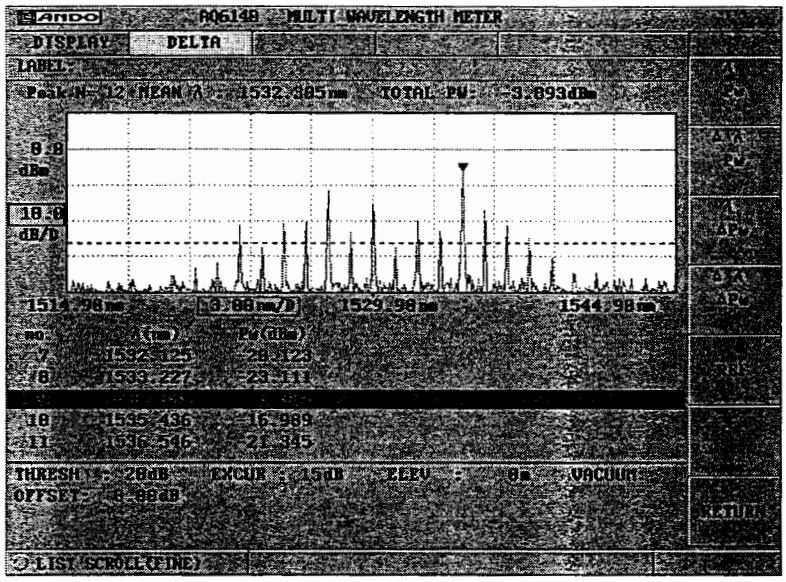
Note

You cannot modify predetermined settings from the "DRIFT" screen.

Time indication on the horizontal axis appears only when the "FAST" is not selected for the DRIFT INTERVAL.

DELTA

The soft keys for the relative display will appear.



1. λ Pw

   When this soft key is pressed, the absolute wavelength and absolute power will appear.

2. Δ λ Pw

   When this soft key is pressed, the relative wavelength and absolute power will appear.

3. λ Δ Pw

   When this soft key is pressed, the absolute wavelength and relative power will appear.

4. Δ λ Δ Pw

   When this soft key is pressed, the relative wavelength and relative power will appear.

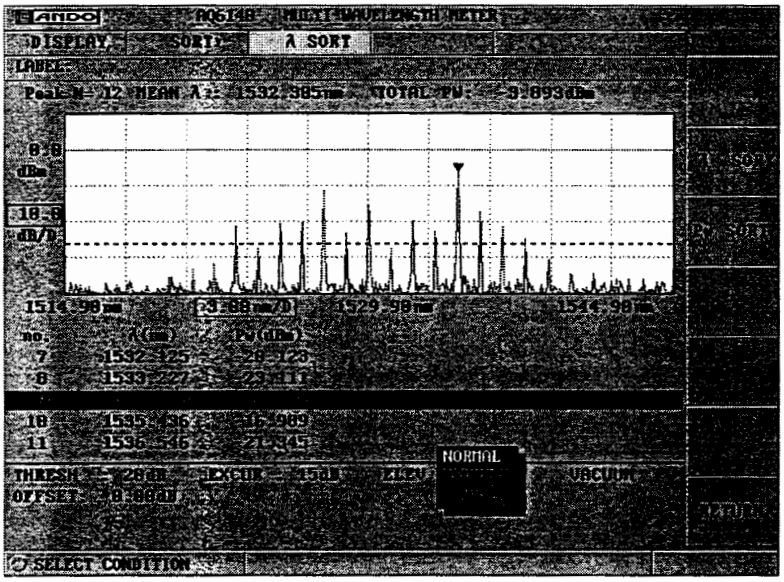
5. REF

   The reference value for the relative display is set.

   The current cursor position in the peak table is the reference.
   The reference peak is indicated with "R" marking on its right side.

SORT

Press this software key to select the peak table sort screen.



1. ** SORT

The selected mode will be sorted.。

The "NORMAL" (ascending order) and "REVERSE" (descending order) windows will appear, so select the sorting method.

Reference

** indicates the "λ", "THz" or "cm-1" unit.

2. Pw SORT

The data is sorted by power.

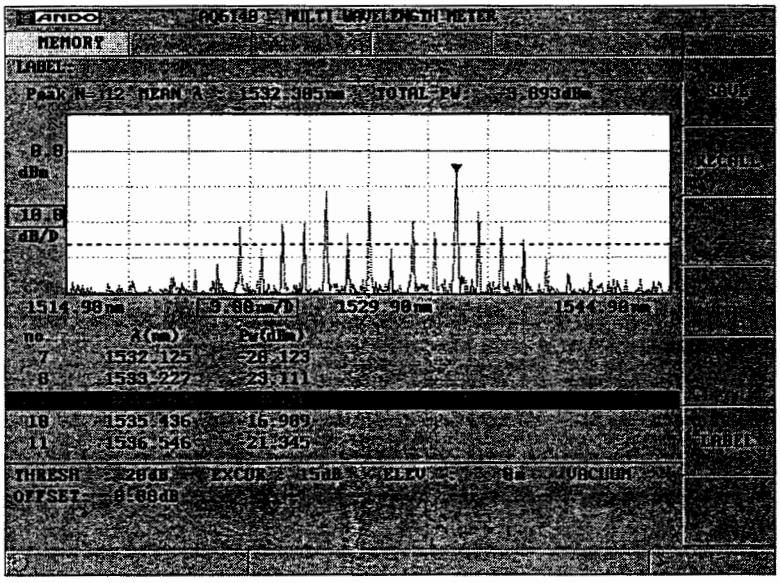
The "NORMAL" (ascending order) and "REVERSE" (descending order) windows will appear, so select the sorting method.

Reference

Only "**SORT" or "PwSORT"can be selected. Both cannot be selected simultaneously.

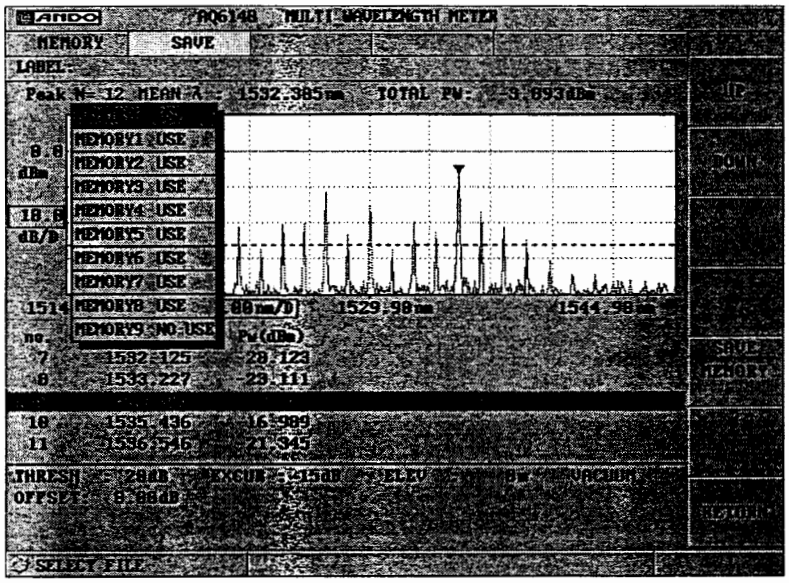
4.9 MEMORY

- 9.MEMORY
  - SAVE
    - UP
    - DOWN
    - SAVE MEMORY
    - RETURN
  - RECALL
    - UP
    - DOWN
    - RECALL MEMORY
    - RETURN
  - LABEL
    - ←
    - →
    - INSERT
    - DELETE
    - CLEAR
    - DONE
    - RETURN



SAVE

The measurement conditions and results are saved in the memory. When this soft key is pressed, a window will appear. The data can be saved in ten memories (0 to 9).



1. UP

The memory No. to save is selected. When this soft key is pressed, the highlight will move upward. When held down, the highlight will move from the bottom toward the top.

2. DOWN

The memory No. to save is selected. When this soft key is pressed, the highlight will move downward. When held down, the highlight will move from the top toward the bottom.

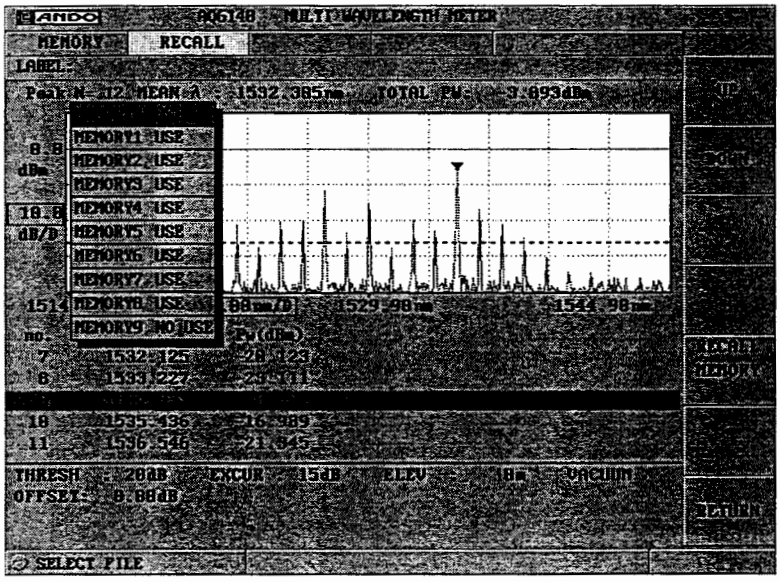
3. SAVE MEMORY

When this soft key is pressed, the measurement conditions and results will be saved in the selected memory No.

When the saving is completed, the original soft key menu will appear.

RECALL

The contents saved in the ten memories are.
When this soft key is pressed, the following type of window will appear.



1. UP

The memory No. to be read out is selected. When this soft key is pressed, the highlight will move upward. When held down, the highlight will move from the bottom toward the top.

2. DOWN

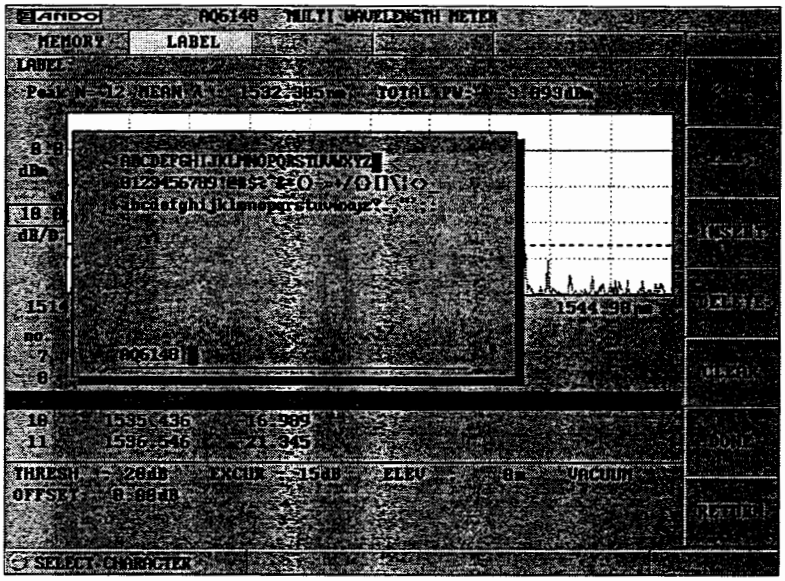
The memory No. to be read out is selected. When this soft key is pressed, the highlight will move downward. When held down, the highlight will move from the top toward the bottom.

3. RECALL MEMORY

When this soft key is pressed, the contents of the selected memory No. will be read. When the reading is completed, the original soft key menu will appear.

LABEL

When this soft key is pressed, the window for inputting a label will appear.



1. ←

   The cursor in the label input area (underline section at cursor) will move one character to the left. When held down, the cursor will successively move to the left. If the cursor is at the left edge, it will not move.

2. →

   The cursor in the label input area will move one character to the right. When held down, the cursor will successively move to the right. If the cursor is at the right edge, it will not move.

3. INSERT

   A blank space will be inserted one character the cursor position in the label input area, and the character string to the right of the cursor will be shifted to the right.

4. DELETE

   The character at the cursor position in the label input area will be deleted one character. The character string to the right of the cursor will be shifted to the left.

5. CLEAR

   All of the characters input in the label input area will be erased.

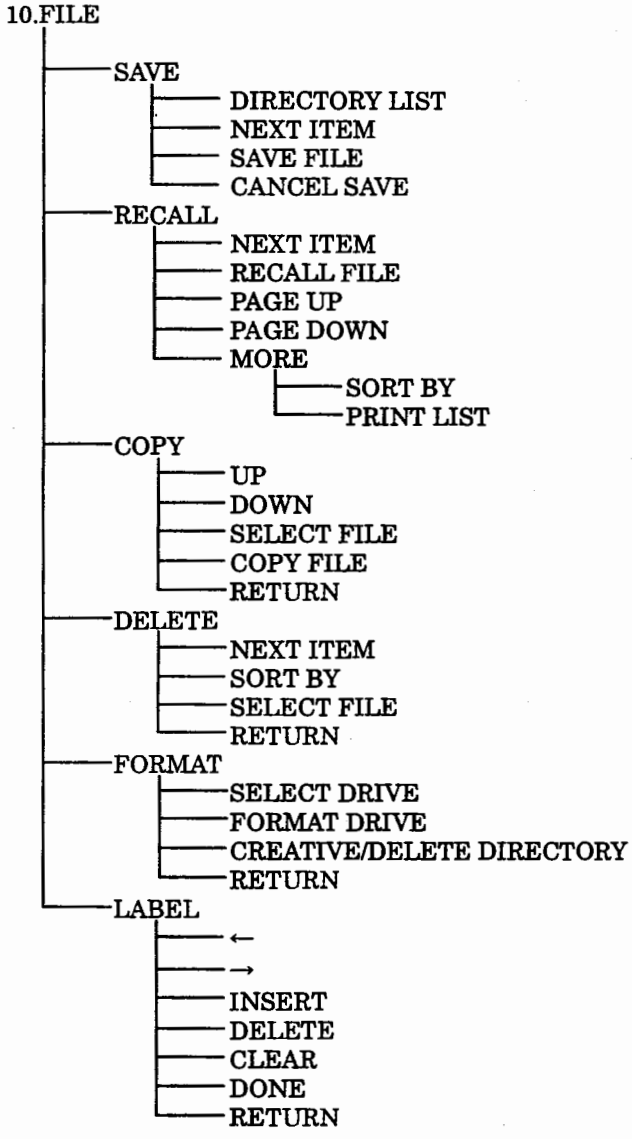
6. DONE

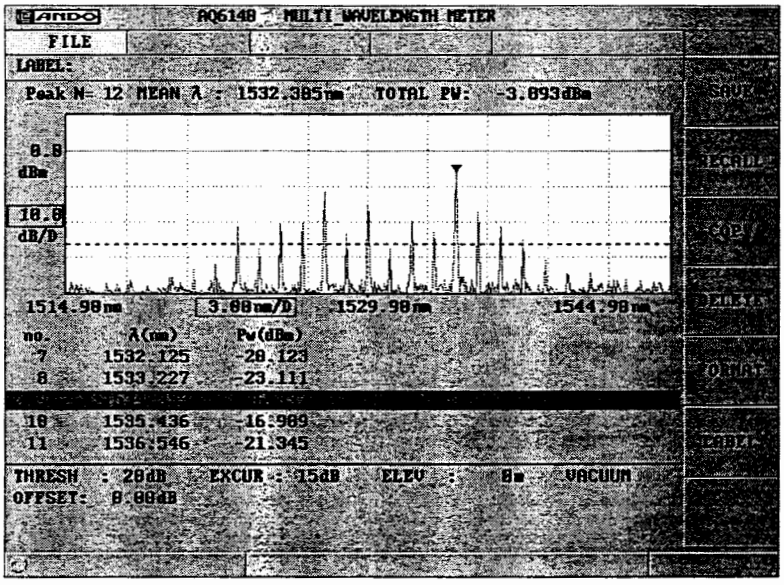
   The character string in the label input area will be copied to the right of "LABEL:" at the top of the screen.

   When the copying is completed, the soft key menu will appear.

4.10 FILE

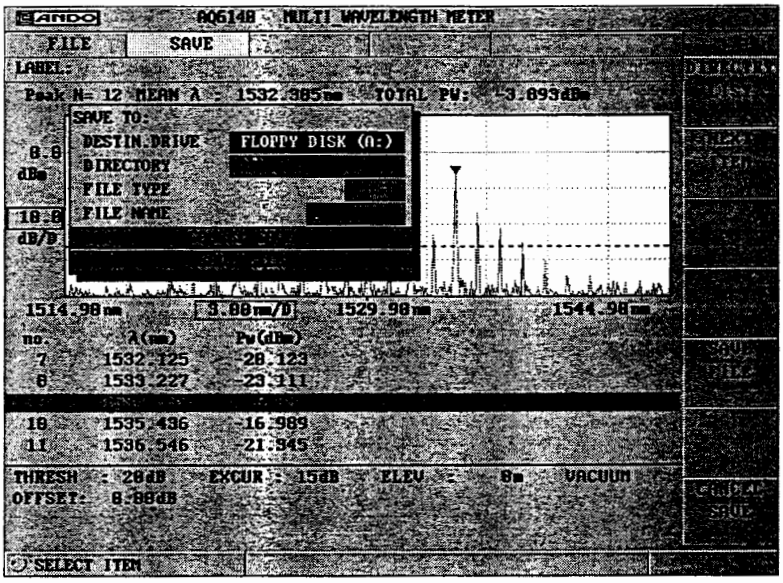
On this screen, data on a floppy disk or hard disk can be read, written, copied, deleted or formatted.





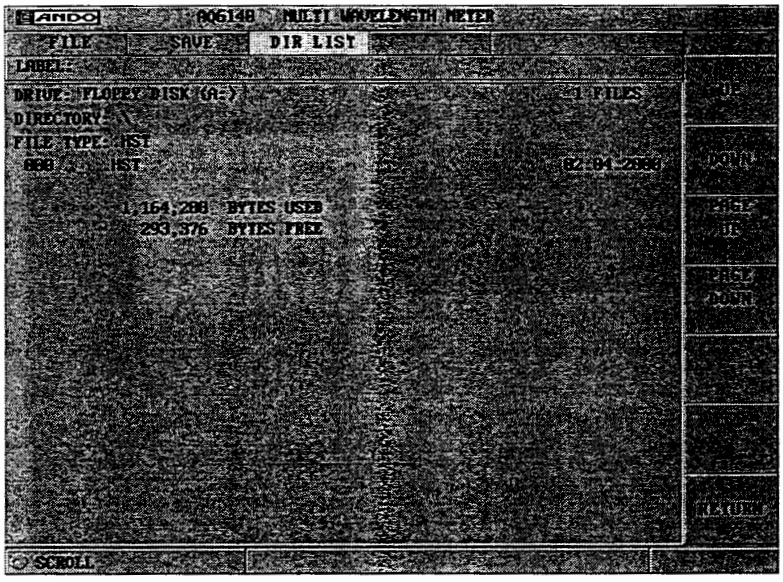
SAVE

When this soft key is pressed, the window required to save data on a floppy disk or hard disk will appear.



1. DIRCTRY LIST

The files in the current directory are displayed in a list. The original menu screen will appear when the "RETURN" key is pressed.



When the list is displayed, the soft keys will change as follows.

1.1 UP

The previous file will appear. If there is no previous file, the cursor will move to the very bottom of the list.

1.2 DOWN

The next file will appear.

1.3 PAGE UP

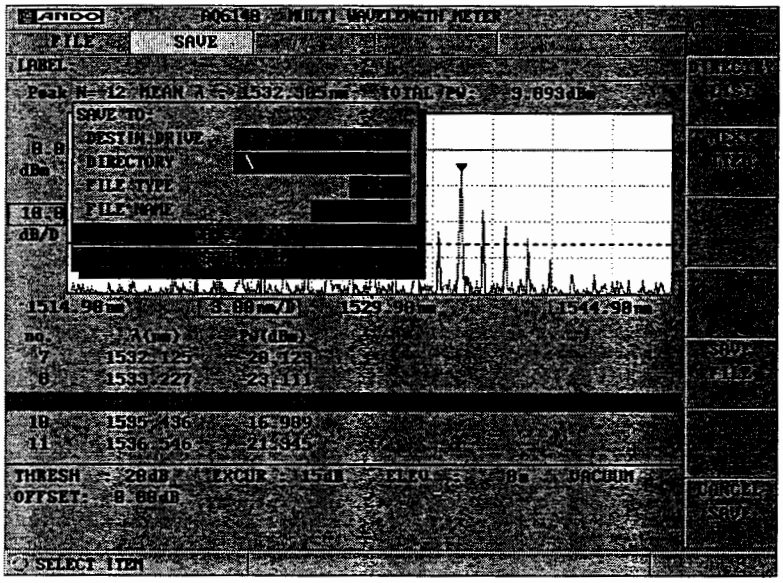
The files on the previous page will appear.

1.4 PAGE DOWN

The files on the next page will appear.

2. NEXT ITEM

The cursor in the window will move to the next item, and the section where the cursor moved to will be highlighted.



When the "ENTER" key is pressed, the item where the cursor is at will open, and the following type of window will appear.

2.1 DESTIN. DRIVE (Function drive)

The drives connected to this device and this device's drive will appear in the window.。
To select the drive to save, press the soft keys "UP" and "DOWN" to select the drive. When the "ENTER" key is pressed to set the selection, the drive No. (A, C, ...) in the window will change. The screen will change to the original soft key menu.

2.2 DIRECTORY

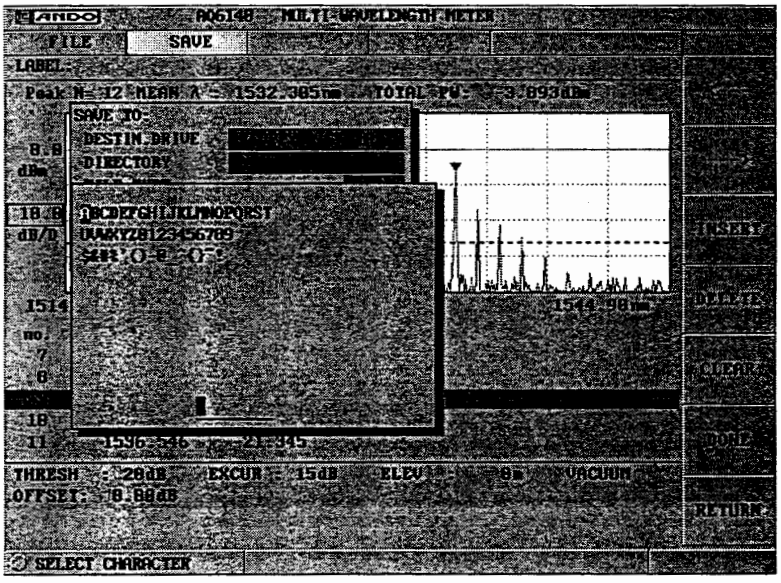
When the cursor is moved, "DIRECTORY" is highlighted and the "ENTER" key is pressed, the contents of the selected drive will appear as a list on the window.
To select the directory to save, press the soft keys "UP" and "DOWN" to select the directory. When the "ENTER" key is pressed to set the selection, the directory display contents will change. The screen will change to the original soft key menu.

2.3 FILE TYPE

Move the cursor to highlight "FILE TYPE", and then press the "ENTER" key. A window, with the file type that can be saved with this device, will appear. Using the soft keys "UP" and "DOWN", select the file type to be saved. When the "ENTER" key is pressed to set the selection, the file type display contents will change. The screen will change to the original soft key menu.

2.4 FILE NAME

Move the cursor to highlight "FILE NAME", and then press the "ENTER" key. A window for inputting characters will appear. Up to "eight characters" can be input.
Input the file name using the soft keys "(" ← "→", "INSERT", "DELETE", "CLEAR", "DONE" and "RETURN".



「←」 The cursor in the file input area will move one character to the left.

「→」 The cursor in the file input area will move one character to the right.

「INSERT」 A blank space character will be inserted one character at the cursor position in the file input area, and the character string to the right of the cursor will shift to the right.

「DELETE」 The character at the cursor position in the file input area will be deleted one character, and the character string to the right of the cursor will shift to the left.

「CLEAR」 The entire character string currently being input will be deleted.

「DONE」 The character string in the file name input area is set as the file name.

「RETURN」 The file input will be canceled, and the original soft key menu will appear.

3. SAVE FILE

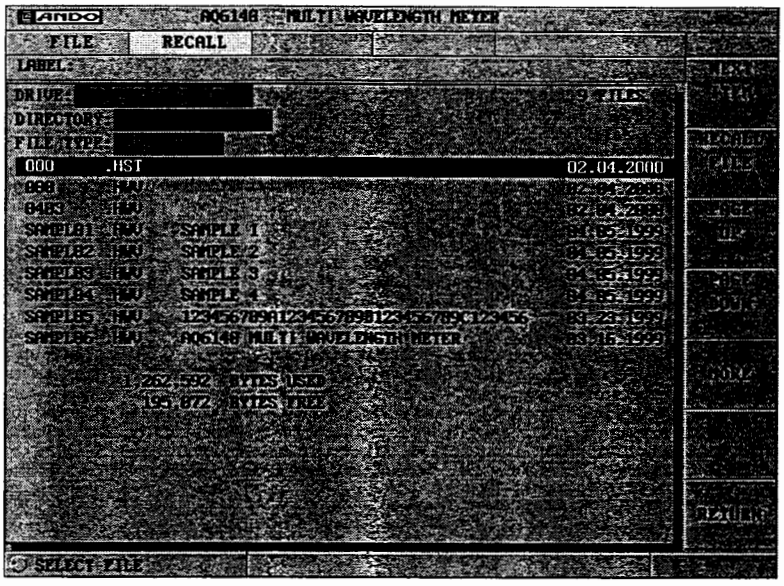
The file will be saved with the selected details, and the original soft key menu will appear

4. CANCEL SAVE

Saving of the file with the selected details will be canceled, and the original soft key menu will appear.

RECALL

The window required for reading data saved on a floppy disk or hard disk will appear.



1. NEXT ITEM

The DRIVE, DIRECTORY and FILE TYPE are selected. Refer to the explanation on "NEXT ITEM" in "FILE SAVE".

2. RECALL FILE

When this soft key is pressed, the file will be read in, and the original soft key menu will appear.

3. PAGE UP

A list of the files on the previous page will appear. If there is no previous page, the current screen will remain displayed.

4. PAGE DOWN

A list of the files on the next page will appear. If there is no next page, the current screen will remain displayed.

5. MORE

When this soft key is pressed, the next menu will appear.

5.1 SORT BY

When this soft key is pressed, a window for selecting which file format to use for sorting will appear.

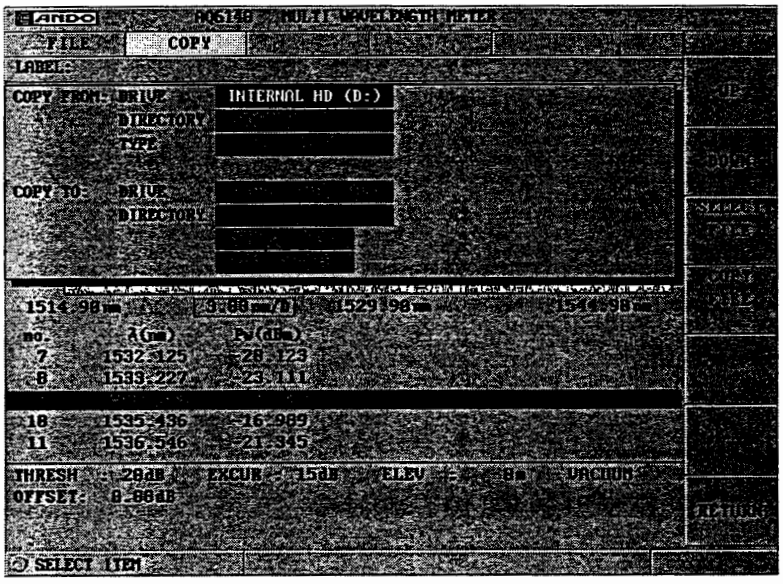
Press the soft keys "UP" and "DOWN" to select the file format to be sorted, and then press the "ENTER" key. The original soft key menu will appear.

5.2 PRINT LIST

When this soft key is pressed, a list of the files in the printer connected to this device will be printed.

COPY

When this soft key is pressed, the copy function window will appear.



1. UP

When this soft key is pressed, the highlight of the item currently selected in the window will move up one.

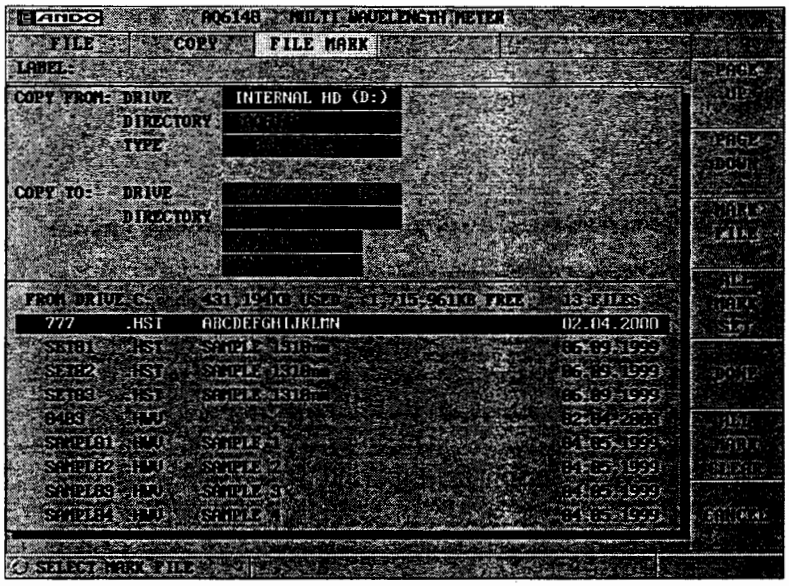
2. DOWN

When this soft key is pressed, the highlight of the item currently selected in the window will move to the next item.

To change the selected details, highlight the item to be changed and press the "ENTER" key. A window for changing the details will appear, so select the item with the "UP" or "DOWN" soft key, and then press the "ENTER" key to set the item.

3. SELECT FILE

The file to be copied is selected.



3.1 PAGE UP

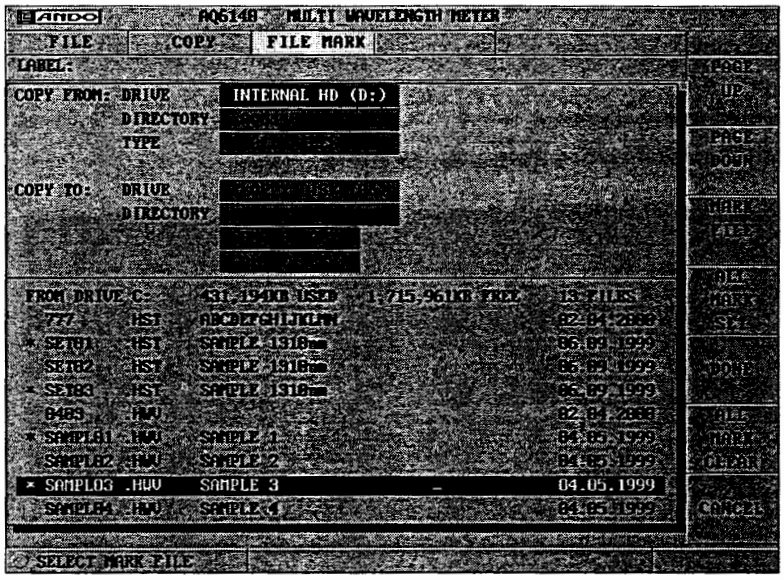
The previous page's file list will appear.

3.2 PAGE DOWN

The next page's file list will appear.

3.3 MARK FILE

The file where the cursor is at is marked as the file to be copied. A "*" mark will appear in front of the marked file. If this key is pressed again, the "*" mark will disappear, and the file will be removed from the copy target.



3.4 ALL MARK FILE

All of the files currently displayed are set as the copy target in a batch. All of the files with the currently selected conditions are the copy target.

3.5 ALL MARK CLEAR

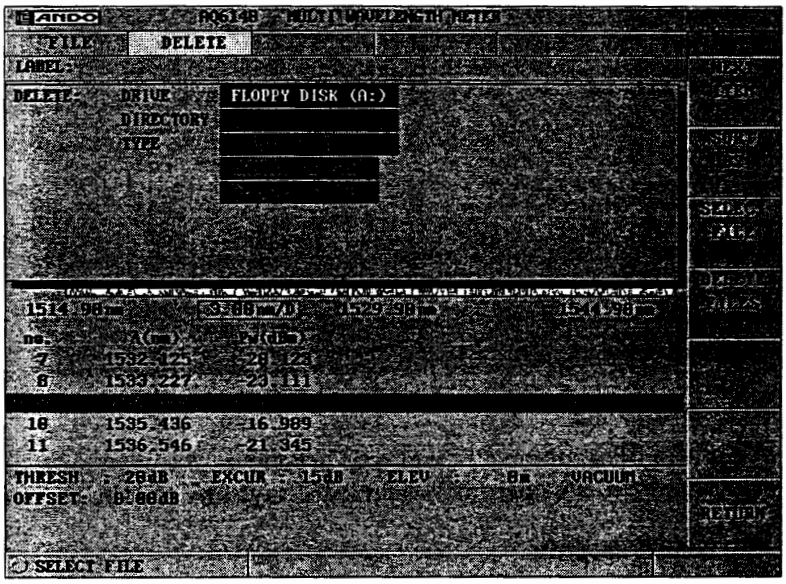
All currently selected copy target files are cleared.

4. COPY FILE

When this soft key is pressed, the selected files will be copied. When the copying is completed, the "FILE" soft key menu will appear.

DELETE

The selected file is deleted.
Note that the deleted file data cannot be recovered.



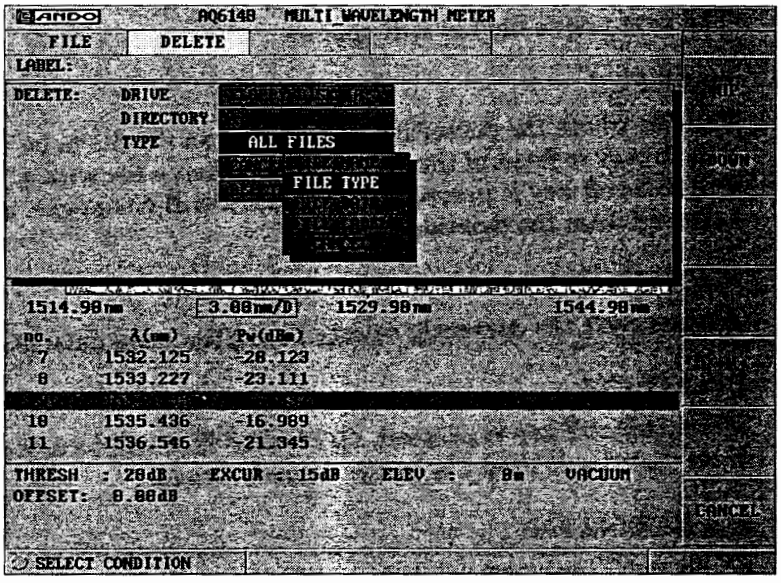
1. NEXT ITEM

The "DRIVE", "DIRECTORY" and "FILE TYPE" of the file to be deleted are set.

When this soft key is pressed, the windows will sequentially appear.Press the "UP" or "DOWN" soft key to select the drive, directory and file type of the file to be deleted. Set each selection by pressing the "ENTER" key.

2. SORT BY

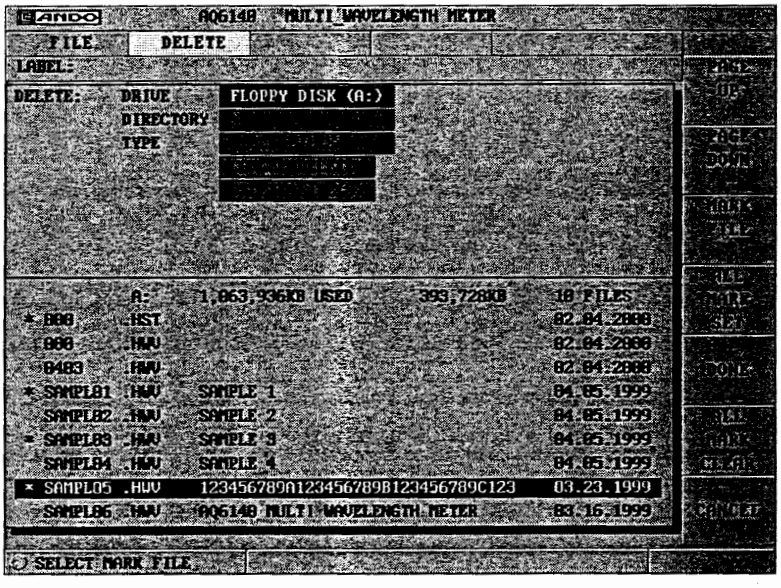
When this soft key is pressed, a window for setting the type to sort the files will appear.



Press the "UP" and "DOWN" soft keys to select the sort type, and press the "ENTER" key to set the selection. When the sorting is completed, the original soft menu key will appear.

3. SELECT FILE

When this soft key is pressed, a list window for selecting the files to be deleted will appear.



3.1 PAGE UP

The previous page's file list will appear.

3.2 PAGE DOWN

The next page's file list will appear.

3.3 MARK FILE

The file where the cursor is at is marked as the file to be deleted. A "*" mark will appear in front of the marked file. When a file with a "*" mark is selected and this soft key is pressed, the "*" mark will disappear, and the file will be removed from the deletion target.

3.4 ALL MARK SET

All files with the currently selected conditions are deleted.

3.5 DELETE FILE

When this soft key is pressed, all marked files will be deleted.
Note that the deleted file cannot be recovered.。

3.6 ALL MARK CLEAR

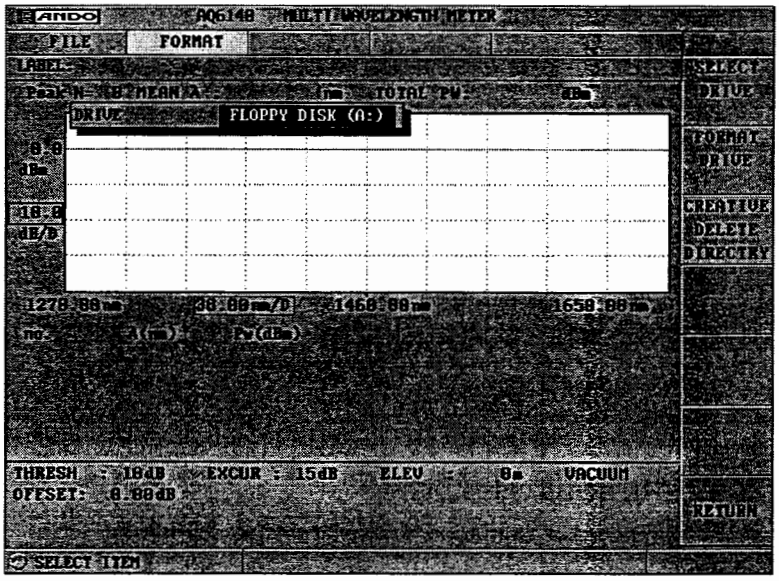
All currently selected delete target files are cleared.

FORMAT

The floppy disk or hard disk is formatted (initialized).

Reference

All contents of the floppy disk or hard disk will be erased with the format, so take care when using this function.



1. SELECT DRIVE

The drive to be formatted is selected.

When this soft key is pressed, a window will appear. Press the "UP" or "DOWN" key to select the drive to be formatted.

2. FORMAT DRIVE

The selected drive is formatted (initialized).

When the formatting is completed, the original soft key screen will appear.

Note

All data will be erased when formatting (initialization) is executed, so take care.

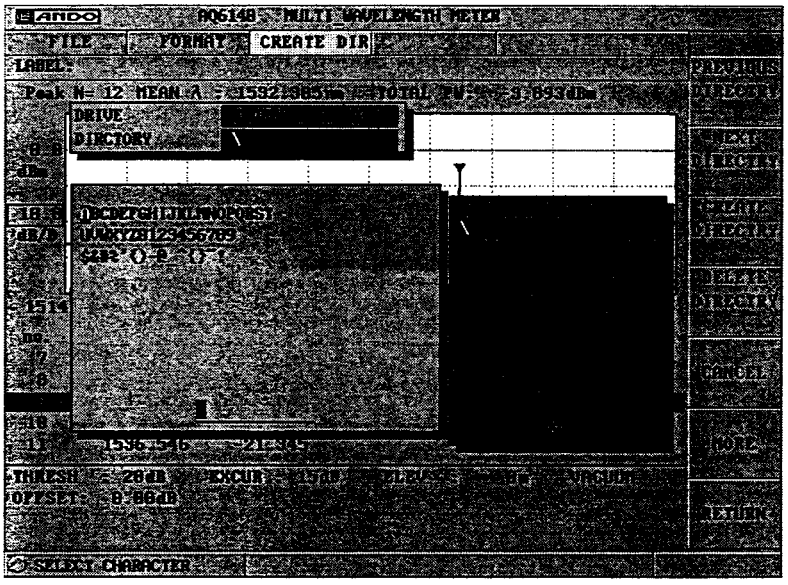
Note

The format of FD corresponds to 2HD,2DD.

However, the FD format of a remote communication corrsponds only to 2HD.

3. CREATIVE /DELETE DIRECTORY

A directory is created or deleted.



3.1 PREVIOUS DIRECTORY

The cursor is moved to the previous directory.

3.2 NEXT DIRECTORY

The cursor is moved to the next directory.

3.3 CLEATE DIRECTRY

A directory with the input name is created.

3.4 DELETE DIRECTRY

The directory at the cursor is deleted.

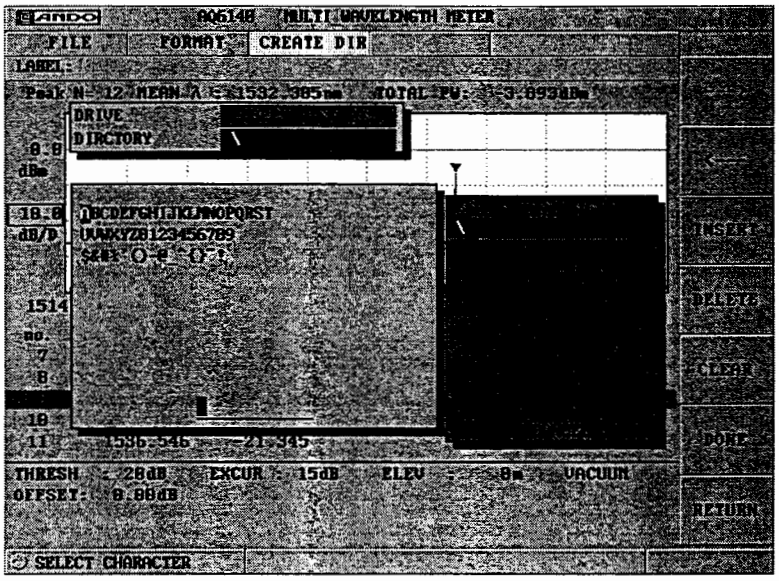
※Note that the deleted directory cannot be recovered.

3.5 CANCEL

Returns to the screen of the original soft key menu.

3.6 MORE

A window for creating the directory name will appear.



3.6.1 →

The cursor at the directory name input area will move one character to the left.

3.6.2 ←

The cursor at the directory name input area will move one character to the right.

3.6.3 INSERT

A blank space will be inserted one character at the position of the cursor at the directory name input area, and the character string to the right of the cursor will shift to the right.

3.6.4 DELETE

The character at the cursor position in the directory name input area will be deleted one character, and the character string to the right of the cursor will shift to the left.

3.6.5 CLEAR

All of the characters in the directory name input area will be deleted.

3.6.6 DONE

The characters input in the directory name input area are set as the directory name.

LABEL

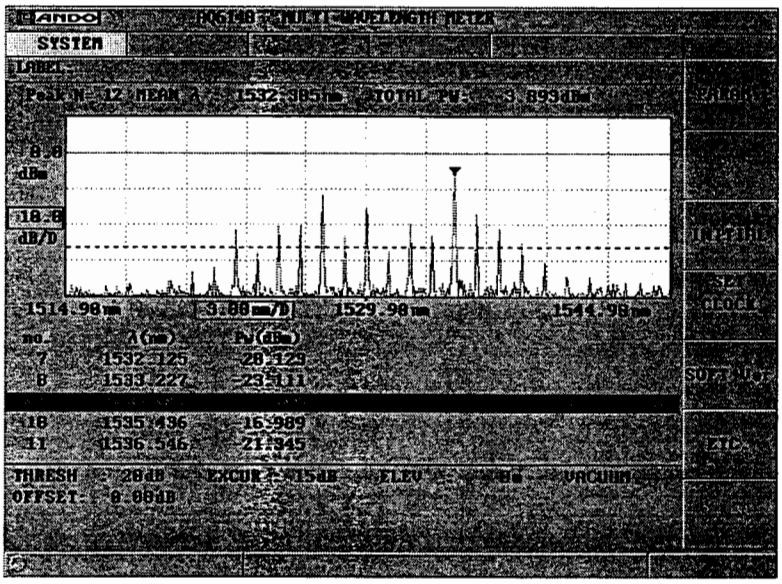
The window for inputting the label will appear.

The operations are the same as "LABEL" in "MEMORY" so refer to that section.

4.11 SYSTEM

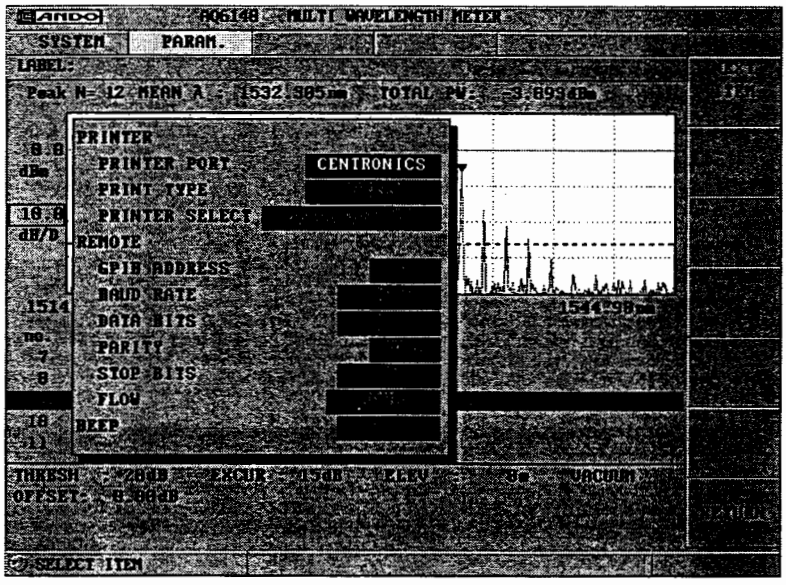
The settings for initialization, the internal clock are made on this screen.

11.SYSTEM
- PARAM.
  - NEXT ITEM
  - RETURN
- INITIAL
- SET CLOCK
  - CALENDAR SET
  - TIME SET
  - CALENDAR TYPE
  - RETURN
- SOFT Ver
- ETC
  - OPERATE LOCKOUT
  - LOCKOUT CODE
  - RETURN



PARAM.

The various setting windows and soft keys will appear.



1. NEXT ITEM

The cursor will move to the next item.

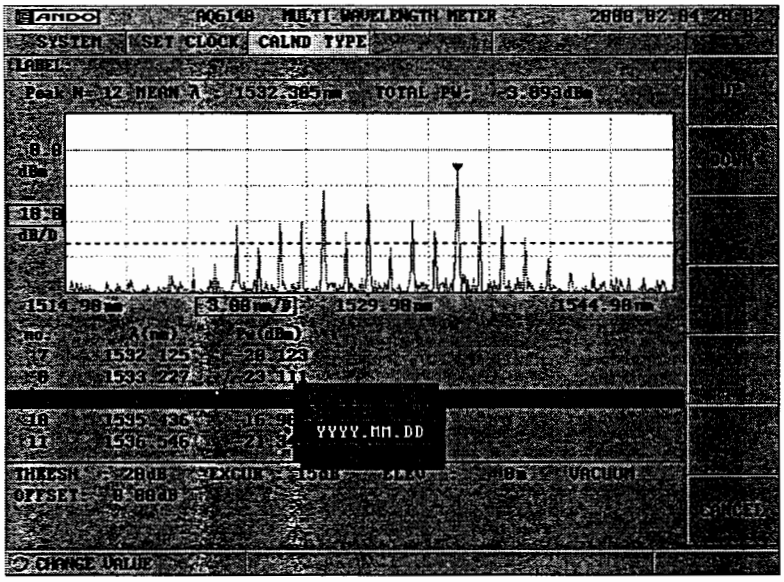
INITIAL

All of the currently set measurement conditions will be returned to the default values.

Save important measurement conditions in the memory or on a floppy disk.

SET CLOCK

A window for setting the internal clock will appear.



1. CALENDAR SET

A window for setting the date will appear.

2. TIME SET

The time for the internal clock is set as a 24-hour display.

2.1 CURSOR →

When this soft key is pressed, the cursor will move from "hour" to "minute". When pressed again, the cursor will move from "minute" to "hour".

Set the hour and minute with the rotary knob or numeric keys.

3. CALENDAR TYPE

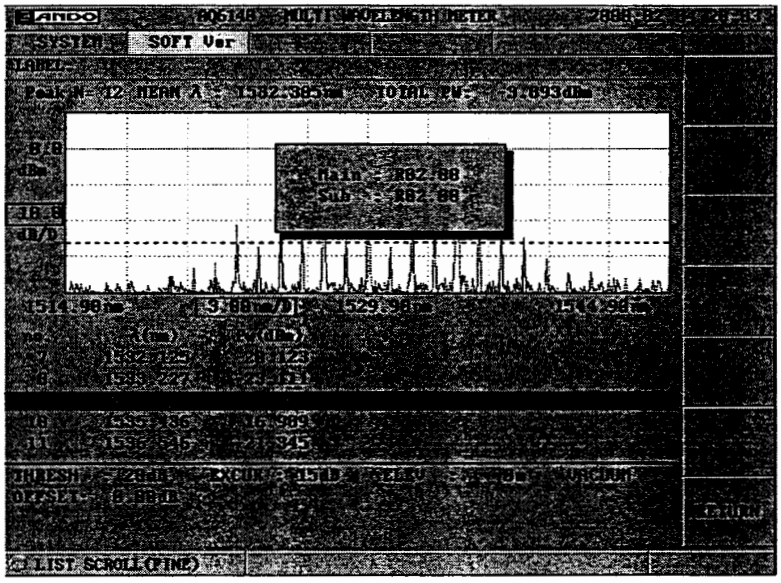
Show to display the date on the screen is set.

The date can be displayed with the following methods

MMM.DD.YYYY	Month.Date.Year
DD.MMM.YYYY	Date.Month.Year
YYYY.MM.DD	Year.Month.Date

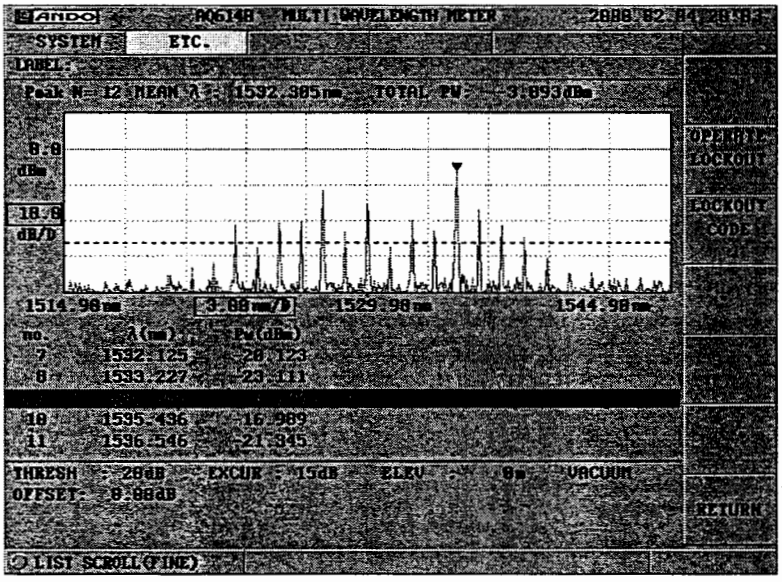
SOFT Ver

Used to display software version.



ETC.

The screen for making the other settings will appear.



1. OPERATE LOCKOUT

A window for turning the operation lock out "ON" or "OFF" will appear.

2. LOCKOUT CODE

A window for inputting the 4-digit operation lock out code will appear.

Input four random digits with numeric keys.

Reference

This function is valid only when "OPERATE LOCKOUT" is set to "ON".

Chapter5
Operation Methods

The methods of operating this device are explained in this chapter.

5.1 Measurement

Measurement

● Wavelength range

This device is compatible with ranges from 1270 to 1650nm.

The initial range is 1270 to 1650nm.

Refer to the section "5.2 Measurement range" for details on changing the measurement range.

● Calibration

Set the medium and altitude value to make accurate measurements.

● Minimum separation resolution characteristics

The minimum separation resolution characteristecs is 10GHz.

● Input power

This device is compatible with an input power of up to 10dBm.

⚠CAUTION
The input power for the entire device can be up to 10dBm. If a power exceeding 10dBm is input, the device's input circuit could be damaged. When using a power exceeding 10dBm, use an attenuator to reduce the input power to 10dBm or less. In this case, a power exceeding 10dBm can be accurately measured by using the power offset function and inputting the attenuator's attenuation amount.

1 Carrying out repeated measurement

(1) Press the <SWEEP> key.

(2) Press the <REPEAT> soft key.

The repeated sweep will start.
During the repeated sweep, "REPE" will appear at the lower right of the screen.

2 Carrying out single measurement

(1) Press the <SWEEP> key.

(2) Press the <SINGLE> soft key.

The single sweep will start.
During single sweep, "SING." will appear at the lower right of the screen.

3 Stopping the measurement

(1) Press the <SWEEP> key.

(2) Press the <STOP> soft key

The sweep will stop.

The single sweep cannot be stopped.

Note

The measurement stops by the following functiions.

FILE,MEMORY,SYSTEM,PRINT

Calibration

● Medium (in vacuum, in standard air)

As the light wavelength varies according to the medium through which the light passes, the measurement must be calibrated to obtain an accurate wavelength measurement.

● Altitude value

As the measurement with this device is carried out in air, the air density according to altitude will affect the measurement results. Calibration is carried out by inputting the altitude value.

The input range is 0 to 5000m (1 step, 1m), and the default value is 0m.

4 Setting the altitude value

(1) Press the < ANALYSIS > key.

(2) Press the < ELEV > soft key.

(3) Input the altitude value with the rotary encoder or numeric keys.
Setting range: 0 to 5000m (1m step)
Default value: 0m

Conversion from feet to meters
If the altitude value unit is feet, convert it with the following expression.
m=ft/3. 281

5 Select the medium (vacuum, air)

(1) Press the < ANALYSIS > key.

(2) Press the < CAL > soft key.

(3) Set the medium with the rotary encoder or cursor keys.
Setting item: VACUUM (in vacuum) or STD AIR (in standard air)
Default value: VACUUM (in vacuum)

Definition of standard air

Barometric pressure: 760torr

Temperature: 15℃

Relative humidity: 0%

6 Setting the power offset value

(1) Press the < ANALYSIS > key.

(2) Press the < Pw OFFSET > soft key.

(3) Input the power offset value with the rotary encoder or numeric keys.
Setting range: -20.00dBm to 20.00dBm
Default value: 0.00dBm

7 Initializing the measurement conditions

(1) Press the < SYSTEM > key.

(2) Press the < INITIAL > soft key.
All of the measurement conditions will be set to the default values.

Reset items (INITIAL)

Item	Reset value	
Label	Clear	
Sweep state	Stop	
Center wavelength	1460nm	
Sweep span	380nm	
Starting wavelength	1270nm	
Ending wavelength	1650nm	
X axis unit	Wavelength	
Reference level	0dB	
Log scale	10dB/div	
Base level	0	
Power unit	dBm	
Automatic peak	CENTER OFF REF LEVEL OFF AUTO SEARCH OFF	
S/N	Function OFF Seletion AUTO User wavelength not affected User Noise Level not affected No. of averages 100	
Medium	Vacuum	
Elevation	not affected	
Peak search threshold	10dB	
Peak search Excursion	15dB	
Offset value for power measurement	0dB	
Fabry-Perot	OFF	
Display screen type	NORMAL	
Move Marker,Line Marker	OFF	
Relative display	λ,Pw	
Sort direction	Forward with wavelength	
REF cursor position	Invalid	
1 peak display	OFF	
GRID	Function OFF GRID SPAN:0.10nm GRID CENTER:ITU-T GRID GRID CHK:ALL ON	
Drift	Function OFF Display △ Repeat Interval FAST Num of Drift 0(Endless)	
	Trap (wavelength span)	Function OFF Value 50nm
	Trap (peak wavelength)	Function OFF Value 10nm
	Trap (peak power)	Function OFF Value 0.001dBm

5.2 Measurement range

The measurement range will be explained for the wavelength mode.
For the frequency or Wave number mode, substitute the respective terms for wavelength.

1 Setting the center wavelength

(1) Press the <CENTER> key.

(2) Press the <CENTER> soft key.

(3) Set the center wavelength with the rotary encoder or numeric keys.
The waveform will be redrawn using the peak wavelength as the center wavelength.

◇ Wavelength mode
Setting range: 1270.3 to 1649.7nm (0.1nm step)

Default value: 1460.0nm

◇ Frequency mode
Setting range: 181.71 to 236.04THz (0.01THz step)

Default value: 208.88THz

◇ Wave number mode
Setting range: 6063 to 7872cm-1 (1 cm-1 step)

Default value: 6968cm-1

2 Setting the peak wavelength as the center wavelength

(1) Press the < CENTER > key.

(2) Press the <PEAK→CENTER> soft key.
The peak wavelength will be searched for, and the peak wavelength will be projected and displayed.
Changes can be made with the rotary encoder or numeric keys.
The waveform will be redrawn using the peak wavelength as the center wavelength.

3 Setting the peak wavelength as the center wavelength at each sweep.

(1) Press the <CENTER> key.

(2) Press the <AUTO CENTER ON/OFF> soft key.

(3) Set to ON with the rotary encoder or cursor keys.
When set to ON, the peak wavelength will be set as the center wavelength at each sweep.

4 Setting the center wavelength 1 and 2

(1) Press the < CENTER > key.

(2) Press the < CENTER 1(2)> soft key.

(3) Set the center wavelength 1 (2) with the rotary encoder or numeric keys.

◇ Wavelength mode

Default value: Center wavelength 1 = 1310.0nm
Center wavelength 2 = 1550.0nm

◇ Frequency mode

Default value: Center wavelength 1 = 229.00THz
Center wavelength 2 = 193.00THz

◇ Wave number mode

Default value: Center wavelength 1 = 7634cm-1
Center wavelength 2 = 6452cm-1

5 Setting the sweep span

(1) Press the < SPAN > key.

(2) Press the < SPAN > soft key.

(3) Set the sweep span with the rotary encoder or numeric keys.

◇ Wavelength mode

Setting range: 0.5 to 380.0nm (0.1nm step)

Default value: 380.0nm

◇ Frequency mode

Setting range: 0.05 to 54.39THz (0.01THz step)

Default value: 54.39THz

◇ Wave number mode

Setting range: 5 to 1815cm-1(0.001×10^6cm-1 step)

Default value: 1815cm-1

6 Setting the sweep span

(1) Press the < SPAN > key.

(2) Press the < START λ > soft key.

(3) Set the sweep span with the rotary encoder or numeric keys.

◇ Wavelength mode
Setting range: 1270.0 to 1649.5nm (0.1nm step)
Default value: 1270.0nm

◇ Frequency mode
Setting range: 181.68 to 236.02THz (0.01THz step)
Default value: 181.68THz

◇ Wave number mode
Setting range: 6060 to 7870cm-1 (1cm-1 step)
Default value: 6060cm-1

7 Setting the measurement starting wavelength

(1) Press the < SPAN > key.

(2) Press the < STOP λ > soft key.

(3) Set the measurement starting wavelength with the rotary encoder or numeric keys.

◇ Wavelength mode
Setting range: 1270.5 to 1650.0nm (0.1nm step)
Default value: 1650.0nm

◇ Frequency mode
Setting range: 181.73 to 236.07THz (0.01THz step)
Default value: 236.07THz

◇ Wave number mode
Setting range: 6065 to 7875cm-1 (1cm-1 step)
Default value: 7875cm-1

8 Setting the span between the wavelength line markers 1 and 2 as the sweep range

(1) Press the < MARKER P> key.

(2) Press the < MORE > soft key.

(3) Set the wavelength line marker with the <LINE MARKER 1(2)> soft key.

(4) Press the <MKR L1-L2 SPAN> soft key.
The span between the wavelength line markers 1 and 2 is set as the sweep span, and the waveform is redrawn.

9 Setting the full span.

(1) Press the <SPAN> key.

(2) Press the <FULL SPAN> soft key.

5.3 Unit

1 Setting the reference level

◇LOG scale

(1) Press the < LEVEL > key.

(2) Press the < REF LEVEL > soft key.

(3) Set the reference level with the rotary encoder or numeric keys.
Setting range: -40.0 to 20.0dBm (0.1 step)

Default value: 0.0dBm

◇LIN scale

(1) Press the < LEVEL > key.

(2) Press the < REF LEVEL > soft key.

(3) Set the reference level with the rotary encoder or numeric keys.
Setting range: 0.001mW(1 μ W) to 10mW (0.001 step)
Default value: 1.0mW

2 Changing the scale to LOG (LIN)

◇Changing to LOG scale

(1) Press the <LEVEL> key.

(2) Press the < LOG SCALE > soft key.

(3) The scale can be changed with the rotary encoder or numeric keys.
Setting range: 1.0 to 10.0dB/DIV (0.1 step)
Default value: 10.0dB/D

◇Changing to LIN scale

(1) Press the <LEVEL> key.

(2) Press the < LIN SCALE > soft key.

(3) Units mW and uW are displayed being embossed.

Select a desired unit from the rotary encoder or numerical keypad.

3 Setting the peak level as the reference level

(1) Press the <LEVEL> key.

(2) Press the < PEAK→REF LEVEL > soft key.

The peak level is searched for, and the obtained value is set as the reference level. The waveform is then redrawn.

The reference level is projected and displayed, and can be changed with the rotary encoder or numeric keys.

4 Setting the peak level as the reference level at each sweep.

(1) Press the <LEVEL> key.

(2) Press the < AUTO REF LEVEL ON/OFF > soft key.

(3) Set to ON with the rotary encoder or cursor keys.

When set to ON, the peak level will be searched for after sweeping, and the peak level will be set as the reference level.

5 Setting the X axis unit (nm, THz, cm-1)

(1) Press the <DISPLAY> key.

(2) Press the <SETUP> soft key.

(3) Press the <H SCALE SELECT > soft key.

(4) Set the X axis unit with the rotary encoder or cursor keys.

Default value: nm

6 Set the lower end level. (Valid only for LIN scale.)

(1) Press the <LEVEL> key.

(2) Press the <BASE LVL> key.

Setting range: 0.001～100.000mW(0.001step)

(The upper limit is REF level × 0.9)

5.4 Peak search

Peak search

- This device can detect up to 256 peaks.
- The peak search is carried out in respect to the active trace.
- Definition of peak

  The items matching both of the following conditions are defined as a peak.

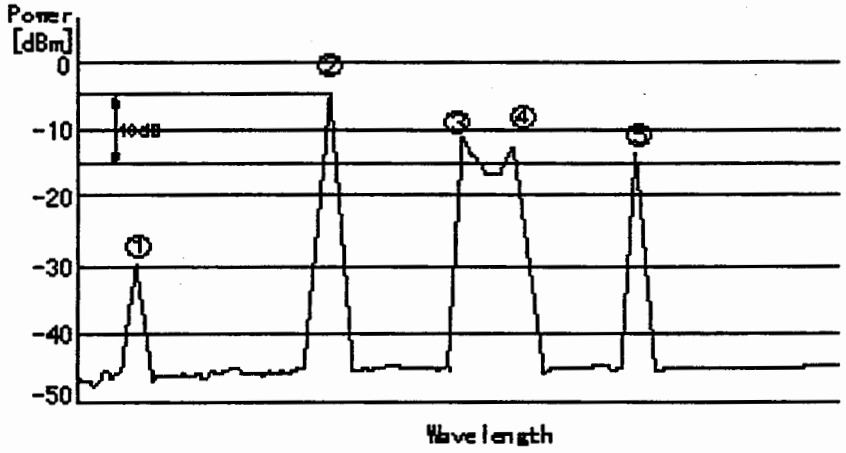
  ·The power must be larger than the power set for the peak search threshold.

  ·The power must rise and lower more than the value set for the peak crest/root difference.

An example of detecting the peak with peak search is given below.

(1) Condition 1 (Threshold: 10dB, Crest/root difference: 10dB)

In the following example, the laser beam having the larger power is ② (-5dB). As the threshold is 10dB and the crest/root difference is 10dB, the laser beam having a power of -15dBm or more and a crest/root difference of 10dBm or more will be the peak.
Thus, ②, ③ and ⑤, which satisfy these conditions, are judged to be peaks. For ①, the power is less than -15dBm, so it is not recognized as a peak. For ④, the minimum point of the power between ③ and ④ does not drop more than 10dB (set crest/root difference), so it is not recognized as a peak.。



(2) Condition 2 (Threshold: 10dB, Crest/root difference: 3dB)

With the same waveform as the above example, when the crest/root difference is set to 3dB, the minimum point between ③ and ④ drops more than 3dB (set crest/root difference), so ③ and ④ are recognized as separate peaks. Thus, in this case the peaks are ②, ③, ④ and ⑤.

1 Searching for the peak

(1) Press the <PEAK SEARCH> key.

(2) Press the < PEAK SEARCH > soft key.

The movement marker is displayed above the waveform at the peak level. If the peak level exceeds the upper or lower edge of the screen, the movement marker will appear at the upper or lower edge. The movement marker can be moved with the rotary encoder.

2 Setting the movement marker to the next peak

(1) Press the < PEAK SEARCH > key.

(2) Press the < NEXT SEARCH > soft key.

The position of the movement marker when the key is pressed is moved to the next peak.
If there is no next peak, the movement marker will not move.

3 Setting the movement marker to the previous peak

(1) Press the < PEAK SEARCH > key.

(2) Press the < PREVIOUS SEARCH > soft key.

The position of the movement marker when the key is pressed is moved to the previous peak.
If there is no previous peak, the movement marker will not move.

4 Setting the peak search threshold

(1) Press the < PEAK SEARCH > key.

(2) Press the < MORE E> soft key.

(3) Press the < PEAK THRESH > soft key.

(4) Set the peak search threshold with the rotary encoder or numeric keys.
The threshold level is indicated with a solid dotted line.
Setting range: 0 to 40dB(1 step)
Default value: 10.0dB

5 Setting the peak search crest/root difference

(1) Press the < PEAK SEARCH > key.

(2) Press the < MORE > soft key.

(3) Press the < PEAK EXCUR > soft key.

(4) Set the peak search crest/root difference with the rotary encoder or numeric keys.
Setting range: 1 to 30dB(1 step)
Default value: 15.0dB

6 Automatically searching for the peak at each sweep.

(1) Press the < PEAK SEARCH > key.

(2) Press the < MORE > soft key.

(3) Press the < AUTO SEARCH ON OFF > soft key.
When set to ON, the ON display will be highlighted in red.
When set to ON, the peak will be searched for automatically when the sweep is completed and the movement marker will be set to the peak level.

5.5 Screen display

1 Setting to the normal display mode (waveform + table)

(1) Press the < DISPLAY > key.
(2) Press the < NORMAL DISPLAY > soft key.

2 Setting to the table only display mode

(1) Press the < DISPLAY > key.
(2) Press the < TABLE ONLY > soft key.

3 Setting to the 3D display mode

(1) Press the < DISPLAY > key.
(2) Press the < 3D DISPLAY > soft key.
(3) Press the < 3D DISPLAY > soft key.

4 Setting to the 3D + table display mode

(1) Press the < DISPLAY > key.
(2) Press the <3D DISPLAY> soft key.
(3) Press the <3D+TABLE> soft key.

5 Setting to the Drift display mode

(1) Press the < DISPLAY > key.
(2) Press the <DRIFT DISPLAY> soft key.

This DRIFT screen is available only when you have specified a drift count after selecting the DRIFT ON.
And, the DRIFT screen is not usable for diverse setups.

Displaying relatively

1 Displaying the absolute wavelength and absolute power

(1) Press the < DISPLAY > key.
(2) Press the < DELTA > soft key.
(3) Press the < λ Pw > soft key.

2 Displaying the relative wavelength and relative power

(1) Press the < DISPLAY > key.
(2) Press the < DELTA > soft key.
(3) Press the < Δ λ Pw > soft key.

3 Displaying the absolute wavelength and relative power

(1) Press the < DISPLAY > key.
(2) Press the < DELTA > soft key.
(3) Press the < Δ λ Pw > soft key.

4 Displaying the relative wavelength and absolute powe

(1) Press the < DISPLAY > key.
(2) Press the < DELTA > soft key.
(3) Press the < Δ λ Pw > soft key.

5 Setting the reference value for the relative display

(1) Press the < DISPLAY > soft key.
(2) Press the < DELTA > soft key.
(3) Press the < REF > soft key.

The current cursor position will be set as the reference value for the relative display.

The reference peak is indicated with "R" marking on its right side.

Sorting the table

1 Sorting the table with wavelengths (ascending order, descending order)

(1) Press the < DISPLAY > key.

(2) Press the < SORT > soft key.

(3) Press the <** SORT > soft key.

(4) Using the rotary encoder or cursor keys, set whether to sort the wavelengths in ascending or descending order.

2 Sorting the table with power (ascending order, descending order)

(1) Press the < DISPLAY > key.

(2) Press the < SORT > soft key.

(3) Press the < Pw SORT E> soft key.

(4) Using the rotary encoder or cursor keys, set whether to sort the power in ascending or descending order.

3 Inputting a label

(1) Press the <MEMORY> key or the <FILE> key.

(2) Press the < LABEL > soft key.

(3) The label input window will open, so input the label.
Up to 36 characters can be input for the label.

◇ Label input soft keys

<←>: The cursor in the label input area will move one character to the left.

<→>: The cursor in the label input area will move one character to the right.

<INSERT>: A blank space will be inserted one character at the cursor position in the label input area, and the character string to the right of the cursor will shift to the right.

<DELETE>: The character at the cursor position in the label input area will be deleted, and the character string to the right of the cursor will shift to the left.

<ENTER>: The characters at the cursor potion in the label window will be set at the cursor position in the label area.

<DONE>: The character string in the label input area will be copied to the label area at the top of the screen. The window will close, and the soft key menu will appear.

<RETURN>: The label input will be canceled, and the original soft key menu will appear.

5.6 Drift

Drift measurement

Drift measurement

Drift measurement refers to measuring the time-passage changes in the laser beam wavelength and power.
With this device, up to 256 wavelengths can be simultaneously drift measured.
The items that are drift measured include the difference with the reference of the measurements from the start to present measurements, the maximum variation width, maximum value and minimum value.

1 Carrying out measurement

(1) Press the < SWEEP > key.

(2) Press the < DRIFT > soft key.

(3) Press the < DRIFT MODE ON/OFF > soft key.

(4) The ON and OFF state will alternate each time the <DRIFT MODE ON/OFF> soft key is pressed.
Set ON for drift measurement.

2 Ending drift measurement

(1) Press the < SWEEP > key.

(2) Press the < DRIFT > soft key.

(3) Press the < DRIFT MODE ON/OFF > soft key.
The ON and OFF state will alternate each time the <DRIFT MODE ON/OFF> soft key is pressed.

3 Select the drift mode

(1) Press the < SWEEP > key.

(2) Press the < DRIFT > soft key.

(3) Press the < Δ MAX MIN MAX-MIN > soft key.
DRIFT Δ, DRIFT MAX, DRIFT MIN, or DRIFT MAX-MIN can be selected.

4 Set the drift reference

(1) Press the <SWEEP> key.

(2) Press the <DRIFT> soft key.

(3) Press the <DRIFT REF SET> soft key.

5 Using the TRAP function

(1) Press the < SWEEP > key.

(2) Press the < DRIFT OPTION > soft key.

(3) Select the TRAP function 1 to 3 with the soft key.

◇ TRAP function 1 (TRAP Δλ)

Of all of the peak spans, if one or more peak span exceeds Δm, a message will appear, and the measurement will stop.

Setting range: For wavelength 0.001 to 380nm (0.001nm step)

For frequency 0.0001 to 54.36THz (0.0001THz step)

For Wave number 0.01 to 1814cm-1 (0.01cm-1 step)

◇TRAP function 2 (TRAP DRIFT)

Of all of the peak wavelengths λ, if the difference (deviation) of even one between the measurement start and the drift reference value exceeds Δλ, a message will appear, and the measurement will stop.

Setting range: For wavelength 0.001 to 100.000nm(0.001nm step)

For frequenc 0.0001 to 20.0000THz(0.0001THz step)

For Wave number 0.01 to 1000.00cm-1(0.01cm-1 step)

◇ TRAP function 3 (TRAP ΔPw)

Of all of the peak power levels, if the difference (deviation) of even one between the measurement start and the drift reference value exceeds ΔW, a message will appear, and the measurement will stop.

Setting range: 0.001 to 20.000dB(0.001dB step)

If a peak exceeds a predetermined allowable range when respective TRAP functions are turned on, measurement will be stopped. "#" will be indicated on the right side of the peak beyond the allowable range.

6 Setting the DRIFT interval

(1) Press the <SWEEP> key.

(2) Press the <DRIFT> soft key

(3) Press the <DRIFT INTERVAL> soft key

Setting range: FAST,2sec to 999min59sec

Default value: FAST

Note

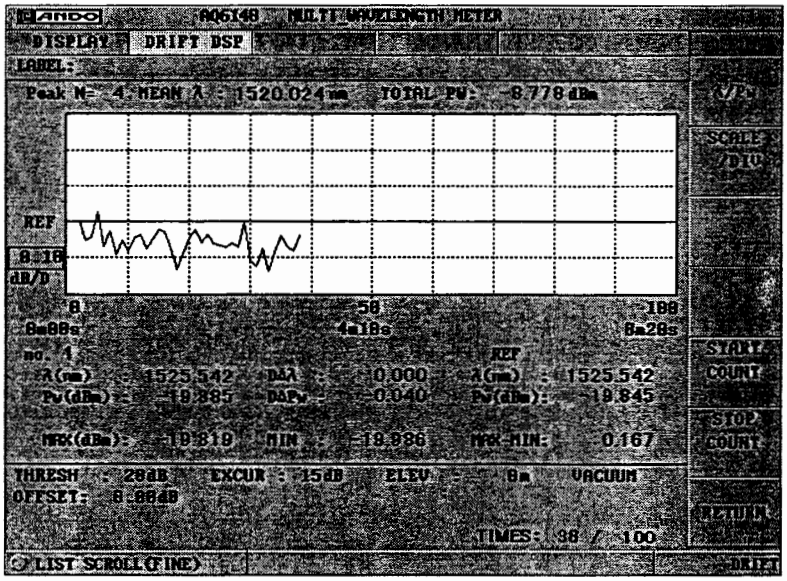
The repeat interval select the "FAST" by the following functiions.

turning power off,INITIAL soft key,"*RST" command,"PRESet" command

DRIFT display function

The DRIFT display function is used to display DRIFT volume in a graph format. This function is available only when a DRIFT count is specified. This function allows you to determine wavelength of each peak and trend of variations in power, making it helpful when, for instance, evaluating temperature characteristics of a light source.

An example of DRIFT display screen:



1 Using the DRIFT display function

(1) Press the < DISPLAY > key.

(2) Press the < DRIFT DISPLAY > soft key.

Note

Note that the DRIFT display screen is not available when you have not specified a DRIFT count after selecting the DRIFT ON.
Also note that the DRIFT screen is not usable for various setups.

2 Setting the DRIFT times

(1) Press the < SWEEP > key.

(2) Press the < DRIFT > soft key.

(3) Press the < DRIFT TIMES > soft key.

(4) Set the drift times with the rotary encoder or numeric keys.

Setting range: 0(Endless),10 to 3000

Default value: 0(Endless)

Note: Executing the following function will set "0" (Endless) for the DRIFT count.

INITIAL soft key,"*RST" command,"PRESet" command

3 Changing the Drift value type(wavelength or power)

(1) Set the DRIFT display mode.

(2) Press the < ∗/Pw > soft key.

(3) Change the drift valuetype (wavelength or power)

"∗" marking represents the unit currently selected for X axis.

4 Changing a starting count of the DRIFT display screen

(1) Set the DRIFT display mode.

(2) Press the < START COUNT > soft key.

(3) Set the starting count with the rotary encoder or numeric keys.

Setting range: 0 to (Specified drift count-10)

Default value: 0

5 changing an ending count of the DRIFT display screen

(1) Set the DRIFT display mode.

(2) Press the < STOP COUNT > soft key.

(3) Set the ending count with the rotary encoder or numeric keys.

Setting range: 10 to (Specified drift count)

Default value: Specified drift count

6 changing a vertical axis scale of the DRIFT display screen

(1) Set the DRIFT display mode.

(2) Press the < SCALE/DIV > soft key.

(3) Set the vertical axis scale with the rotary encoder or numeric keys.

Setting range:

For wavelength mode: 0.005～1.000nm
For frequency mode: 0.0005～0.1000THz
For wave number mode: 0.05～10.00cm^{-1}
For power mode: 0.1～10.0dB

Default value:

For wavelength mode: 0.005nm
For frequency mode: 0.0005THz
For wave number mode: 0.05cm^{-1}
For power mode: 0.1dB

7 changing a peak number on the DRIFT display screen

(1) Press the < DISPLAY > key.

(2) Press the < NORMAL DISPLAY > soft key.

(or Press the <TABLE ONLY> soft key)

(3) Enter a desired peak number from the rotary encoder or numerical keypad.

(4) Press the < DRIFT DISPLAY > soft key.

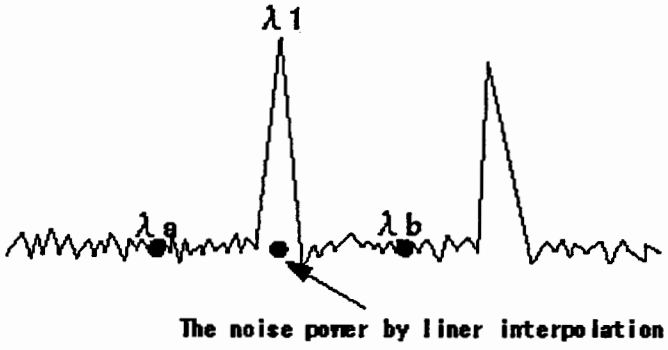
5.7 S/N ratio

S/N ratio measurement

The S/N ratio is the ratio of the peak absolute power and noise absolute power. As the S/N ratio has a direct relation with the bit error rate, important for the WDM system, the system can be evaluated by measuring the S/N ratio.
The automatic interpolation, user input wavelength or average methods can be used to analyze the S/N ratio with this device.

S/N ratio measurement with automatic interpolation

With automatic interpolation, first the laser beam adjacent to the laser beam being measured is searched for. If the distance of the laser beam closest to the laser beam being measured is 200GHz or less, that center point, and two points on the opposite side of the laser beam being measured, separated by this distance are used to measure the noise power with linear interpolation.
If the closest laser beam is 200GHz or further away or if it does not exist, points at 100GHz on both sides of the laser beam being measured are used to measure the noise power with linear interpolation.
In the following example, the λ 1 S/N ratio is obtained with the noise power and λ 1 power using linear interpolation between the λ a and λ b points.



S/N ratio measurement with user input wavelength

With S/N ratio measurement with user input wavelength, the noise power of the wavelength input by the user is used to measure the S/N ratio of all laser beams being measured.

S/N ratio measurement with user input noise level

In this measurement, S/N ratio of every target laser is measured based on a noise power volume entered by the user.

S/N ratio measurement with average

With S/N ratio measurement with average, the noise floor is lowered with averaging. The noise power is obtained with automatic interpolation from this noise floor lowered with averaging, so the S/N ratio can be improved.
Generally with a modulated laser beam, the noise floor rises, so by using averaging, the noise floor can be lowered to the real noise level and the accurate S/N ratio can be measured.

1 Using the SN ratio analysis function

(1) Press the < ANALYSIS > key.

(2) Press the < S/N > soft key.
Refer to the following items.

(3) Press the soft key (S/N AUTO, S/N USER, S/N AVG) according to the analysis method.

2 Ending S/N ratio analysis at each sweep

(1) Press the <ANALYSIS> key.

(2) Press the <S/N> soft key.

(3) Press the <S/N ON/OFF> soft key.

3 Set the No. of averages for SN AVG

(1) Press the <ANALYSIS> key.

(2) Press the <S/N> soft key.

(3) Press the <AVG TIMES> soft key.
Setting range: 10~900(1step)
Default: 100

5.8 Recalling and saving the results

1 Saving the measurement condition and results in the memory

(1) Press the <MEMORY> key.

(2) Press the <SAVE> soft key.

(3) A window indicating the memory No. will appear.

(4) Designate the memory No. with the <UP> and <DOWN> soft keys, the rotary encoder or the cursor keys.

(5) When the <SAVE MEMORY> soft key is pressed, the measurement conditions and results will be saved in the memory, and the original menu will appear.

2 Reading the memory contents (Measurement conditions and results)

(1) Press the <MEMORY> key.

(2) Press the <SAVE> soft key.

(3) A window indicating the memory No. will appear.

(4) Designate the memory No. with the <UP> and <DOWN> soft keys, the rotary encoder or the cursor keys.

(5) When the <RECALL MEMORY> soft key is pressed, the measurement conditions and results will be saved in the memory, and the original menu will appear.

3 Saving the measurement conditions or measurement conditions and results on an FD

(1) Press the <FILE> key.

(2) Press the <SAVE> soft key.

(3) Set the file save conditions.

(4) When the <SAVE FILE> key is pressed, the file will be saved with the type set in the save conditions, and then the original menu will appear.

◇ Setting the save conditions

The items to be set are the drive, directory, file type and file name.

Move between the items with the <NEXT ITEM> soft key.

The file type can be selected from HST (SETTING), TXT (DATATXT), HWV (TRACE), BMP (GRAPHIC) or TIF (GRAPHIC).

◇ Referring to the directory list

When the <DIRECTORY LIST> soft key is pressed, a list of files in the current directory will appear.

The previous or next files can be displayed by pressing the <UP> or <DOWN> soft keys.

The previous pages and next of the file list can be displayed by pressing the <PAGE UP> and <PAGE DOWN> keys.

4 Recalling the measurement conditions or measurement conditions and results from an FD

(1) Press the <FILE> key.

(2) Press the <RECALL> soft key.

(3) Set the file recall conditions.

(4) Select the file name, and recall the file by pressing the <RECALL FILE> key. Then, the original menu will appear.

◇ Setting the recall conditions

The items to be set are the drive, directory and file type.

When the recall conditions are set, a list of files corresponding to the conditions will appear.

Move between the items with the <NEXT ITEM> soft key.

The file type can be selected from "ALL FILE", "TRACE", "SETTING" or "GRAPHIC".

◇ Changing the file list page

The next and previous pages of the file list can be displayed by pressing the <PAGE UP> and <PAGE DOWN> keys.

◇ Sorting the file list

(1) Press the <RECALL> key.

(2) Press the <MORE> soft key to display the next soft key menu.

(3) Press the <MORE> soft key.

(4) Press the <SORT BY> soft key.

(5) Select the sorting type with the <NEXT ITEM>, <UP> and <DOWN> soft keys.

(6) The file list will be sorted when the <ENTER> soft key is pressed.

◇ Printing the file list

(1) Press the <RECALL> key.

(2) Press the <MORE> soft key to display the next soft key menu.

(3) The currently displayed file list will be printed when the <PRINT LIST> soft key is pressed.

5 Copying the files

(1) Press the <FILE> key.

(2) Press the <COPY> soft key.

(3) Set the copy source and copy destination.

(4) When the <SELECT FILE> soft key is pressed, a list of the copy source files will appear.

(5) Select the file to be copied with the <MARK FILE> soft key.

A "*" mark will appear before the selected file.

If the <MARK FILE> soft key is pressed again, the "*" mark will be removed and the selection will be canceled.

(6) When the <COPY FILE> soft key is pressed, the file will be copied, and then the original menu will appear.

◇ Setting the copy source

The items to be set are the drive and directory.

Change the item with the <UP> and <DOWN> soft keys.

Press the <ENTER> soft key to display the contents of the item.

◇ Setting the copy destination

The items to be set are the drive and directory.

Change the item with the <UP> and <DOWN> soft keys.

Press the <ENTER> soft key to display the contents of the item.

6 Deleting a file

(1) Press the <FILE> key.

(2) Press the <DLELTE> soft key.

(3) Set the file list conditions.

(4) Press the <SELECT FILE> soft key, and select the file to be deleted.

(5) When the <DELETE FILE> soft key is pressed, the file will be deleted, and then the original menu will appear.

◇Setting the file list conditions

Set the drive, directory and file type for the file list conditions.

The file type can be selected from "ALL FILE", "TRACE", "SETTING" or "GRAPHIC".

A list of the files that match the set conditions will appear.

◇ Changing the file list page

Display the next and previous pages of the file list by pressing the <PAGE UP> and <PAGE DOWN> keys.

7 Formatting

(1) Press the <FILE> key.

(2) Press the <FORMAT> soft key.

(3) Using the <SELECT DRIVE> soft key, designate the drive to be formatted.
Select the drive with the <UP> and <DOWN> soft keys, and set the selection by pressing the <ENTER> soft key.

(4) When the <FORMAT DRIVE> soft key is pressed, the formatting will be executed.

8 Creating a directory

(1) Press the <FILE> key.

(2) Press the <FORMAT> soft key.

(3) Press the <CREATIVE DELETE DIRECTRY> soft key.

(4) Input the directory name with the <MORE> soft key.

(5) Press the <CREATE DIRECTORY> soft key.

9 Deleting a directory

(1) Press the <FILE> key.

(2) Press the <FORMAT> soft key.

(3) Press the <CREATIVE DELETE DIRECTORY> soft key.

(4) Set the directory.

(5) Press the <DELETE DIRECTORY> soft key.

Conditions required when saving measurement conditions into a file

Item	Note
Label	
Center wavelength	
Sweep span	
Starting wavelength	
Ending wavelength	
X axis unit	
Reference level	
Log scale	
Base level	As for LIN scale
Power unit	
AUTO Function AUTO CENTER Function ON/OFF AUTO REF LEVEL Function ON/OFF AUTO SEARCH Function ON/OFF	
S/NFunction ON/OFF S/N ratio analysis approach User wavelength User noise level Num of averages	
Medium	
Elevation	
Peak search threshold	
Peak search Excursion	
Offset value for power measurement	
Fabry-Perot ON/OFF	
Display screen type	Not available from the DRIFT screen
Move marker, Line marker	
Relative display	
Sort direction	
REF cursor position	When the relative display ON is selected
1 peak display	
GRID function OFF GRID SPAN GRID CENTER GRID CHK	Turning on the GRID function does not save the measurement conditions
DRIFT function OFF Display type DRIFT times TRAP △* function ON/OFF Setting value of TRAP △* TRAP DRIFT function ON/OFF Seting value of TRAP DRIFT TRAP △Pw function ON/OFF Setting value of TRAP △Pw	Turning on the DRIFT function does not save the measurement conditions

5.9 Printing the results

1 Setting the printer

(1) Press the <SYSTEM> soft key.

(2) Press the <PARAM.> soft key.

(3) Using the soft keys, set the printer port, print type and printer model.

2 Setting the printer port (Centronics, RS-232-C, FILE)

(1) Press the <SYSTEM> soft key.

(2) Press the <PARAM.> soft key.

(3) Set the printer port with the rotary encoder or cursor keys.

(4) The set printer port will be validated when the <ENTER> soft key is pressed.

Setting range: CENTRONICS、RS-232C、FILE

Default value : CENTRONICS

Reference

When you set the printer port in "FILE".
When the <PRINT> key is pushed, the file is preserved according to a set condition of FILE/SAVE.
Setting the print type and the printer model becames invalid.

---

3 Setting the print type (HORIZONTAL, VERTICAL, SCREEN)

(1) Press the <SYSTEM> soft key.

(2) Press the <PARAM> soft key.

(3) Set the print type with the rotary encoder or cursor keys.

(4) The set print type will be validated when the <ENTER> soft key is pressed.

Setting range: HORIZONTAL、VERTICAL、SCREEN

Default value: SCREEN

4 Setting the printer model

(1) Press the <SYSTEM> soft key.

(2) Press the <PARAM> soft key.

(3) Set the printer model with the rotary encoder or cursor keys.

(4) The set printer model will be validated when the <ENTER> key is pressed.

Setting range: EPSON(ESC/P)、CANON(LIPS)、NEC(PC-PR)、HPGL、PCL、POSTSCRIPT、SEIKO(DPU411)、SEIKO(DPU412)

5.10 Remote

Setting the remote
The GP-IB or RS-232-C is set.

1 Setting GP-IB address

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set GP-IB address with the rotary encoder or numeric keys.

(4) The set GP-IB address will be validated when the <ENTER> key is pressed.
Setting value: 0 to 30

Default value: 7

2 Setting the RS-232-C baud rate

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set the baud rate with the rotary encoder or numeric keys.

(4) The set baud rate will be validated when the <ENTER> key is pressed.
Setting value: 300,600,1200,2400,4800,9600,19200

Default value: 9600

3 Setting the RS-232-C data bit length

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set the data bit length with the rotary encoder or numeric keys.

(4) The set data bit length will be validated when the <ENTER> key is pressed.
Setting value: 5,6,7,8

Default value: 8

4 Setting the RS-232-C parity bit

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set the parity bit with the rotary encoder or cursor keys.

(4) The set parity bit will be validated when the <ENTER> key is pressed.
Setting range: NONE,ODD,EVEN

Default value: NONE

5 Setting the RS-232-C stop bit

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set the stop bit with the rotary encoder or cursor keys.

(4) The set stop bit will be validated when the <ENTER> key is pressed.
Setting range: 1,1.5,2
("1.5" is applicable only when the data bit length is "5")
Default value: 1

6 Setting the RS-232-C flow control

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Set the flow control with the rotary encoder or cursor keys.

(4) The set flow control will be validated when the <ENTER> key is pressed.
Setting range: Xon/Xoff、HARDWARE、NONE

Default value: NONE

5.11 Analysis

The marker is valid for the active trace.

1 Displaying the movement marker.

(1) Press the <MARKER> key.

(2) Press the <MARKER> soft key.

(3) The marker will appear above the waveform of the peak wavelength.
The marker value will appear in the data area.

Note: This step is invalid if a marker is already displayed.

2 Setting the movement marker position to the center wavelength

(1) Press the <MARKER> key.

(2) Press the <MARKER →CENTER> soft key.

(3) The movement marker position will be set to the center wavelength, and the waveform will be redrawn.

3 Setting the movement marker to a fixed marker

(1) Press the <MARKER> key.

(2) Press the <SET MKR> soft key.

(3) The movement marker will be set to a fixed marker. The marker value will appear in the data area.
The movement maker can be moved even after fixing.

4 Erasing a movement or fixed marker

Note: All of the movement markers, fixed markers and marker values in the data area will be erased.

(1) Press the <MARKER> key.

(2) Press the <ALL MARKER CLEAR> soft key.

(3) The movement and fixed markers, and the marker values in the data area will be erased.

5 Setting the wavelength line marker

(1) Press the <MARKER> key.

(2) Press the <MORE> soft key.

(3) Press the <LINE MARKER1(2)> soft key.

(4) The wavelength line marker 1 will appear at a position one-quarter from the left edge of the screen.

(The wavelength line marker 2 will appear at a position one-quarter from the right edge of the screen.)
This step is invalid if a line marker is already displayed.

6 Setting the level line marker

(1) Press the <MARKER> key.

(2) Press the <MORE> soft key.

(3) Press the <LINE MARKER3(4)> soft key.

(4) The level line marker 3 will appear at a position one-quarter from the top edge of the screen.

(The level line marker 4 will appear at a position one-quarter from the bottom edge of the screen.)
This step is invalid if a line marker is already displayed.

7 Erasing the line markers

Note All line markers and line marker values displayed will be erased.

(1) Press the <MARKER> key.

(2) Press the <MORE> soft key.

(3) Press the <LINE MKR CLEAR> soft key.

(4) All line markers and line marker values displayed will be erased.

Fabry-Perot Analysis

When Fabry-Perot analysis is turned ON, the following items will appear on the screen.

* Peak Amplitude (Maximum peak value): Ppeak
* Peak Wavelength (Wavelength with maximum peak): λ peak
* Total Power (Total peak): Ptotal
* Mode Spacing (Peak spacing): Δ λ mode
* Mean Wavelength (Average wavelength): λ mean
* Full width at half Maximum(FWHM): λ FWHM
* Sigma(Σ): Δ λ

The above items are obtained with the following calculation expressions.

◇ Ppeak

The peak values in the peak table are sorted in order of large No., and the highest (largest) data=Ppeak

◇ λ peak

Wavelength having Ppeak= λ peak

◇Ptotal

$$Ptotal = \sum_{i=1}^{n} Pi$$

◇ Δ λ mode(SPACE λ)

$$\Delta\lambda mode = \frac{\sum_{i=1}^{n-1}(\lambda i+1 - \lambda i)}{n-1} = \frac{\lambda n - \lambda 1}{n-1}$$

◇ λ mean

$$\lambda mean = \frac{\sum_{i=1}^{n}(Pi \times \lambda i)}{\sum_{i=1}^{n} Pi}$$

◇FWHM

$$FWHM = 2.355 \times SIGMA$$

◇SIGMA

$$SIGMA = \sqrt{\frac{\sum_{i=1}^{n} Pi \times (\lambda i - \lambda mean)^2}{Ptotal}}$$

1 Carrying out Fabry-Perot analysis at each sweep

(1) Press the <ANALYSIS> key.

(2) Press the <FABRY-PEROT ON/OFF> soft key.

(3) The ON and OFF state will alternate with each press of the <FABRY-PEROT ON/OFF> soft key.
When set to ON, Fabry-Perot analysis will be carried out at each sweep.

2 Ending Fabry-Perot analysis after each sweep

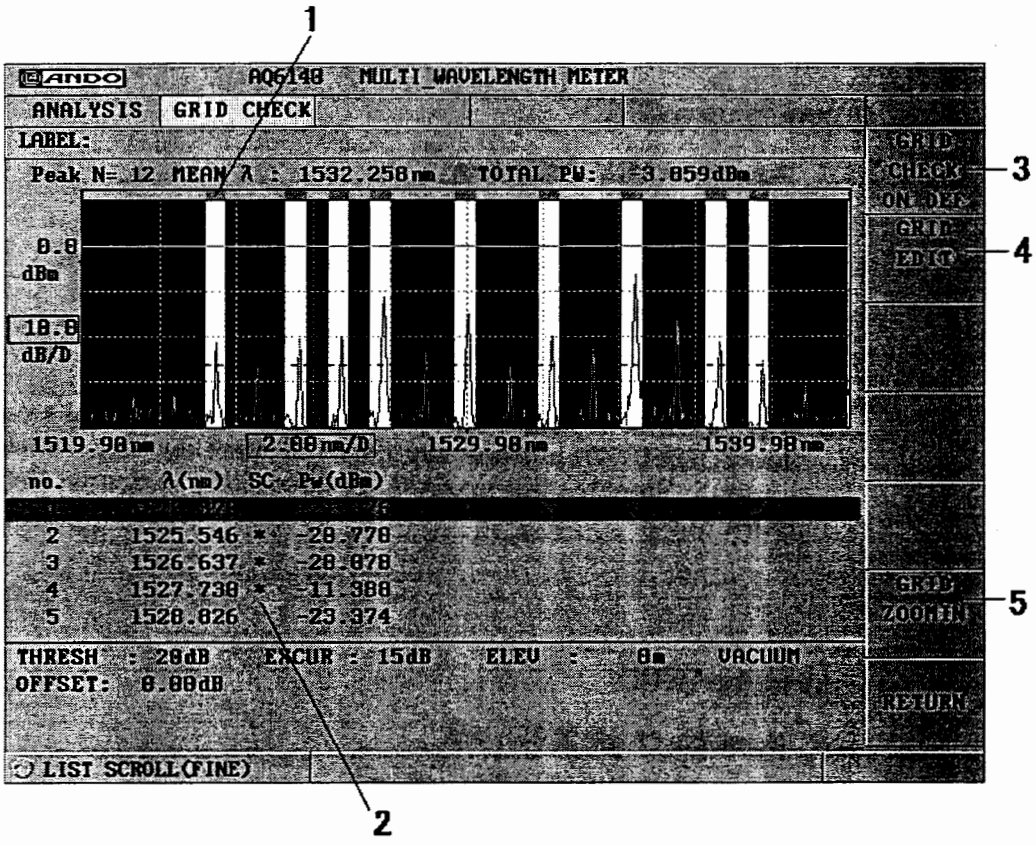
(1) Press the <ANALYSIS> key.

(2) Press the <FABRY-PEROT ON/OFF> soft key.

(3) The ON and OFF state will alternate with each press of the <FABRY-PEROT ON/OFF> soft key.
When set to OFF, Fabry-Perot analysis will be carried out at each sweep.

GRID analysis function

Turn the GRID analysis on to determine if a peak exists within the GRID.
An example of the GRID analysis screen:



No.	Item	Explanation
1	GRID	Displays the range (GRID) within which presence or absence a peak is determined.
2	SC MARK (SECTION CHECK)	"*" marking is attached to the peak within the GRID. Display condition of SC mark ・The range of GRID ・GRID CHK must be turning on ・Peak by peak search The SC mark is displayed in the peak with which the above-mentioned condition is filled.
3	GRID CHECK ON OFF	It is the ON/OFF software key for the GRID analysis function.
4	GRID EDIT	It is the software key used to edit the GRID.
5	GRID ZOOMIN	It zooms up the GRID situated at the current cursor line. You can zoom up only those peaks that are attached with SC mark ("*").

1 Using the GRID analysis function

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID CHECK ON/OFF> soft key.

2 Zooming up a GRID

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Move the cursor on to the peak wavelength to be zoomed in.

(4) Press the <GRID ZOOMIN> soft key.

Note

When a GRID is zoomed up, you can return to the original screen only from the <ZOOMOUT> software key alone (no other key will restore the original screen). Note that line markers are deleted if you operate the <ZOOMOUT> software key.

3 Editing the GRID

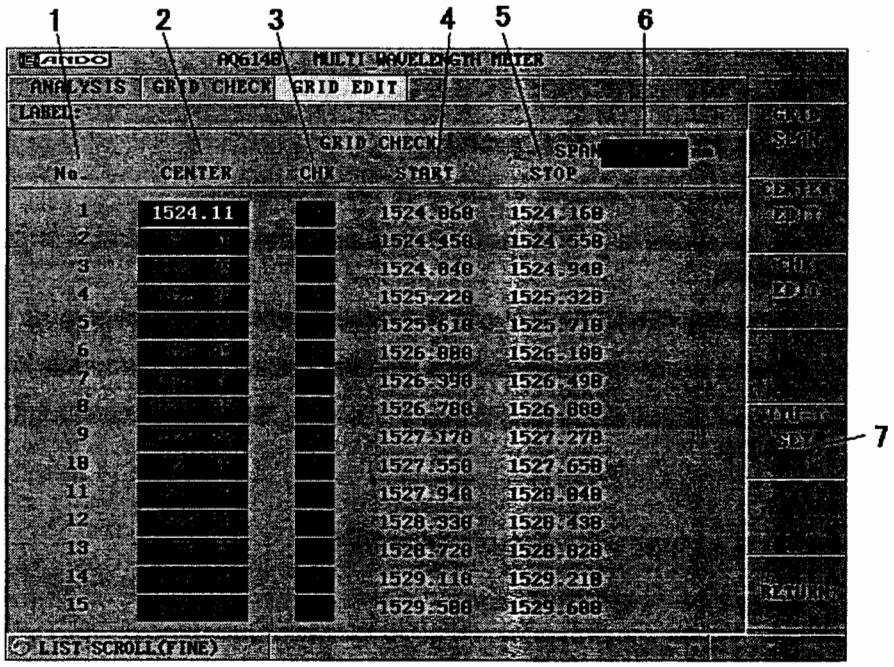
(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key to turn on the GRID edit screen.

Editing item: GRID CENTER、GRID SPAN、CHK、ITU-T SET

An example of the DRID edit screen:



No.	Item	Explanation
1	GRID No.	GRID 番号です。
2	GRID center wavelength	Center wavelength of the GRID. Enter center wavelengths from the <EDIT> software key. Enter a center wavelength to each GRID in ascending of GRID No (in descending order when entering frequencies or wave numbers).
3	CHK mark	"*" marking is attached to the GRID within which presence or absence of peak is to be determined.
4	GRID starting wavelength	It is the starting wavelength of the GRID. It is automatically selected from the GRID CENTER and GRIP SPAN.
5	GRID ending wavelength	It is the ending wavelength of the GRID. It is automatically selected from the GRID CENTER and GRIP SPAN.
6	GRID SPAN	Select a GRID span with the GRID CENTER at the center. You cannot specify a value that causes overlapping between the preceding and succeeding GRIDs.
7	ITU-T SET	Enter all ITU-T specification-conformed center wavelengths in block (CHK for every GRID is turned ON).

4 Setting the GRID center

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) The cursor will appear at the GRIP No. 1 position.

(5) ou can move to a GRID to be edited using the rotary encoder or numerical keypad.

(6) Press the <ENTER> key and the numeric edit screen will pop up.

(7) Enter a center wavelength from the rotary encoder or numerical keypad.

(8) Repeat above steps (5) through (7) to enter the center wavelength for other GRIDs.

5 Deleting a center wavelength of a GRID

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CENTER EDIT> soft key.

(5) Using the rotary encoder or numerical keypad, select the GRID whose center wavelength is to be deleted.

(6) Press the <CLEAR> software key to delete the center wavelength.

(7) Repeat steps (5) and (6) to delete other center wavelengths.

6 Deleting the center wavelength of respective GRID in block.

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CENTER EDIT> soft key.

(5) Press the <ALL CLEAR> soft key.

(6) Select "Yes" to the message confirming the block delete.

(7) All center wavelengths will be deleted.

7 Selecting a GRID on which the GRID analysis it be performed(1)

If you select CHK mark ("*"), presence or absence of a peak within the specified GRID will be checked.

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CHK EDIT> soft key.

(5) Using the rotary encoder or numerical keypad, select the GRID on which the GRID analysis is to take place.

(6) Press the <ENTER> key to display CHK mark ("*").

Pressing the <ENTER> key will sequentially select ON ("*" is displayed) and OFF ("*" is not displayed).

(7) Repeat steps (5) and (6) to set CHK for other GRIDs.

8 Selecting a GRID on which the GRID analysis it be performed(2)

Selecting a range to which CHK marks ("*") are to be attached.

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CHK EDIT> soft key.

(5) Press the <START CHK> soft key.

(6) The window for entering the starting GRID No. will appear.

(7) Using the rotary encoder or numerical keypad, enter the GRID No. from which CHK mark is started.

(8) Press the <STOP CHK> soft key.

(9) The window for entering the ending GRID No. will appear.

(10) Using the rotary encoder or numerical keypad, enter the GRID No. from which CHK mark is ended.

(11) CHK marks will be attached to all GRIDs within the specified range.

9 Deleting CHK mark from a GRID

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CHK EDIT> soft key.

(5) Using the rotary encoder or numerical keypad, select a GRID whose CHK mark is to be deleted.

(6) Press the <CLEAR> software key to delete CHK mark.

(7) Repeat steps (5) and (6) to delete CHK for other GRIDs.

10 Used to delete all CHK marks in block

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <CHK EDIT> soft key.

(5) Press the <ALL CLEAR> soft key.

(6) Select "Yes" to the message confirming the block delete.

(7) You can delete CHK marks in block.

11 Enter ITU-T specification-conformed GRID

(1) Press the <ANALYSIS> key.

(2) Press the <GRID CHECK> soft key.

(3) Press the <GRID EDIT> soft key.

(4) Press the <ITU-T SET> soft key.

(5) Select "Yes" to the message confirming the block input.

Enter ITU-T specification-conformed wavelengths in block (every CHK mark is turned ON).

ITU-T specification-conformed wavelengths (nm) 1/4

GRID No.	CENTER	CHK	START	STOP
1	1524.11	*	1524.06	1524.16
2	1524.50	*	1524.45	1524.55
3	1524.89	*	1524.84	1524.94
4	1525.27	*	1525.22	1525.32
5	1525.66	*	1525.61	1525.71
6	1526.05	*	1526.00	1526.10
7	1526.44	*	1526.39	1526.49
8	1526.83	*	1526.78	1526.88
9	1527.22	*	1527.17	1527.27
10	1527.60	*	1527.55	1527.65
11	1527.99	*	1527.94	1528.04
12	1528.38	*	1528.33	1528.43
13	1528.77	*	1528.72	1528.82
14	1529.16	*	1529.11	1529.21
15	1529.55	*	1529.50	1529.60
16	1529.94	*	1529.89	1529.99
17	1530.33	*	1530.28	1530.38
18	1530.72	*	1530.67	1530.77
19	1531.12	*	1531.07	1531.17
20	1531.51	*	1531.46	1531.56
21	1531.90	*	1531.85	1531.95
22	1532.29	*	1532.24	1532.34
23	1532.68	*	1532.63	1532.73
24	1533.07	*	1533.02	1533.12
25	1533.47	*	1533.42	1533.52
26	1533.86	*	1533.81	1533.91
27	1534.25	*	1534.20	1534.30
28	1534.64	*	1534.59	1534.69
29	1535.04	*	1534.99	1535.09
30	1535.43	*	1535.38	1535.48
31	1535.82	*	1535.77	1535.87
32	1536.22	*	1536.17	1536.27
33	1536.61	*	1536.56	1536.66
34	1537.00	*	1536.95	1537.05
35	1537.40	*	1537.35	1537.45
36	1537.79	*	1537.74	1537.84
37	1538.19	*	1538.14	1538.24
38	1538.58	*	1538.53	1538.63
39	1538.98	*	1538.93	1539.03
40	1539.37	*	1539.32	1539.42
41	1539.77	*	1539.72	1539.82
42	1540.16	*	1540.11	1540.21
43	1540.56	*	1540.51	1540.61
44	1540.95	*	1540.90	1541.00
45	1541.35	*	1541.30	1541.40
46	1541.75	*	1541.70	1541.80
47	1542.14	*	1542.09	1542.19
48	1542.54	*	1542.49	1542.59
49	1542.94	*	1542.89	1542.99
50	1543.33	*	1543.28	1543.38
51	1543.73	*	1543.68	1543.78
52	1544.13	*	1544.08	1544.18
53	1544.53	*	1544.48	1544.58
54	1544.92	*	1544.87	1544.97
55	1545.32	*	1545.27	1545.37

ITU-T specification-conformed wavelengths (nm) 2/4

GRID No.	CENTER	CHK	START	STOP
56	1545.72	*	1545.67	1545.77
57	1546.12	*	1546.07	1546.17
58	1546.52	*	1546.47	1546.57
59	1546.92	*	1546.87	1546.97
60	1547.32	*	1547.27	1547.37
61	1547.72	*	1547.67	1547.77
62	1548.11	*	1548.06	1548.16
63	1548.51	*	1548.46	1548.56
64	1548.91	*	1548.86	1548.96
65	1549.32	*	1549.27	1549.37
66	1549.72	*	1549.67	1549.77
67	1550.12	*	1550.07	1550.17
68	1550.52	*	1550.47	1550.57
69	1550.92	*	1550.87	1550.97
70	1551.32	*	1551.27	1551.37
71	1551.72	*	1551.67	1551.77
72	1552.12	*	1552.07	1552.17
73	1552.52	*	1552.47	1552.57
74	1552.93	*	1552.88	1552.98
75	1553.33	*	1553.28	1553.38
76	1553.73	*	1553.68	1553.78
77	1554.13	*	1554.08	1554.18
78	1554.54	*	1554.49	1554.59
79	1554.94	*	1554.89	1554.99
80	1555.34	*	1555.29	1555.39
81	1555.75	*	1555.70	1555.80
82	1556.15	*	1556.10	1556.20
83	1556.55	*	1556.50	1556.60
84	1556.96	*	1556.91	1557.01
85	1557.36	*	1557.31	1557.41
86	1557.77	*	1557.72	1557.82
87	1558.17	*	1558.12	1558.22
88	1558.58	*	1558.53	1558.63
89	1558.98	*	1558.93	1559.03
90	1559.39	*	1559.34	1559.44
91	1559.79	*	1559.74	1559.84
92	1560.20	*	1560.15	1560.25
93	1560.61	*	1560.56	1560.66
94	1561.01	*	1560.96	1561.06
95	1561.42	*	1561.37	1561.47
96	1561.83	*	1561.78	1561.88
97	1562.23	*	1562.18	1562.28
98	1562.64	*	1562.59	1562.69
99	1563.05	*	1563.00	1563.10
100	1563.45	*	1563.40	1563.50
101	1563.86	*	1563.81	1563.91
102	1564.27	*	1564.22	1564.32
103	1564.68	*	1564.63	1564.73
104	1565.09	*	1565.04	1565.14
105	1565.50	*	1565.45	1565.55
106	1565.90	*	1565.85	1565.95
107	1566.31	*	1566.26	1566.36
108	1566.72	*	1566.67	1566.77
109	1567.13	*	1567.08	1567.18
110	1567.54	*	1567.49	1567.59

ITU-T specification-conformed wavelengths (nm) 3/4

GRID No.	CENTER	CHK	START	STOP
111	1567.95	*	1567.90	1568.00
112	1568.36	*	1568.31	1568.41
113	1568.77	*	1568.72	1568.82
114	1569.18	*	1569.13	1569.23
115	1569.59	*	1569.54	1569.64
116	1570.01	*	1569.96	1570.06
117	1570.42	*	1570.37	1570.47
118	1570.83	*	1570.78	1570.88
119	1571.24	*	1571.19	1571.29
120	1571.65	*	1571.60	1571.70
121	1572.06	*	1572.01	1572.11
122	1572.48	*	1572.43	1572.53
123	1572.89	*	1572.84	1572.94
124	1573.30	*	1573.25	1573.35
125	1573.71	*	1573.66	1573.76
126	1574.13	*	1574.08	1574.18
127	1574.54	*	1574.49	1574.59
128	1574.95	*	1574.90	1575.00
129	1575.37	*	1575.32	1575.42
130	1575.78	*	1575.73	1575.83
131	1576.20	*	1576.15	1576.25
132	1576.61	*	1576.56	1576.66
133	1577.03	*	1576.98	1577.08
134	1577.44	*	1577.39	1577.49
135	1577.86	*	1577.81	1577.91
136	1578.27	*	1578.22	1578.32
137	1578.69	*	1578.64	1578.74
138	1579.10	*	1579.05	1579.15
139	1579.52	*	1579.47	1579.57
140	1579.93	*	1579.88	1579.98
141	1580.35	*	1580.30	1580.40
142	1580.77	*	1580.72	1580.82
143	1581.18	*	1581.13	1581.23
144	1581.60	*	1581.55	1581.65
145	1582.02	*	1581.97	1582.07
146	1582.44	*	1582.39	1582.49
147	1582.85	*	1582.80	1582.90
148	1583.27	*	1583.22	1583.32
149	1583.69	*	1583.64	1583.74
150	1584.11	*	1584.06	1584.16
151	1584.53	*	1584.48	1584.58
152	1584.95	*	1584.90	1585.00
153	1585.36	*	1585.31	1585.41
154	1585.78	*	1585.73	1585.83
155	1586.20	*	1586.15	1586.25
156	1586.62	*	1586.57	1586.67
157	1587.04	*	1586.99	1587.09
158	1587.46	*	1587.41	1587.51
159	1587.88	*	1587.83	1587.93
160	1588.30	*	1588.25	1588.35
161	1588.73	*	1588.68	1588.78
162	1589.15	*	1589.10	1589.20
163	1589.57	*	1589.52	1589.62
164	1589.99	*	1589.94	1590.04
165	1590.41	*	1590.36	1590.46

ITU-T specification-conformed wavelengths (nm) 4/4

GRID No.	CENTER	CHK	START	STOP
166	1590.83	*	1590.78	1590.88
167	1591.26	*	1591.21	1591.31
168	1591.68	*	1591.63	1591.73
169	1592.10	*	1592.05	1592.15
170	1592.52	*	1592.47	1592.57
171	1592.95	*	1592.90	1593.00
172	1593.37	*	1593.32	1593.42
173	1593.79	*	1593.74	1593.84
174	1594.22	*	1594.17	1594.27
175	1594.64	*	1594.59	1594.69
176	1595.06	*	1595.01	1595.11
177	1595.49	*	1595.44	1595.54
178	1595.91	*	1595.86	1595.96
179	1596.34	*	1596.29	1596.39
180	1596.76	*	1596.71	1596.81
181	1597.19	*	1597.14	1597.24
182	1597.62	*	1597.57	1597.67
183	1598.04	*	1597.99	1598.09
184	1598.47	*	1598.42	1598.52
185	1598.89	*	1598.84	1598.94
186	1599.32	*	1599.27	1599.37
187	1599.75	*	1599.70	1599.80
188	1600.17	*	1600.12	1600.22
189	1600.60	*	1600.55	1600.65
190	1601.03	*	1600.98	1601.08
191	1601.46	*	1601.41	1601.51
192	1601.88	*	1601.83	1601.93
193	1602.31	*	1602.26	1602.36
194	1602.74	*	1602.69	1602.79
195	1603.17	*	1603.12	1603.22
196	1603.60	*	1603.55	1603.65
197	1604.03	*	1603.98	1604.08
198	1604.46	*	1604.41	1604.51
199	1604.88	*	1604.83	1604.93
200	1605.31	*	1605.26	1605.36
201	1605.74	*	1605.69	1605.79
202	1606.17	*	1606.12	1606.22
203	1606.60	*	1606.55	1606.65
204	1607.04	*	1606.99	1607.09
205	1607.47	*	1607.42	1607.52
206	1607.90	*	1607.85	1607.95

ITU-T specification-conformed frequency(THz) 1/4

GRID No.	CENTER	CHK	START	STOP
1	196.70	*	196.69	196.71
2	196.65	*	196.64	196.66
3	196.60	*	196.59	196.61
4	196.55	*	196.54	196.56
5	196.50	*	196.49	196.51
6	196.45	*	196.44	196.46
7	196.40	*	196.39	196.41
8	196.35	*	196.34	196.36
9	196.30	*	196.29	196.31
10	196.25	*	196.24	196.26
11	196.20	*	196.19	196.21
12	196.15	*	196.14	196.16
13	196.10	*	196.09	196.11
14	196.05	*	196.04	196.06
15	196.00	*	195.99	196.01
16	195.95	*	195.94	195.96
17	195.90	*	195.89	195.91
18	195.85	*	195.84	195.86
19	195.80	*	195.79	195.81
20	195.75	*	195.74	195.76
21	195.70	*	195.69	195.71
22	195.65	*	195.64	195.66
23	195.60	*	195.59	195.61
24	195.55	*	195.54	195.56
25	195.50	*	195.49	195.51
26	195.45	*	195.44	195.46
27	195.40	*	195.39	195.41
28	195.35	*	195.34	195.36
29	195.30	*	195.29	195.31
30	195.25	*	195.24	195.26
31	195.20	*	195.19	195.21
32	195.15	*	195.14	195.16
33	195.10	*	195.09	195.11
34	195.05	*	195.04	195.06
35	195.00	*	194.99	195.01
36	194.95	*	194.94	194.96
37	194.90	*	194.89	194.91
38	194.85	*	194.84	194.86
39	194.80	*	194.79	194.81
40	194.75	*	194.74	194.76
41	194.70	*	194.69	194.71
42	194.65	*	194.64	194.66
43	194.60	*	194.59	194.61
44	194.55	*	194.54	194.56
45	194.50	*	194.49	194.51
46	194.45	*	194.44	194.46
47	194.40	*	194.39	194.41
48	194.35	*	194.34	194.36
49	194.30	*	194.29	194.31
50	194.25	*	194.24	194.26
51	194.20	*	194.19	194.21
52	194.15	*	194.14	194.16
53	194.10	*	194.09	194.11
54	194.05	*	194.04	194.06
55	194.00	*	193.99	194.01

ITU-T specification-conformed frequency(THz) 2/4

GRID No.	CENTER	CHK	START	STOP
56	193.95	*	193.94	193.96
57	193.90	*	193.89	193.91
58	193.85	*	193.84	193.86
59	193.80	*	193.79	193.81
60	193.75	*	193.74	193.76
61	193.70	*	193.69	193.71
62	193.65	*	193.64	193.66
63	193.60	*	193.59	193.61
64	193.55	*	193.54	193.56
65	193.50	*	193.49	193.51
66	193.45	*	193.44	193.46
67	193.40	*	193.39	193.41
68	193.35	*	193.34	193.36
69	193.30	*	193.29	193.31
70	193.25	*	193.24	193.26
71	193.20	*	193.19	193.21
72	193.15	*	193.14	193.16
73	193.10	*	193.09	193.11
74	193.05	*	193.04	193.06
75	193.00	*	192.99	193.01
76	192.95	*	192.94	192.96
77	192.90	*	192.89	192.91
78	192.85	*	192.84	192.86
79	192.80	*	192.79	192.81
80	192.75	*	192.74	192.76
81	192.70	*	192.69	192.71
82	192.65	*	192.64	192.66
83	192.60	*	192.59	192.61
84	192.55	*	192.54	192.56
85	192.50	*	192.49	192.51
86	192.45	*	192.44	192.46
87	192.40	*	192.39	192.41
88	192.35	*	192.34	192.36
89	192.30	*	192.29	192.31
90	192.25	*	192.24	192.26
91	192.20	*	192.19	192.21
92	192.15	*	192.14	192.16
93	192.10	*	192.09	192.11
94	192.05	*	192.04	192.06
95	192.00	*	191.99	192.01
96	191.95	*	191.94	191.96
97	191.90	*	191.89	191.91
98	191.85	*	191.84	191.86
99	191.80	*	191.79	191.81
100	191.75	*	191.74	191.76
101	191.70	*	191.69	191.71
102	191.65	*	191.64	191.66
103	191.60	*	191.59	191.61
104	191.55	*	191.54	191.56
105	191.50	*	191.49	191.51
106	191.45	*	191.44	191.46
107	191.40	*	191.39	191.41
108	191.35	*	191.34	191.36
109	191.30	*	191.29	191.31
110	191.25	*	191.24	191.26

ITU-T specification-conformed frequency(THz) 3/4

GRID No.	CENTER	CHK	START	STOP
111	191.20	*	191.19	191.21
112	191.15	*	191.14	191.16
113	191.10	*	191.09	191.11
114	191.05	*	191.04	191.06
115	191.00	*	190.99	191.01
116	190.95	*	190.94	190.96
117	190.90	*	190.89	190.91
118	190.85	*	190.84	190.86
119	190.80	*	190.79	190.81
120	190.75	*	190.74	190.76
121	190.70	*	190.69	190.71
122	190.65	*	190.64	190.66
123	190.60	*	190.59	190.61
124	190.55	*	190.54	190.56
125	190.50	*	190.49	190.51
126	190.45	*	190.44	190.46
127	190.40	*	190.39	190.41
128	190.35	*	190.34	190.36
129	190.30	*	190.29	190.31
130	190.25	*	190.24	190.26
131	190.20	*	190.19	190.21
132	190.15	*	190.14	190.16
133	190.10	*	190.09	190.11
134	190.05	*	190.04	190.06
135	190.00	*	189.99	190.01
136	189.95	*	189.94	189.96
137	189.90	*	189.89	189.91
138	189.85	*	189.84	189.86
139	189.80	*	189.79	189.81
140	189.75	*	189.74	189.76
141	189.70	*	189.69	189.71
142	189.65	*	189.64	189.66
143	189.60	*	189.59	189.61
144	189.55	*	189.54	189.56
145	189.50	*	189.49	189.51
146	189.45	*	189.44	189.46
147	189.40	*	189.39	189.41
148	189.35	*	189.34	189.36
149	189.30	*	189.29	189.31
150	189.25	*	189.24	189.26
151	189.20	*	189.19	189.21
152	189.15	*	189.14	189.16
153	189.10	*	189.09	189.11
154	189.05	*	189.04	189.06
155	189.00	*	188.99	189.01
156	188.95	*	188.94	188.96
157	188.90	*	188.89	188.91
158	188.85	*	188.84	188.86
159	188.80	*	188.79	188.81
160	188.75	*	188.74	188.76
161	188.70	*	188.69	188.71
162	188.65	*	188.64	188.66
163	188.60	*	188.59	188.61
164	188.55	*	188.54	188.56
165	188.50	*	188.49	188.51

ITU-T specification-conformed frequency(THz) 4/4

GRID No.	CENTER	CHK	START	STOP
166	188.45	*	188.44	188.46
167	188.40	*	188.39	188.41
168	188.35	*	188.34	188.36
169	188.30	*	188.29	188.31
170	188.25	*	188.24	188.26
171	188.20	*	188.19	188.21
172	188.15	*	188.14	188.16
173	188.10	*	188.09	188.11
174	188.05	*	188.04	188.06
175	188.00	*	187.99	188.01
176	187.95	*	187.94	187.96
177	187.90	*	187.89	187.91
178	187.85	*	187.84	187.86
179	187.80	*	187.79	187.81
180	187.75	*	187.74	187.76
181	187.70	*	187.69	187.71
182	187.65	*	187.64	187.66
183	187.60	*	187.59	187.61
184	187.55	*	187.54	187.56
185	187.50	*	187.49	187.51
186	187.45	*	187.44	187.46
187	187.40	*	187.39	187.41
188	187.35	*	187.34	187.36
189	187.30	*	187.29	187.31
190	187.25	*	187.24	187.26
191	187.20	*	187.19	187.21
192	187.15	*	187.14	187.16
193	187.10	*	187.09	187.11
194	187.05	*	187.04	187.06
195	187.00	*	186.99	187.01
196	186.95	*	186.94	186.96
197	186.90	*	186.89	186.91
198	186.85	*	186.84	186.86
199	186.80	*	186.79	186.81
200	186.75	*	186.74	186.76
201	186.70	*	186.69	186.71
202	186.65	*	186.64	186.66
203	186.60	*	186.59	186.61
204	186.55	*	186.54	186.56
205	186.50	*	186.49	186.51
206	186.45	*	186.44	186.46

ITU-T specification-conformed wave number (cm^{-1}) 1/4

GRID No.	CENTER	CHK	START	STOP
1	6561.21	*	6561.01	6561.41
2	6559.54	*	6559.34	6559.74
3	6557.87	*	6557.67	6558.07
4	6556.20	*	6556.00	6556.40
5	6554.53	*	6554.33	6554.73
6	6552.87	*	6552.67	6553.07
7	6551.20	*	6551.00	6551.40
8	6549.53	*	6549.33	6549.73
9	6547.86	*	6547.66	6548.06
10	6546.20	*	6546.00	6546.40
11	6544.53	*	6544.33	6544.73
12	6542.86	*	6542.66	6543.06
13	6541.19	*	6540.99	6541.39
14	6539.52	*	6539.32	6539.72
15	6537.86	*	6537.66	6538.06
16	6536.19	*	6535.99	6536.39
17	6534.52	*	6534.32	6534.72
18	6532.85	*	6532.65	6533.05
19	6531.18	*	6530.98	6531.38
20	6529.52	*	6529.32	6529.72
21	6527.85	*	6527.65	6528.05
22	6526.18	*	6525.98	6526.38
23	6524.51	*	6524.31	6524.71
24	6522.85	*	6522.65	6523.05
25	6521.18	*	6520.98	6521.38
26	6519.51	*	6519.31	6519.71
27	6517.84	*	6517.64	6518.04
28	6516.17	*	6515.97	6516.37
29	6514.51	*	6514.31	6514.71
30	6512.84	*	6512.64	6513.04
31	6511.17	*	6510.97	6511.37
32	6509.50	*	6509.30	6509.70
33	6507.84	*	6507.64	6508.04
34	6506.17	*	6505.97	6506.37
35	6504.50	*	6504.30	6504.70
36	6502.83	*	6502.63	6503.03
37	6501.16	*	6500.96	6501.36
38	6499.50	*	6499.30	6499.70
39	6497.83	*	6497.63	6498.03
40	6496.16	*	6495.96	6496.36
41	6494.49	*	6494.29	6494.69
42	6492.83	*	6492.63	6493.03
43	6491.16	*	6490.96	6491.36
44	6489.49	*	6489.29	6489.69
45	6487.82	*	6487.62	6488.02
46	6486.15	*	6485.95	6486.35
47	6484.49	*	6484.29	6484.69
48	6482.82	*	6482.62	6483.02
49	6481.15	*	6480.95	6481.35
50	6479.48	*	6479.28	6479.68
51	6477.81	*	6477.61	6478.01
52	6476.15	*	6475.95	6476.35
53	6474.48	*	6474.28	6474.68
54	6472.81	*	6472.61	6473.01
55	6471.14	*	6470.94	6471.34

ITU-T specification-conformed wave number (cm^{-1}) 2/4

GRID No.	CENTER	CHK	START	STOP
56	6469.48	*	6469.28	6469.68
57	6467.81	*	6467.61	6468.01
58	6466.14	*	6465.94	6466.34
59	6464.47	*	6464.27	6464.67
60	6462.80	*	6462.60	6463.00
61	6461.14	*	6460.94	6461.34
62	6459.47	*	6459.27	6459.67
63	6457.80	*	6457.60	6458.00
64	6456.13	*	6455.93	6456.33
65	6454.47	*	6454.27	6454.67
66	6452.80	*	6452.60	6453.00
67	6451.13	*	6450.93	6451.33
68	6449.46	*	6449.26	6449.66
69	6447.79	*	6447.59	6447.99
70	6446.13	*	6445.93	6446.33
71	6444.46	*	6444.26	6444.66
72	6442.79	*	6442.59	6442.99
73	6441.12	*	6440.92	6441.32
74	6439.45	*	6439.25	6439.65
75	6437.79	*	6437.59	6437.99
76	6436.12	*	6435.92	6436.32
77	6434.45	*	6434.25	6434.65
78	6432.78	*	6432.58	6432.98
79	6431.12	*	6430.92	6431.32
80	6429.45	*	6429.25	6429.65
81	6427.78	*	6427.58	6427.98
82	6426.11	*	6425.91	6426.31
83	6424.44	*	6424.24	6424.64
84	6422.78	*	6422.58	6422.98
85	6421.11	*	6420.91	6421.31
86	6419.44	*	6419.24	6419.64
87	6417.77	*	6417.57	6417.97
88	6416.11	*	6415.91	6416.31
89	6414.44	*	6414.24	6414.64
90	6412.77	*	6412.57	6412.97
91	6411.10	*	6410.90	6411.30
92	6409.43	*	6409.23	6409.63
93	6407.77	*	6407.57	6407.97
94	6406.10	*	6405.90	6406.30
95	6404.43	*	6404.23	6404.63
96	6402.76	*	6402.56	6402.96
97	6401.09	*	6400.89	6401.29
98	6399.43	*	6399.23	6399.63
99	6397.76	*	6397.56	6397.96
100	6396.09	*	6395.89	6396.29
101	6394.42	*	6394.22	6394.62
102	6392.76	*	6392.56	6392.96
103	6391.09	*	6390.89	6391.29
104	6389.42	*	6389.22	6389.62
105	6387.75	*	6387.55	6387.95
106	6386.08	*	6385.88	6386.28
107	6384.42	*	6384.22	6384.62
108	6382.75	*	6382.55	6382.95
109	6381.08	*	6380.88	6381.28
110	6379.41	*	6379.21	6379.61

ITU-T specification-conformed wave number (cm^{-1}) 3/4

GRID No.	CENTER	CHK	START	STOP
111	6377.75	*	6377.55	6377.95
112	6376.08	*	6375.88	6376.28
113	6374.41	*	6374.21	6374.61
114	6372.74	*	6372.54	6372.94
115	6371.07	*	6370.87	6371.27
116	6369.41	*	6369.21	6369.61
117	6367.74	*	6367.54	6367.94
118	6366.07	*	6365.87	6366.27
119	6364.40	*	6364.20	6364.60
120	6362.74	*	6362.54	6362.94
121	6361.07	*	6360.87	6361.27
122	6359.40	*	6359.20	6359.60
123	6357.73	*	6357.53	6357.93
124	6356.06	*	6355.86	6356.26
125	6354.40	*	6354.20	6354.60
126	6352.73	*	6352.53	6352.93
127	6351.06	*	6350.86	6351.26
128	6349.39	*	6349.19	6349.59
129	6347.72	*	6347.52	6347.92
130	6346.06	*	6345.86	6346.26
131	6344.39	*	6344.19	6344.59
132	6342.72	*	6342.52	6342.92
133	6341.05	*	6340.85	6341.25
134	6339.39	*	6339.19	6339.59
135	6337.72	*	6337.52	6337.92
136	6336.05	*	6335.85	6336.25
137	6334.38	*	6334.18	6334.58
138	6332.71	*	6332.51	6332.91
139	6331.05	*	6330.85	6331.25
140	6329.38	*	6329.18	6329.58
141	6327.71	*	6327.51	6327.91
142	6326.04	*	6325.84	6326.24
143	6324.38	*	6324.18	6324.58
144	6322.71	*	6322.51	6322.91
145	6321.04	*	6320.84	6321.24
146	6319.37	*	6319.17	6319.57
147	6317.70	*	6317.50	6317.90
148	6316.04	*	6315.84	6316.24
149	6314.37	*	6314.17	6314.57
150	6312.70	*	6312.50	6312.90
151	6311.03	*	6310.83	6311.23
152	6309.36	*	6309.16	6309.56
153	6307.70	*	6307.50	6307.90
154	6306.03	*	6305.83	6306.23
155	6304.36	*	6304.16	6304.56
156	6302.69	*	6302.49	6302.89
157	6301.03	*	6300.83	6301.23
158	6299.36	*	6299.16	6299.56
159	6297.69	*	6297.49	6297.89
160	6296.02	*	6295.82	6296.22
161	6294.35	*	6294.15	6294.55
162	6292.69	*	6292.49	6292.89
163	6291.02	*	6290.82	6291.22
164	6289.35	*	6289.15	6289.55
165	6287.68	*	6287.48	6287.88

ITU-T specification-conformed wave number (cm^{-1}) 4/4

GRID No.	CENTER	CHK	START	STOP
166	6286.02	*	6285.82	6286.22
167	6284.35	*	6284.15	6284.55
168	6282.68	*	6282.48	6282.88
169	6281.01	*	6280.81	6281.21
170	6279.34	*	6279.14	6279.54
171	6277.68	*	6277.48	6277.88
172	6276.01	*	6275.81	6276.21
173	6274.34	*	6274.14	6274.54
174	6272.67	*	6272.47	6272.87
175	6271.00	*	6270.80	6271.20
176	6269.34	*	6269.14	6269.54
177	6267.67	*	6267.47	6267.87
178	6266.00	*	6265.80	6266.20
179	6264.33	*	6264.13	6264.53
180	6262.67	*	6262.47	6262.87
181	6261.00	*	6260.80	6261.20
182	6259.33	*	6259.13	6259.53
183	6257.66	*	6257.46	6257.86
184	6255.99	*	6255.79	6256.19
185	6254.33	*	6254.13	6254.53
186	6252.66	*	6252.46	6252.86
187	6250.99	*	6250.79	6251.19
188	6249.32	*	6249.12	6249.52
189	6247.66	*	6247.46	6247.86
190	6245.99	*	6245.79	6246.19
191	6244.32	*	6244.12	6244.52
192	6242.65	*	6242.45	6242.85
193	6240.98	*	6240.78	6241.18
194	6239.32	*	6239.12	6239.52
195	6237.65	*	6237.45	6237.85
196	6235.98	*	6235.78	6236.18
197	6234.31	*	6234.11	6234.51
198	6232.65	*	6232.45	6232.85
199	6230.98	*	6230.78	6231.18
200	6229.31	*	6229.11	6229.51
201	6227.64	*	6227.44	6227.84
202	6225.97	*	6225.77	6226.17
203	6224.31	*	6224.11	6224.51
204	6222.64	*	6222.44	6222.84
205	6220.97	*	6220.77	6221.17
206	6219.30	*	6219.10	6219.50

5.12 Others

1 Setting the internal clock

(1) Press the <SYSTEM> key.

(2) Press the <SET CLOCK> soft key.

(3) Press the <TIME SET> soft key.

(4) Set the time with the rotary encoder or numeric keys.

(5) Change between the hour and minutes with the <CURSOR →> soft key.

(6) When the <RETURN> key is pressed, the original menu will appear.

2 Setting the calendar

(1) Press the <SYSTEM> key.

(2) Press the <SET CLOCK> soft key.

(3) Press the <CALENDAR SET> soft key.

(4) Set the calendar with the rotary encoder or numeric keys.

(5) Change between YR, MO and DY with the <CURSOR →> soft key.

(6) When the <RETURN> key is pressed, the original menu will appear.

3 Erasing the date display.

(1) Press the <SYSTEM> key.

(2) Press the <SET CLOCK> soft key.

(3) Press the <CALENDAR TYPE> soft key.

(4) Set to OFF with the rotary encoder or cursor keys.

(5) When the <RETURN> soft key is pressed, the date displayed at the top of the screen will disappear, and the original menu will appear.

4 Changing the date display format

(1) Press the <SYSTEM> key.

(2) Press the <SET CLOCK> soft key.

(3) Press the <CALENDAR TYPE> soft key.

(4) Select the date display method with the rotary encoder or cursor keys.

(5) When the <RETURN> soft key is pressed, the date will appear with the set display format.

5 Using the operation lock out function

(1) Press the <SYSTEM> key.

(2) Press the <ETC.> soft key.

(3) Press the <OPERATE LOCKOUT> soft key.

(4) Set to ON with the rotary encoder or cursor keys, and then press the <ENTER> key.

Note: Please set the LOCKOUT CODE beforehand at the time of each setting.

If you select the lockout ON, modifications on settings done from the SYSTEM-PARM. is disabled.

6 Setting the operation lock out code

(1) Press the <SYSTEM> key.

(2) Press the <ETC.> soft key.

(3) Press the <LOCKOUT CODE> soft key.

(4) Input four digits for the operation lock out code.

Note: Be sure to record the LOCKOUT CODE.

If it is not recorded, LOCKOUT can not be canceled.

Ensure that the LOCKOUT CODE is registered as a four digit code.

Otherwise, the registered code is invalid.

7 Setting the buzzer(alarm sound)

(1) Press the <SYSTEM> key.

(2) Press the <PARAM.> soft key.

(3) You can select ON or OFF of the beep using the rotary encoder or numerical keypad.

Setting range: ON (alarm buzzer sound) or OFF (alarm buzzer not sounded).

Default value: ON

8 Displaying the software version

(1) Press the <SYSTEM> key.

(2) Press the <SOFT Ver> soft key.

Chapter6

Remote Function

The remote function is described in this chapter.
This device has a GP-IB (IEEE-488.2 compliant) and RS-232C interface mounted as a standard. This allows automatic measurements to be carried out by connecting this device with a personal computer (controller).

6.1 Remote measurement using GP-IB

Remote control with GP-IB (IEEE-488.2 compliant) is possible with this device. A GP-IB port (connector) is provided on the back of this device.

Connecting the GP-IB connector

Turn OFF the power for this device and for all of the devices connected to this device. Connect the GP-IB bus cable to the GP-IB connector on the back of the device. Securely tighten the connector's fixing screws at this time.

⚠CAUTION

Always turn OFF the power of all devices connected to the bus cable before connecting or disconnecting the GP-IB bus cable.
Connecting/disconnecting the bus cable while the power is ON could lead to device malfunctioning and trouble.

Setting the GP-IB address

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Select the GP-IB address with the rotary encoder or numeric keys.

(4) Press the <ENTER> soft key to set the GP-IB address.
Setting range:0 to 30 Default value:7

Note The GP-IB address is maintained with the backup circuit.

When AQ6140 is used for the first time, the GP-IB address after the battery exchange of the backup circuit becomes "7" of an initial value.

Interface functions

Of the GP-IB interface functions specified in IEEE488.1, this device has the subset functions shown in Table 6.1.

Table 6-1 Interface functions

Code	Interface functions
SH1	All transmission functions
AH1	All reception functions
T6	Basic talker and serial poll function
L4	Basic listener functions
SR1	All service request functions
RL1	Local lock out functions
PPO	No parallel poll function
DC1	All device clear functions (The send and receive buffers is cleared.)
DT1	All device trigger functions (When the GET command is received, it executes the single-measurement.)
C0	No controller functions

Remote/local function

REN and ATN are set to "True" by the controller, and the listen address is set to this device. This device will then enter the remote state.

In the remote state, all panel switches and soft keys other than the <LOCAL> soft keys are invalid.

When the <LOCAL> soft key is pressed, this device will return to the local state, and the panel switches will be accepted.

This device will also return to the local state when the GTL (Go To Local) message is sent from the controller or when REN is set to "False".

This device will enter the local lock out state when the LLO (Local Lock Out) message is sent from the controller. In this state, the local state will not be returned to even when the <LOCAL> soft key is pressed. To cancel the local lock out state, set RED to "False" with the controller.

Remote commands

The remote commands comply with IEEE-488.2.

Character strings used

The character strings used with this function are not case-sensitive.

Terminator

The following message terminator can be used with this device.

(1) Program message terminator

^END,LF+^END,LF

CRLF+^END,CR+^END,CRLF

LF is a single JIS code 0x0A

(2) Response message terminator

This device uses CRLF+^END as the message terminator.

Send and Receive Buffers

The AQ6140 has the 512-byte(to store CR.LF and other control codes and commas",") receive buffers.

The AQ6140 has the 1024-byte(to store CR.LF and other control codes and commas",") send buffers.

Command reference

(1) Inputting commands

The minimum character string required for this device to recognize commands is described in uppercase. Always input this uppercase section when sending a command. The section described in lowercase can be omitted.

The input character string is input with half-byte character in either upper or lowercase.

(2) Symbols rule table

Symbol	Explanation
< >	Designate the parameter according to the details defined in <>. Insert a half-byte space between the command and parameter, and separate the parameters with "," (commas).
|	This divides several elements in a list. (One of the elements is selected.)
[ ]	This selects an option. (Does not need to be described.)
{ }	One of the elements enclosed in { } must be selected.
<integer>	Integer Follows the IEEE488.2 <NR1> description method. <NR1>: Integer (no decimal point) ASCII. Example: "10"
<real>	Real number Follows the IEEE488.2 <NR2>, <NRf> description method. <NR2>: Decimal point description ASCII Example: "1.01" <NRf>: Floating point description ASCII Example: -5.1E+001"

(3) Expressing values

NR1 type: Value unconditionally expressed with a decimal point. The decimal point is always placed at the right end of the number string.
Example) 123, -9999

NR2 type: Value expressed with decimal point.
Example) 123.00, -9999.99

NR3 type: Value with decimal point having exponential.
Example) 1.23e2, -9.99999E3

NRf type: Values can be expressed with the NR1, 2 or 3 method.
Example) 123, 123.00, 1.23e2

(4) Unit table

Multiplier (floating point description)	Multiplier character	Name	Wave length (m)	Frequency (Hz)	m-1 (None)	Linear (W)	dBm (None)
1E18	EX	exa	—	—	—	—	—
1E15	PE	peta	—	—	—	—	—
1E12	T	tera	—	○	—	—	—
1E9	G	giga	—	○	—	—	—
1E6	MA	mega	—	○	—	—	—
1E3	K	kilo	—	○	—	—	—
1E-3	M	milli	○	—	—	○	—
1E-6	U	micro	○	—	—	○	—
1E-9	N	nano	○	—	—	○	—
1E-12	P	pico	○	—	—	○	—
1E-15	F	femto	—	—	—	—	—
1E-18	A	atto	—	—	—	—	—

(5) Others

C in the type is the setting command, and Q is the query command. A "?" is added for a query command.
In some cases MINimum (minimum value), MAXimum (maximum value, DEFault (default), ON (1) and OFF (0) can be used for the parameters.

The MEAS, READ, FECH and CONF commands are in the same command hierarchy.

※Indicates a comment

For the query data, <integer> is integer ASCII, and <real> is unit fixed floating point E type ASCII.
The query data unit is the dBm/W designated unit for POWER, m for WAVE, Hz for FREQ, and m^{-1} for WNUM.
When sending multiple query data items, separate the ASCII data with ",".

An example of parameter input

(1) When selecting 208.87 THz for the center frequency
:CALCulate2:WLIMit:CENTer:FREQuency 208.87THz

(2) When selecting 1460.0 nm for the center wavelength
:CALCulate2:WLIMit:CENTer[:WAVelength] 1460.0nm

(3) When selecting 6966.50 cm^{-1} for the center wave number
:CALCulate2:WLIMit:CENTer:WNUMber 696650

(4) When selecting 0.0 dBm for the level of the vertical axis
(it is assumed that the LOG scale is currently selected)
:CALCulate2:VERTical:REF:DBM 0.0dBm

(5) When selecting 1.000 mW for the level of the vertical axis
(it is assumed that the LIN scale is currently selected)
:CALCulate2:VERTical:REF:WATTs 1.000mW

An example of query data

(1) As for power (dBm)
-14.29dBm: -1.42974901e+001

(2) As for power(mW)
1.000mW: +1.00000005e-003

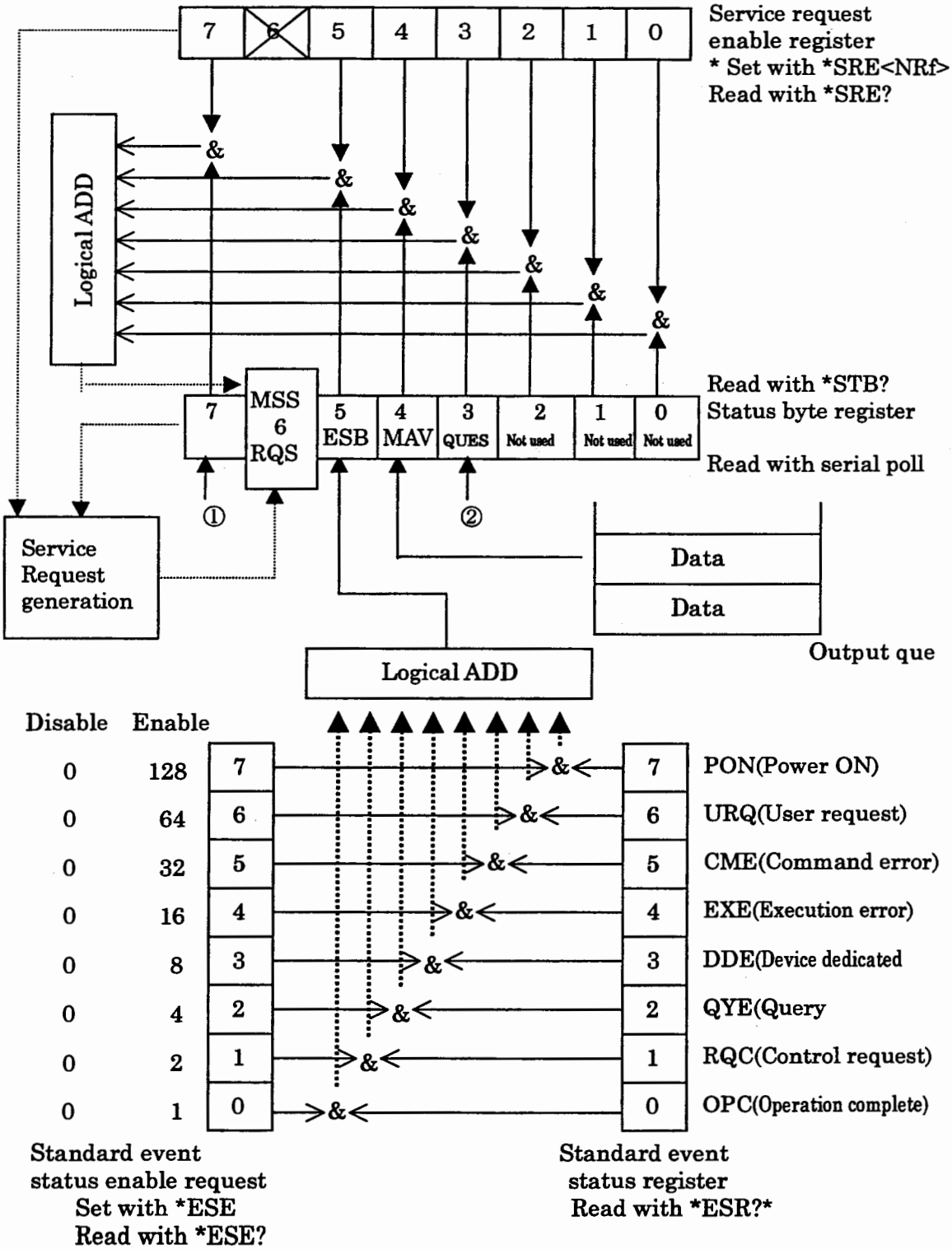
(3) As for frequency(THz)
195.39THz: +1.95390394e+014

(4) As for wavelength(nm)
1527.72nm: +1.52772202e-006

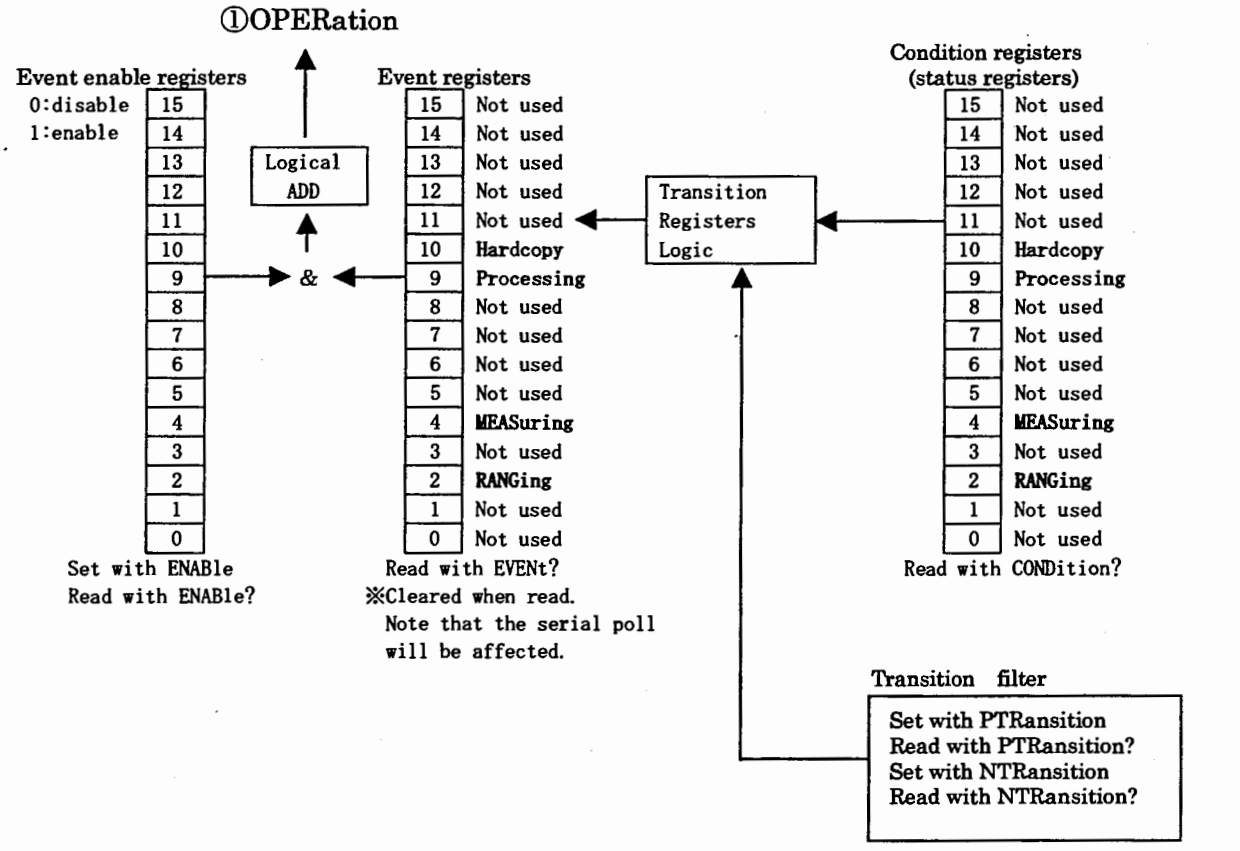
(5) As for wave number(cm^{-1})
6517cm^{-1}: +6.51752000e+005

Status data configuration

IEEE-488.2 Standard status data structure



◆OPERation status



Set with PTR : When the content of the condition register changes from 0 into 1, the event register is set in "1".
Set with NTR : When the content of the condition register changes from 1 into 0, the event register is set in "1".

・Explanation of each event

Event	Explanation
Hardcopy	"1" is set while executing the hard copy.
Processing	"1" is set while extracting the data (change of each X axis and change of SPAN, etc.).
MEASuring	"1" is set during the measurement execution.
RANGing	When the range switch is done, "1" is set.

- Setting of Transition filter

  Transition filter sets timing by which the event register is set.
  PTR sets the event register according to timing that the condition register changes from "0" into "1".
  NTR sets the event register according to timing that the condition register changes from "1" into "0".
  This filter of each bit can be set.
  Example:
  ":STAT:OPER:PTR 32"
  In this case, the event register is set by the measurement beginning.

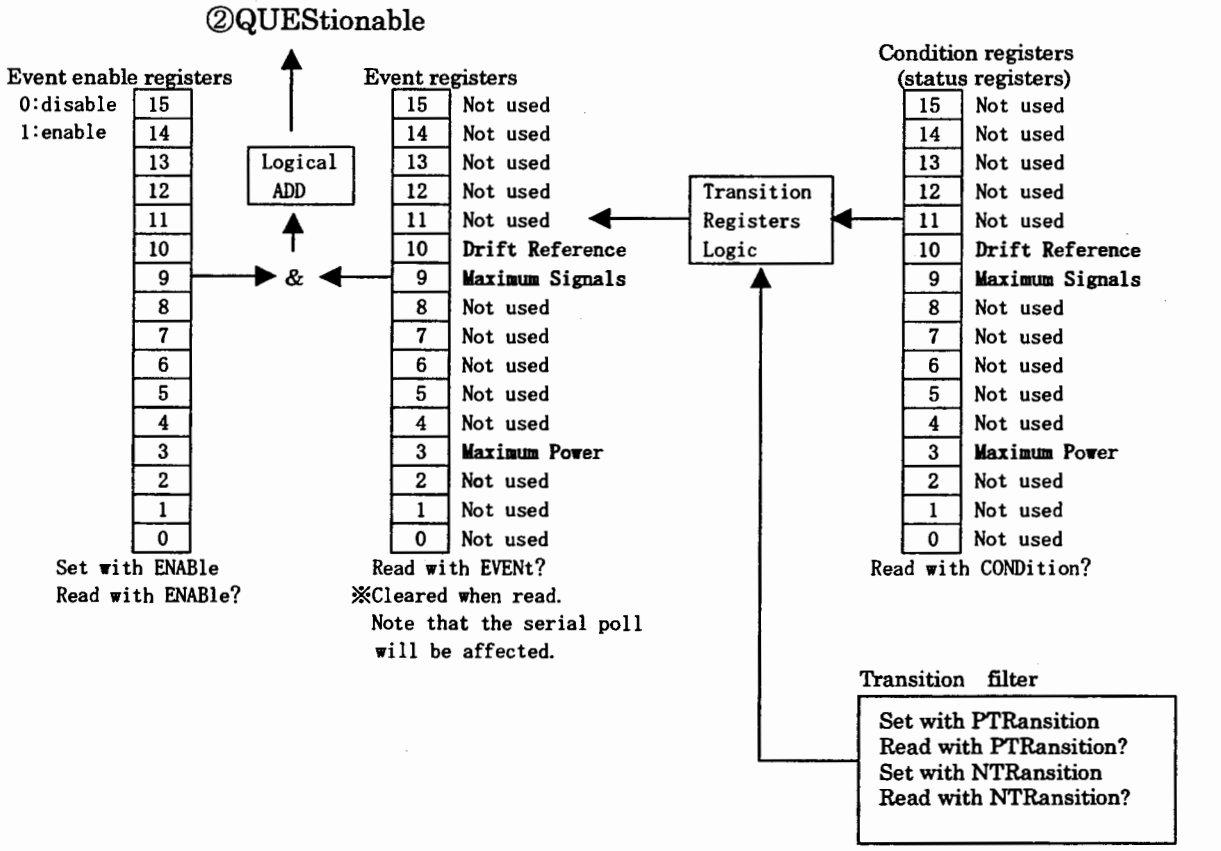
- Setting of Enable register

  Enable register sets the mask of each event.
  This register can set each bit.
  Example:
  ":STAT:OPER:ENAB 32"
  In this case, the event of the measurement(bit4) becomes effective.

Example:
":STAT:OPER:PTR 32" (Setting of Transition filter)
":STAT:OPER:ENAB 32" (Setting of Enable register)

When AQ6140 begins measuring, bit4 of the condition register is set from "0" to "1".
Because bit4 of Transition filter is set in positive, the event register is set according to timing that the condition register changes from "0" into "1".
And, because bit4 of Enable register is set in "Enable", bit7 of status byte register is set.

◆QUEStionable status



Set with PTR : When the content of the condition register changes from 0 into 1, the event register is set in "1".
Set with NTR : When the content of the condition register changes from 1 into 0, the event register is set in "1".

・Setting of Transition filter and Enable registers
It is the same as OPERation status.

・Explanation of each event

Event	Explanation
Drift Reference	The CONDition register is set in "1" when the number of Reference peaks and the numbers of measurement peaks are different. (Drift measurement)
Maximum Signals	When 256 peaks or more are detected, the CONDition register is set in "1".
Maximum Power	When the power of +10dBm or more is input, the CONDition register is set in "1".

◆Status · Byte · Register

(1) Clear timing

·At power on

(2) Explanation of each bit

Bit	Name	Explanation
7	OPER	When one or more event of Operation status is set in "1", "1" is set.
6	MSS	This bit is set in "1" when there is a factor to demand service of device. This bit is cleared with device clear(DCL, SDC).
5	ESB	When one or more event of Standard Event Status Register is set in "1", "1" is set.
4	MAV	When device is ready to accept the demand of data byte output from the controller, this bit is set in "1". This bit is cleared with device clear(DCL, SDC).
3	QUES	When one or more event of Questionable Status is set in "1", "1" is set.
2～0	Not used	AQ6140 is not used.

(3) Method of mask

The service request function can do the mask in each generation factor. Each bit of SRE corresponds to each bit of STB.

Exp.
"*SRE 32"
If "32" of a set value is shown by the binary number, this value becomes "00100000". In this case, bit5(ESB) becomes effective.
Therefore, when ESB becomes "1", service is demanded of the controller.

(4) At serial poll

At Serial poll, bit6 becomes RQS.
Moreover, RQS is cleared by Serial poll.

◆Standard・Event・Status・Register

(1) PON (Power ON)

Indicates that the device power has turned from OFF to ON.
This bit is set to "1" when ON.

(2) URQ (User request)

This bit is always set to "0".

(3) CME (Command error)

When one of the following occurs, this bit will be set to "1".

① When a command (including IEEE-488.2 common commands that are not mounted), which cannot be recognized by the device, is sent from the controller.
② When the GET message is received during reception of the program messages.

(4) EXE (Execution error)

When one of the following occurs, this bit will be set to "1".
When the program data following the program header is not within the valid range.
When there is a valid program header, but the device cannot execute it.

(5) DDE (Device dedicated error)

This event indicates that an error other than a command error, execution error or query error has occurred.
This bit is set to "1" when an error occurs.

(6) QYE (Query error)

When one of the following occurs, this bit will be set to "1".
When reading of the data is attempted even when there is no data in the output que.
When the data in the output que has been lost.
When the next program message is received before transmission of the response message is completed.

Note With remote measurement using RS-232C, the above status will not occur and thus the bits will not be set.

(7) RQC (Control request)

This bit is always set to "0".

(8) OPC (Operation complete)

This bit becomes "1" if there is no command not completed when * OPC command is received.

Command reference

Common commands 1/2

<table>
<tr><th>No.</th><th>Type</th><th>Format</th><th>Explanation</th></tr>
<tr><td>1</td><td>C</td><td>*CLS</td><td>Clears the ESR (event status register) summarized in the STB (status byte register).
(When ESR is cleared, STB is also cleared.)</td></tr>
<tr><td>2</td><td>Q
C</td><td>*ESE {? | <integer>}</td><td>Sets ESE (event status enable register), and retrieves status.

<integer> 0～255

Query <integer>

<table>
<tr><th>bit</th><th>Symbol</th><th>Meaning</th></tr>
<tr><td>D7</td><td>PON</td><td>Power ON</td></tr>
<tr><td>D6</td><td>–</td><td>Not used</td></tr>
<tr><td>D5</td><td>CME</td><td>Command error</td></tr>
<tr><td>D4</td><td>EXE</td><td>Execution error</td></tr>
<tr><td>D3</td><td>DDE</td><td>Device error</td></tr>
<tr><td>D2</td><td>QYE</td><td>Query error</td></tr>
<tr><td>D1</td><td>–</td><td>Not used</td></tr>
<tr><td>D0</td><td>OPC</td><td>Operation complete</td></tr>
</table></td></tr>
<tr><td>3</td><td>Q</td><td>*ESR?</td><td>Retrieves ESR (event status register) status.
Cleared when read.

Query <integer> 0～255

<table>
<tr><th>bit</th><th>Symbol</th><th>Meaning</th></tr>
<tr><td>D7</td><td>PON</td><td>Power ON</td></tr>
<tr><td>D6</td><td>–</td><td>Not used</td></tr>
<tr><td>D5</td><td>CME</td><td>Command error</td></tr>
<tr><td>D4</td><td>EXE</td><td>Execution error</td></tr>
<tr><td>D3</td><td>DDE</td><td>Device error</td></tr>
<tr><td>D2</td><td>QYE</td><td>Query error</td></tr>
<tr><td>D1</td><td>–</td><td>Not used</td></tr>
<tr><td>D0</td><td>OPC</td><td>Operation complete</td></tr>
</table></td></tr>
<tr><td>4</td><td>Q</td><td>*IDN?</td><td>Retrieves ID information

Query Returns "ANDO ELECTRIC CO. LTD., AQ6140, #, #,#".
#,#,# : Mainframe number , Software version(Main,Sub)</td></tr>
<tr><td>5</td><td>Q</td><td>*OPC

*OPC?</td><td>*OPC: Issues operation complete event when all pending commands being processed are completed.

*OPC?: Returns query when execution of all pending commands being processed is completed.(0 bits of ESR are set in "1".)

Query ASCII "1"</td></tr>
<tr><td>6</td><td>C</td><td>*RCL<integer></td><td>Recalls status of device saved with *SAV.

<integer> 0～9

(Refer to *SAV) Executes QA6140 memory recall.</td></tr>
<tr><td>7</td><td>C</td><td>*RST</td><td>The measurement condition is set in setting shown in the reset item.</td></tr>
</table>

Reset items (*RST)

Item	Reset value	
Label	Clear	
Sweep state	Stop	
Center wavelength	1460nm	
Sweep span	380nm	
Starting wavelength	1270nm	
Ending wavelength	1650nm	
X axis unit	Wavelength	
Reference level	0dB	
Log scale	10dB/div	
Base level	0	
Power unit	dBm	
Automatic peak	CENTER OFF REF LEVEL OFF AUTO SEARCH OFF	
S/N	Function OFF Seletion AUTO User wavelength not affected User Noise Level not affected No. of averages 100	
Medium	Vacuum	
Elevation	not affected	
Peak search threshold	10dB	
Peak search Excursion	15dB	
Offset value for power measurement	0dB	
Fabry-Perot	OFF	
Display screen type	NORMAL	
Move,Line Marker	OFF	
Relative display	λ,Pw	
Sort direction	Forward with wavelength	
REF cursor position	Invalid	
1 peak display	OFF	
GRID	Function OFF GRID SPAN:0.10nm GRID CENTER:ITU-T GRID GRID CHK:ALL ON	
Drift	Function OFF Display △ Repeat Interval FAST Num of Drift 0(Endless)	
	Trap (wavelength span)	Function OFF Value 50nm
	Trap (peak wavelength)	Function OFF Value 10nm
	Trap (peak power)	Function OFF Value 0.001dBm

Common commands 2/2

No.	Type	Format	Explanation
8	C	*SAV<integer>	Saves the device status. <integer> 0~9 Saves the AQ6140 memory.
9	Q C	*SRE {? | <integer>}	Sets the SRE (service request enable register), and retrieves status. <integer> 0~255 Query <integer> bit: Meaning D7: OPER D6: – D5: ESB D4: MAV D3: QUES D2: Not used D1: Not used D0: Not used
10	Q	*STB ?	Retrieves STB (status byte) <integer> 0~255 Query <integer> bit: Meaning D7: OPER D6: MSS D5: ESB D4: MAV D3: QUES D2: Not used D1: Not used D0: Not used
11	C	*TRG	Starts measurement. (Single) Same as GET.
12	Q	*TST?	Returns query after self-test is completed. Query <integer> 0: Normal completion Other than 0: Abnormal completion The AQ6140 is always normal.
13	C	*WAI	Saves the next query until the execution of all pending commands is completed. The AQ6140 does nothing.

MEASurement instructions

No.	Type	Command hierarchy	Explanation
1		:MEASure	MEAS command: Command that sets the device conditions, newly measures and returns the measurement results.
		:ARRay	
	Q	:POWer[?]	:MEAS:ARR:POW ? : Returns peak power value array date. (Unit dBm/W)
	Q	:FREQuency?	:MEAS:ARR:POW:FREQ ? : Returns peak frequency as array.
	Q	:WAVelength?	:MEAS:ARR:POW:WAV ? : Returns peak wavelength as array.
	Q	:WNUMber?	:MEAS:ARR:POW:WNUM ? : Returns " Wave number as array.
		[:SCALar]	
	Q	:POWer[?]	:MEAS[:SCAL]:POW ? [<real>] : Returns power value closest to input value.
	Q	:FREQuency?	:MEAS[:SCAL]:POW:FREQ ? [<real>] : Returns frequency value closest to input value.
	Q	:WAVelength?	:MEAS[:SCAL]:POW:WAV? [<real>] : Returns wavelength value closest to input value.
	Q	:WNUMber?	:MEAS[:SCAL]:POW:WNUM? [<real>] : Returns wavelength value closest to input value.
			* ARRay is the entire array, and the data size is returned to the head of the array. * SCALar is a 1-data designation, and the value closest to the input value is returned. If there is no input value, the current marker position value is returned. * POWer returns the current unit (dBm/W). *The following values are returned when there is no optical input.(SCALar) (:READ and :FETC are also the same.) WAV : +1.00000000e-007 FREQ : +2.99792400e+015 WNUM : +9.99999600e+006 POW(dBm) : -2.00000000e+002 POW(W) : +9.99999300e-024

READ instructions

No.	Type	Command hierarchy	Explanation
2		:READ	READ command: Command that measures and returns measurement results. (The device conditions are not set.)
		:ARRay	
	Q	:POWer[?]	:READ:ARR:POW ? : Returns peak power value array date. (Unit dBm/W)
	Q	:FREQuency?	:READ:ARR:POW:FREQ ? : Returns peak frequency as array.
	Q	:WAVelength?	:READ:ARR:POW:WAV ? : Returns peak wavelength as array.
	Q	:WNUMber?	:READ:ARR:POW:WNUM ? : Returns " Wave number as array.
		[:SCALar]	
	Q	:POWer[?]	:READ[:SCAL]:POW ? [<real>] : Returns power value closest to input value.
	Q	:FREQuency?	:READ[:SCAL]:POW:FREQ ? [<real>] : Returns frequency value closest to input value.
	Q	:WAVelength?	:READ[:SCAL]:POW:WAV? [<real>] : Returns wavelength value closest to input value.
	Q	:WNUMber?	:READ[:SCAL]:POW:WNUM? [<real>] : Returns wavelength value closest to input value.
			* ARRay is the entire array, and the data size is returned to the head of the array. * SCALar is a 1-data designation, and the value closest to the input value is returned. If there is no input value, the current marker position value is returned. * POWer returns the current unit (dBm/W).

FETCh instructions

No.	Type	Command hierarchy	Explanation
3			FETC command: Command that returns current measurement results. (Does not measure)
	Q	:FETCh[?]	:FETC?
		:ARRay	
	Q	:POWer[?]	:FETC:ARR:POW ? : Returns peak power value array date. (Unit dBm/W)
	Q	:FREQuency?	:FETC:ARR:POW:FREQ ? : Returns peak frequency as array.
	Q	:WAVelength?	:FETC:ARR:POW:WAV ? : Returns peak wavelength as array.
	Q	:WNUMber?	:FETC:ARR:POW:WNUM ? : Returns " Wave number as array.
		[:SCALar]	
	Q	:POWer[?]	:FETC[:SCAL]:POW ? [<real>] : Returns power value closest to input value.
	Q	:FREQuency?	:FETC[:SCAL]:POW:FREQ ? [<real>] : Returns frequency value closest to input value.
	Q	:WAVelength?	:FETC[:SCAL]:POW:WAV? [<real>] : Returns wavelength value closest to input value.
	Q	:WNUMber?	:FETC[:SCAL]:POW:WNUM? [<real>] : Returns wavelength value closest to input value.
			* The command hierarchy and return data is the same as the MEAS command.

CONFigure instructions

No.	Type	Command hierarchy	Explanation
4			CONF command: Command that sets device conditions. (Changes measurement setting without measuring.) The CONF command setting is returned as the query. When ":CONF:SCAL:POWer:WAVelength 130NM, MAX" is set, the returned data will be as follows. "POW:WAV 1.300000e-6,0.01"
	Q	:CONFigure[?]	:CONF?
		:ARRay	
	C	:POWer	:CONF:ARR:POW : Displays list of power sorted in ascending order.
	C	:FREQuency	:CONF:ARR:POW:FREQ : Displays list of WL sorted in ascending order (List by WL)
	C	:WAVelength	:CONF:ARR:POW:WAV : Displays list of WL sorted in ascending order (List by WL)
	C	:WNUMber	:CONF:ARR:POW:WNUM : Displays list of WL sorted in ascending order (List by WL)
		[:SCALar]	
	C	:POWer	:CONF[:SCAL]:POW [<real>] : Returns power value closest to input value.
	C	:FREQuency	:CONF[:SCAL]:POW:FREQ [<real>] : Returns frequency value closest to input value.
	C	:WAVelength	:CONF[:SCAL]:POW:WAV [<real>] : Returns wavelength value closest to input value.
	C	:WNUMber	:CONF[:SCAL]:POW:WNUM [<real>] : Returns wavelength value closest to input value.
			* The command hierarchy is the same as the MEAS command.

CALCulate2 Subsystem 1/4

No.	Type	Command hierarchy	Explanation
5		:CALCulate2 :DATA?	:CALC2:DATA? {POWer | FREQuency | WAVelength | WNUMber} : Returns peak table data.
	Q		:CALC2:DATA? POWer : Returns peak power array. (or total power). : Returns peak power array. (or total power). Query response <NRf>
	Q		:CALC2:DATA? FREQuency : Returns peak frequency array. (or average frequency) Query response <NRf>
	Q		:CALC2:DATA? WAVElength : Returns peak frequency array. (or average wavelength) Query response <NRf>
	Q		:CALC2:DATA? WNUMber : Returns peak frequency array. (or average Wave number) Query response <NRf>
			* Note that with the above four items, if :CALC2:PWAV:STAT is ON, the data in the parentheses will be returned.
	Q	:POINts?	:CALC2:POIN? : Returns the data size returned with "CALCulate2:DATA? above. Query response <NRf>
	CQ	:PEXCursion	:CALC2:PEXC {? | {<integer> | MINimum | MAXimum | DEFault}} : Sets the peak crest/root difference. <integer> : 1~30(dB) MINimum : 1(dB) MAXimum : 30(dB) DEFault : 15(dB) Query response <integer>
	CQ	:PTHRshold	:CALC2:PTHR {? | {<integer> | MINimum | MAXimum | DEFault}} : Sets the peak threshold. <integer> : 0~40(dB) MINimum : 0(dB) MAXimum : 40(dB) DEFault : 10(dB) Query response <integer>
	CQ	:PWAVerage [:STATe]	:CALC2:PWAV[:STATe] {? |{ ON | OFF | 1 | 0 }} : Sets the average wavelength and total power measurement mode. Query response 1:ON 0:OFF

CALCulate2 Subsystem 2/4

No.	Type	Command hierarchy	Explanation
		:CALCulate2	
		:WLIMit	
	CQ	[:STATe]	:CALC2:WLIM [:STATe] {? |{ ON | OFF | 1 | 0}} : Sets the wavelength range input mode. Query response 1:ON 0:OFF
		:STARt	
	CQ	:FREQuency	:CALC2:WLIM :STAR:FREQ {? |{ <real>| MINimum|MAXimum}} : Sets the starting frequency. <real> : 181.68~236.02THz MINimum : 181.68THz MAXimum : 236.02THz Query response <NRf>
	CQ	[:WAVelength]	:CALC2:WLIM :STAR[:WAV] {? |{ <real>| MINimum|MAXimum}} : Sets the starting wavelength. <real> : 1270.0~1649.5nm MINimum : 1270.0nm MAXimum : 1649.5nm Query response <NRf>
	CQ	:WNUMber	:CALC2:WLIM :STAR:WNUM {? |{ <real>| MINimum|MAXimum}} : Sets the starting Wave number. <real> : 6060~7870cm^{-1} MINimum : 6060 cm^{-1} MAXimum : 7870 cm^{-1} Query response <NRf>
		:STOP	
	CQ	:FREQuency	:CALC2:WLIM :STOP:FREQ {? |{ <real>| MINimum|MAXimum}} : Sets the ending frequency. <real> : 181.73~236.07THz MINimum : 181.73THz MAXimum : 236.07THz Query response <NRf>
	CQ	[:WAVelength]	:CALC2:WLIM :STOP[:WAV] {? |{ <real>| MINimum|MAXimum}} : Sets the ending wavelength. <real> : 1270.5~1650.0nm MINimum : 1270.5nm MAXimum : 1650.0nm Query response <NRf>
	CQ	:WNUMber	:CALC2:WLIM :STOP :WNUM {? |{ <real>| MINimum|MAXimum}} : Sets the ending Wave number. <real> : 6065~7875cm^{-1} MINimum : 6065 cm^{-1} MAXimum : 7875 cm^{-1} Query response <NRf>

CALCulate2 Subsystem
3/4

No.	Type	Command hierarchy	Explanation
		:CALCulate2 :WLIMit :CENTer	
	CQ	:FREQuency	:CALC2:WLIM:CENT:FREQ {?|{<real>|MAXimum|MINimum}} : Sets the center frequency.(Hz) <real> : 181.71～236.04THz MINimum : 181.71THz MAXimum : 236.04THz Query response <NRf>
	CQ	[:WAVelength]	:CALC2:WLIM:CENT[:WAV] {?|{<real>|MAXimum|MINimum}} :Sets the center wavelength.(m) <real> : 1270.3～1649.7nm MINimum : 1270.3nm MAXimum : 1649.7nm Query response <NRf>
	CQ	:WNUMber	:CALC2:WLIM:CENT:WNUM {?|{<real>|MAXimum|MINimum}} :Sets the center wave number.(m^{-1}) <real> : 6063～7872cm^{-1} MINimum : 6063 cm^{-1} MAXimum : 7872 cm^{-1} Query response <NRf>
		:SPAN	
	CQ	:FREQuency	:CALC2:WLIM:SPAN:FREQ {?|{<real>|MAXimum|MINimum}} :Sets the sweep width.(Hz) <real> : 0.05～54.39THz MINimum : 0.05THz MAXimum : 54.39THz Query response <NRf>
	CQ	[:WAVelength]	:CALC2:WLIM:SPAN[:WAV] {?|{<real>|MAXimum|MINimum}} :Sets the sweep width.(m) <real> : 0.5～380.0nm MINimum : 0.5nm MAXimum : 380.0nm Query response <NRf>
	CQ	:WNUMber	:CALC2:WLIM:SPAN:WNUM {?|{<real>|MAXimum|MINimum}} :Sets the sweep width.(m^{-1}) <real> : 5～1815cm^{-1} MINimum : 5cm^{-1} MAXimum : 1815 cm^{-1} Query response <NRf>

CALCulate2 Subsystem 4/4

No.	Type	Command hierarchy	Explanation
		:CALCulate2 :VERTical	
	Q	:REF	:CALC2:VERT:REF ? :Returns the reference level. Query response <real>
	C	:DBM	:CALC2:VERT:REF:DBM <real> :Sets the reference level.(Only dBm scale) <real> : -40.0～20.0(dBm)
	C	:WATTs	:CALC2:VERT:REF:WATT <real> :Sets the reference level.(Only W scale) <real> : 0.001～100(mW)
	CQ	:SCALE	:CALC2:VERT:SCALE {?|<real>} :Sets the dB/div scale.(Only dBm scale) <real> : 0.1～10.0(dB/div) Query response <real>
	CQ	:BASE	:CALC2:VERT:BASE {?|<real>} :Sets the base level.(Only Wscale) <real> : 0.001～90.00(mW) ※Limit : REF*0.9 Query response <real>

CALCulate3 Subsystem 1/8			
No.	Type	Command hierarchy	Explanation
6		:CALCulate3 :DATA?	Returns the relative,drift,SN ratio and SN ratio AUTO results. :CALC3:DATA? {POWer | FREQuency | WAVelength | WNUMber}
	Q		:CALC3:DATA? POW : Returns the CALC3 calculated power array.
	Q		:CALC3:DATA? FREQ : Returns the CALC3 calculated frequency array.
	Q		:CALC3:DATA? WAVE : Returns the CALC3 calculated wavelength array.
	Q		:CALC3:DATA? WNUM : Returns the CALC3 calculated Wave number array.
			Query response Returns the data size with <NRf>. * Note that if the :CALC3 calculated ASNR, DELTa, DRIFt or SNR in the above four items are all OFF, and error will occur. * Note that only POWer is correct for SNR and ASNR.
	Q	:POINts?	:CALC3:POIN? : Returns the data size returned with :CALCulate3:DATA? above.
	C	:PRESet	:CALC3:PRES : (ASNR, DELTAa, DRIFt or SNR) of CALCulate3 are all OFF. CALC3 turns only one of (ASNR, DELTa, DRIFt or SNR) ON. Two or more cause an error. Please turn off by this command when you change ASNR,DELT,DRIFt,and ASNR.
	C	:ASNR :CLEar	Average SN ratio operation :CALC3:ASNR:CLE : Clears the No. of SN ratio average measurement times. The current measurement is the reference for the new SN ratio calculation.
	CQ	:COUNt	:CALC3:ASNR:COUN {? |{ <integer> | MINimum | MAXimum }} : Sets the No. of SN ratio average measurement times. If the new No. of times is smaller than the No. of times already measured with SN ratio average measurement, the measurement will stop. <integer> SN ratio average measurement times 10~900 MINimum : 10 MAXimum : 900 Query response <integer> Others : Sets to 100 at PRESet. : Sets to 100 at *RST.
	CQ	[:STATe]	:CALC3:ASNR [:STATe]{? | {ON | OFF| 1 | 0}} : SN ratio average measurement ON/OFF The SN ratio average value is not updated until the No. of measurement times is equal or larger. Query response 1:ON 0:OFF Others : Sets to off at PRESet. : Sets to off at *RST.

※Only the unit of present of X axis (WAVE,FREQ,WNUM) is effective to CALC3.

CALCulate3 Subsystem 2/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3	
		:SNR	SN ratio operation
	CQ	[:STATe]	:CALC3:SNR[:STATe]{? | { ON | OFF | 1 | 0 }} : SN ratio calculation ON/OFF Query response 1:ON 0:OFF
	CQ	:AUTO	:CALC3:SNR:AUTO{? | {ON | OFF | 1 | 0 }} : Selection (USER/AUTO) of SN ratio measurement. ON sets automatic interpolation, OFF sets user input wavelength. Query response 1:ON 0:OFF
		:REFerence	
	CQ	:FREQuency	:CALC3:SNR:REF :FREQuency{? | {<real> | MINimum | MAXimum}} : SN ratio user frequency setting <real> : SN ratio user frequency (Hz) MINimum : 181.68THz MAXimum : 236.07THz Query response <NRf>
	CQ	[:WAVelength]	:CALC3:SNR:REF [:WAVelength]{? | {<real> | MINimum | MAXimum}} : SN ratio user wavelength setting <real> : SN ratio user wavelength (m) MINimum : 1270nm MAXimum : 1650nm Query response <NRf>
	CQ	:WNUMber	:CALC3:SNR:REF:WNUMber{? | {<real> | MINimum | MAXimum}} : SN ratio user wnumber setting <real> : SN ratio user wnumber (m^{-1}) MINimum : 6060cm^{-1} MAXimum : 7875cm^{-1} Query response <NRf>
	CQ	:NLEVel	:CALC3:SNR:REF:NLEVel{? | {<real> | MINimum | MAXimum}} : SN ratio user noise level setting <real> : SN ratio user noise level (dBm) MINimum : -99.000dBm MAXimum : -40.000dBm DEFault : -60.000dBm Query response <real>

CALCulate3 Subsystem 3/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3	
		:DRIFt	Drift operation
	C	:PRESet	:CALC3:DRIF:PRES : Drift state (DIFF, MAX, MIN, REF) all OFF. In this state, REF is returned if ":CALC3:DATA?" is established.。
	CQ	[:STATe]	:CALC3:DRIF[:STATe]{? |{ ON | OFF | 1 | 0}} : Drift calculation ON/OFF. The current measurement value is referred to when drift is initially turned ON. Query response 1:ON 0:OFF Others : Sets to off at PRESet. : Sets to off at *RST.
		:REFerence	
	C	:RESet	:CALC3:DRIFt:REF:RESet : The current measurement value is used as the drift reference.
	CQ	[:STATe]	:CALC3:DRIFt:REF[:STATe]{? | {ON | OFF | 1 | 0}} : Drift reference state ON/OFF
	CQ	:DIFFerence [:STATe]	:CALC3:DRIF:DIFF[:STATe]{? |{ ON | OFF | 1 | 0}} : MAX-MIN drift ON/OFF. MAX-MIN of power and wavelength
	CQ	:MAXimum [:STATe]	:CALC3:DRIF:MAX[:STATe]{? | {ON | OFF | 1 | 0}} : Drift maximum value ON/OFF. MAX. value of power and wavelength.
	CQ	:MINimum [:STATe]	:CALC3:DRIF:MIN[:STATe]{? | {ON | OFF | 1 | 0}} : Drift maximum value ON/OFF. MAX. value of power and wavelength. Query response 1:ON 0:OFF Others : Sets to off at PRESet. : Sets to off at *RST.
		:TRAP1	
	CQ	[:STATe]	:CALC3:DRIF:TRAP1[:STATe] {?|{ON|OFF|1|0}} :Trap function1 ON/OFF Query response 1:ON 0:OFF
	CQ	:FREQuency	:CALC3:DRIF:TRAP1:FREQ {?|<real>} <real> : 0.0001～54.39000THz
	CQ	:WAVelength	:CALC3:DRIF:TRAP1:WAV {?|<real>} <real> : 0.001～380.000nm
	CQ	:WNUMber	:CALC3:DRIF:TRAP1:WNUM {?|<real>} <real> : 0.01～1000.00cm^{-1} :Sets the peak spacing Query response <NRf>

CALCulate3 Subsystem 4/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3 :DRIFt :TRAP2	
	CQ	[:STATe]	:CALC3:DRIF:TRAP2[:STATe] {?|{ON|OFF|1|0}} :Trap function2 ON/OFF Query response 1:ON 0:OFF
	CQ	:FREQuency	:CALC3:DRIF:TRAP2:FREQ {?|<real>} <real> : 0.0001～20.0000THz
	CQ	:WAVelength	:CALC3:DRIF:TRAP2:WAV {?|<real>} <real> : 0.001～100.000nm
	CQ	:WNUMber	:CALC3:DRIF:TRAP2:WNUM {?|<real>} <real> : 0.01～1000.00cm^{-1} :Sets the drift value. Query response <NRf>
		:TRAP3	
	CQ	[:STATe]	:CALC3:DRIF:TRAP3[:STATe] {?|{ON|OFF|1|0}} :Trap function3 ON/OFF Query response 1:ON 0:OFF
	CQ	:POWer	:CALC3:DRIF:TRAP3:POW {?|<real>} <real> : 0.001～20.000dB :Sets the drift value. Query response <NRf>
	CQ	:COUNt	:CALC3:DRIF:COUN {?|<integer>} :Sets the drift measurement count. <integer> : 0,10～3000 0:ENDLESS Query response <integer>
	CQ	:INTErval	:CALC3:DRIF:INTE {?|<integer>} :Sets the drift measurement interval. <integer> : 0,2～59999(sec) 0:FAST Query response <integer>
	Q	:DATA?	:CALC3:DRIF:DATA? {POWer|FREQuency|WAVelength|WNUMber} :Returns the drift data at the cursor position. :CALC3:DRIF:DATA? POW :Returns the drift data.(power) :CALC3:DRIF:DATA? FREQ :Returns the drift data.(frequency) :CALC3:DRIF:DATA? WAV :Returns the drift data.(wavelength) :CALC3:DRIF:DATA? WNUM :Returns the drift data.(wave number) Output format: (Reference data), (1st measurement data), (2nd measurement data) and on. Data is returned in the absolute value. Data size : about 50kB(measurement count : 3000) ※Currently specified unit alone is valid. ※Valid only when measurement is stopped.
	Q	:POINts?	:CALC3:DRIF:POIN? : Data returned with ":DRIFT:POIN?" is returned. "DRIFT measurement count + 1 (reference data)" is returned. Query response <integer> ※Valid only when measurement is stopped.

CALCulate3 Subsystem 5/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3 :DELTa	Relative operation
	C	:PRESet	:CALC3:DELT:PRES : All relative modes are OFF.
		:REFerence	
	Q	:POWer?	:CALC3:DELT:REF:POW? : Returns Ref (reference) power value. Query response <NRf>
	CQ	:FREQuency	:CALC3:DELT:REF:FREQuency{? |{ <real> | MAXimum | MINimum}} : Sets frequency closest to input frequency as Ref value. <real> : MAXimum : 236.07THz MINimum : 181.68THz Query response <NRf>
	CQ	[:WAVelength]	:CALC3:DELT:REF[:WAVelength]{? | {<real> | MAXimum | MINimum}} : Sets wavelength closest to input wavelength as Ref value. <real> : MAXimum : 1650nm MINimum : 1270nm Query response <NRf>
	CQ	:WNUMber	:CALC3:DELT:REF:WNUMber {? |{<real> | MAXimum | MINimum}} : Sets Wave number closest to input Wave number as Ref value. <real> : MAXimum : 7875cm^{-1} MINimum : 6060cm^{-1} Query response <NRf>
		:POWer	
	CQ	[:STATe]	:CALC3:DELT:POW[:STATe]{? |{ ON | OFF | 1| 0}} : Turns relative ON/OFF only for power.
		:WAVelength	
	CQ	[:STATe]	:CALC3:DELT:WAV[:STATe]{? |{ ON | OFF | 1| 0}} : Turns relative ON/OFF only for wavelength.
		:WPOWer	
	CQ	[:STATe]	:CALC3:DELT:WPOW[:STATe]{? |{ ON | OFF | 1| 0}} : Turns relative ON/OFF for both power and wavelength. Query response 1:ON 0:OFF * Note that if two or more of POW, WAV and WPOW are ON, and error occurs. * Note that the relative display is an absolute value for the Ref value, and relative value for all others (each value - Ref value).

CALCulate3 Subsystem 6/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3	
		:FPERot	
	CQ	[:STATe]	:CALC3:FPER[:STSTe] {?|{ON|OFF|1|0}}
			:Fabry-perot analysis ON/OFF
			Query response 1:ON 0:OFF
		:FWHM?	
	Q	:FREQuency	:CALC3:FPER:FWHM{:FREQ|[:WAV]|:WNUM} ?
		[:WAVelength]	:Returns the FWHM
		:WNUMber	Query response <NRf>
		:MEAN?	
	Q	:FREQuency	:CALC3:FPER:MEAN{:FREQ|[:WAV]|:WNUM} ?
		[:WAVelength]	:Returns the mean data.
		:WNUMber	Query response <NRf>
		:MODE:SPACing?	
	Q	:FREQuency	:CALC3:FPER:MODE:SPAC{:FREQ|[:WAV]|:WNUM} ?
		[:WAVelength]	:Returns the mode spacing data
		:WNUMber	Query response <NRf>
		:PEAK?	
	Q	:FREQuency	:CALC3:FPER:PEAK{:FREQ|[:WAV]|:WNUM} ?
		[:WAVelength]	:Returns the peak data.
		:WNUMber	Query response <NRf>
		:POWer?	
	Q	[:DBM]	:CALC3:FPER:POW{ [:DBM]|:WATTs} ?
		:WATTs	:Returns the peak power data.
			Query response <NRf>
		:SIGMa?	
	Q	:FREQuency	:CALC3:FPER:SIGM{:FREQ|[:WAV]|:WNUM} ?
		[:WAVelength]	:Returns the sigma data.
		:WNUMber	Query response <NRf>

CALCulate3 Subsystem 7/8

No.	Type	Command hierarchy	Explanation
		:CALCulate3	
		:GRID	
	CQ	[:STATe]	:CALC3:GRID[:STATe] {?|{ON|OFF|1|0}} :Grid analysis function ON/OFF Query response 1:ON 0:OFF
		:SPAN	
	CQ	:FREQuency	:CALC3:GRID:SPAN:FREQ {?|<real>|MINimum|MAXimum} :Sets the grid span(Hz) <real> : 0.01~54.39THz MINimum : 0.01THz MAXimum : 54.39THz Query response <NRf>
	CQ	[:WAVelength]	:CALC3:GRID:SPAN[:WAV] {?|<real>|MINimum|MAXimum} :Sets the grid span(m) <real> : 0.05~380.00nm MINimum : 0.05nm MAXimum : 380.00nm Query response <NRf>
	CQ	:WNUMber	:CALC3:GRID:SPAN:WNUM {?|<real>|MINimum|MAXimum} :Sets the grid span(m^{-1}) <real> : 0.4~181.5cm^{-1} MINimum : 0.4 cm^{-1} MAXimum : 181.5 cm^{-1} Query response <NRf> ※
		:CENTer	
	CQ	:FREQuency	:CALC3:GRID:CENT:FREQ {? <integer> | <integer>,<real>} :Sets the grid center frequency.(Hz) <integer> : GRID No.1~256 <real> : GRID Center frequency(Hz) Query response <real>
	CQ	[:WAVelength]	:CALC3:GRID:CENT[:WAV] {? <integer> | <integer>,<real>} :Sets the grid center wavelength.(m) <integer> : GRID No.1~256 <real> : GRID Center wavelength(m) Query response <real>
	CQ	:WNUMber	:CALC3:GRID:CENT:WNUM {? <integer> | <integer>,<real>} :Sets the grid center wave number.(m^{-1}) <integer> : GRID No.1~256 <real> : GRID Center wavenumber(m^{-1}) Query response <real>
	C	:CLEAr	:CALC3:GRID:CENT:CLEA : ALL clear of GRID center wavelength ※Selection of a GRID center frequency is available only when the GRID analysis function is turned on.

CALCulate3 Subsystem 8/8			
No.	Type	Command hierarchy	Explanation
		:CALCulate3 :GRID	
	CQ	:CHK	:CALC3:GRID:CHK {? <integer> | <integer>,{ON|OFF|1|0}} : Sets the GRID CHK (analysis is turned on with ON or "1"). <integer> : GRID No.1~256 Query response 1: CHK is turned on. 0: CHK is not turned on.
	C	:CLEAr	:CALC3:GRID:CHK:CLEA : ALL clear of the GRID CHK ※The GRID CHK is available only when the GRIP analysis function is turned on.
	Q	:PEAK?	:CALC3:GRID:PEAK? <integer> : Presence or absence of PEAK in the specified GRID No. is returned. <integer> : GRID No.1~256 Query response 1: PEAK is present. 2: PEAK is absent.(or not GRID CHK) ※"GRID PEAK?" is available only when the GRID analysis function is turned on.

DISPlay Subsystem

No.	Type	Command hierarchy	Explanation
7		:DISPlay :MARKer	
	C	:MAXimum	:DISP:MARK :MAX : Sets maximum power's peak value at marker.
	C	:LEFT	:DISP:MARK :MAX:LEFT : Moves marker to left (smaller wavelength side).
	C	:NEXT	:DISP:MARK :MAX:NEXT : Moves marker to next largest power value.
	C	:PREVious	:DISP:MARK :MAX:PREV : Moves marker to previous power value.
	C	:RIGHt	:DISP:MARK :MAX:RIGH : Moves marker to right (larger wavelength side).
			※LEFT, RIGHT, NEXT or PREVIOUS is selectable only when the maker is set.

HCOPy Subsystem

No.	Type	Command hierarchy	Explanation
8	C	:HCOPy [:IMMediate]	:HCOPy:[IMM] : Sends hard copy of displayed measurement results to printer.

SENSe Subsystem

No.	Type	Command hierarchy	Explanation
9		[:SENSe]	Used to calibrate measurement results.
		:CORRection	
	CQ	:ELEVations	[:SENS]:CORR :ELEV{? |{<integer> | MAXimum | MINimum}} : Sets altitude. <integger> : 0~5000 MINimum : 0 MAXimum : 5000 Query response <integger>
		:CORRection :ELEVations	
	CQ	:MEDium	[:SENS]:CORR :MED {? {|AIR | VACuum}} : Medium setting In air/In vacuum AIR : sets AIR VAC : sets VACUUM Query response AIR : in air VAC: in vacuum Others : Sets to VAC at PRESet. : Sets to VAC at *RST.
		:OFFSet	
	CQ	[:MAGNitude]	[:SENS]:CORR :OFFS[:MAGN] {? | {<real> | MAXimum | MINimum}} Sets power offset. <real> -20.00~+20.00 [dBm] MINimum : -20.00 [dBm] MAXimum : 20.00 [dBm] Query response <real>

STATus Subsystem			
No.	Type	Command hierarchy	Explanation
10		:STATus	
	C	:PRESet	:STAT:PRES : Presets enable R and PTR and NTR filters to default. Note that *CLS is used to clear all event Rs and queries. Initialization value OPERation ENABle register : 0 QUEStionable ENABle register : 0 OPERation [QUEStionable] PTRansition filters : 32767 OPERation [QUEStionable] NTRansition filters : 0
		:OPERation	
	Q	:CONDition?	:STAT:OPER:COND? : Returns contents of operation condition register (R).
	CQ	:ENABle	:STAT:OPER:ENAB {? | <integer>} : Enables operation enable R mask.
	Q	[:EVENt]?	:STAT:OPER:EVEN? : Returns contents of operation event R. (0 to 65535) (:STAT:OPER?) When this register is read, it is cleared.
	CQ	:PTRansition	:STAT:OPER:PTR {? | <integer>} : Positive Transition filter is set. When the content of condition R is "0→1", event R is set.
	CQ	:NTRansition	:STAT:OPER:NTR {? | <integer>} : Negative Transition filter is set. When the content of condition R is "1→0", event R is set. <integger> : 0～65535 Query response <integger> : 0～32767
		:QUEStionable	
	Q	:CONDition?	:STAT:QUES:COND ? : Returns contents of questionable condition R.
	CQ	:ENABle	:STAT:QUES:ENAB {? | <integer>} : Enables questionable condition R mask.
	Q	[:EVENt]?	:STAT:QUES:EVEN ? : Returns contents of questionable condition R. (:STAT:QUES?) When this register is read, it is cleared.
	CQ	:PTRansition	:STAT:QUES:PTR {? | <integer>} : Positive Transition filter is set. When the content of condition R is "0→1", event R is set.
	CQ	:NTRansition	:STAT:QUES:NTR {? | <integer>} : Negative Transition filter is set. When the content of condition R is "0→1", event R is set. <integger> : 0～65535 Query response <integger> : 0～32767

SYSTem Subsystem

No.	Type	Command hierarchy	Explanation
11		:SYSTem	
		:HELP	
	Q	:HEADera?	:SYST:HELP:HEAD? :Output the remote command list Query response #<integer> <string> <string> <string>... Output example) #45678 :ABORt /nquery/ :CALCulate2:DATA? /qonly/ : "#45678" indicates that total number of characters used in the command list is 5678 bytes long. And, "4" at the head indicates that "5678" is a four-digit number.
	C	:PRESet	:SYST:PRESet : The initial settings are selected as the measurement conditions. (the same as * RST items) Carries out continuous measurement.
	Q	:VERSion?	:SYST:VERSion ? : Returns GP-IB software version. Query response <NR2> type (ex. Version1.00 is "1.00".)
	Q	:ERRor?	:SYST:ERR? : 30 pieces of error queue are taken out one by one. Query response <string> (ex. "+0,NO ERROR")
		:TIME	
	CQ	:HOUR	:SYST:TIME:HOUR {?|<integer>} :Sets the hour <integer> : 0~23 Query response <integer>
	CQ	:MINute	:SYST:TIME:MIN {?|<integer>} :Sets the minute <integer> : 0~59 Query response <integer>
		:CALEndar	
	CQ	:YEAR	:SYST:CALE:YEAR {?|<integer>} :Sets the calendar year <integer> : 1900~2010 Query response <integer>
	CQ	:MONTh	:SYST:CALE:MONT {?|<integer>} :Sets the calendar month <integer> : 1~12 Query response <integer>
	CQ	:DAY	:SYST:CALE:DAY {?|<integer>} :Sets the calendar day <integer> : 1~31 Query response <integer>
	CQ	:BUZZer	:SYST:BUZZ {?|{ON|OFF|1|0}} : Selecting ON or OFF of the buzzer. Query response 1:ON 0:OFF

TRIGger Subsystem

No.	Type	Command hierarchy	Explanation
12	C	:ABORt	:ABORt :Stop the measurement.
		:INITiate	:INIT:CONT {? | {ON | OFF | 1 | 0}} : Selects single or continuous measurement, and retrieves status.
	C	:CONTinuous	:INIT:CONT {ON | 1} : Carries out continuous measurement.
	C		:INIT:CONT {OFF | 0} : Stops after one measurement.
	Q		:INIT:CONT ? : Query
			Query response :0:off 1:on
			Others : Sets to on at PRESet. : Sets to on at *RST.
	C	[:IMMediate]	:INIT[:IMM] : During repeat, stops after one measurement. Nothing takes place while stopped.

UNIT Subsystem

No.	Type	Command hierarchy	Explanation
13		:UNIT	
		[:POWer]	:UNIT:POW {? | {W | DBM}} : Sets the unit for Y axis.
	C		:UNIT[:POW] W : Sets to Watts.
	C		:UNIT[:POW] DBM : Sets to dBm.
	Q		:UNIT[:POW] ? : Returns the unit for Y axis
			Query response W : Watts DBM : dBm
		:WL	:UNIT:WL {?|{FREQ|WAV|WNUM}} :Sets the unit for X axis.
	C	:FREQuency	:UNIT:WL:FREQ :Sets to frequency
	C	:WAVelength	:UNIT:WL:WAV :Sets to wavelength
	C	:WNUMber	:UNIT:WL:WNUM :Sets to wave number
	Q		:UNIT:WL? :Returns the unit for X axis
			Query response FREQ : THz WAV : nm WNUM : cm^{-1}

FILE Subsystem
1/3

No.	Type	Command hierarchy	Explanation
14		:FILE	
	CQ	:DRIVe	:FILE:DRIV {?|<integer>} :Sets the drive <integer> 0|2 0:FDD 2:HDD Query response <integer>
	CQ	:NAMe	:FILE:NAM {?|<string>} :Sets the file name <string> file name (a character string consisted of up to 8 characters) Query response <string>
	CQ	:DIRectory	:FILE:DIR {?|<string>} : <string> directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed. Note, however, that you must specify the directory after specifying the drive. Query response <string>
	C	:MAKe	:FILE:DIR:MAK <integer>,<string> :Make the directory <integer> 0|2 0:FDD 2:HDD <string> directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed.
	C	:DELete	:FILE:DIR:DEL <integer>,<string> :Delete the directory <integer> 0|2 0:FDD 2:HDD <string> directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed.
	CQ	:TYPe	:FILE:TYP {?|<integer} : <integer> 0~4 0:SETTING (.HST) 1:TEXT (.TXT) 2:TRACE (.HWV) 3:GRAPHIC (.BMP) 4:GRAPHIC (.TIF) Query response <integer>
	C	:RECall	:FILE:REC :Recall the file A file at the specified recording address is read. (Every file must be specified with DRIV, DIR, NAME and TYP). Reading of the screen information file(BMP,TIF) and text file is not available.

※Method of specifying directory
Exsample :
In case of "A:\" : "\"
In case of "A:\aaa\bbb" : "aaa\bbb"
The delimitation of directory is "¥" or "\".

FILE Subsystem 2/3

No.	Type	Command hierarchy	Explanation
		:FILE	
	C	:SAVe	:FILE:SAV :Record the file File is written in the specified address. (Every file must be specified with DRIV, DIR, NAME and TYP). When another file with the same name is already present at the address, the succeeding file won't be overwritten on the preceding file.
	C	:OVERwrite	:FILE:SAV:OVER :Overwrite the file A file is overwritten at the specified address. (Every file must be specified with DRIV, DIR, NAME and TYP). If no file is present at the specified address, no action is taken.
	Q	:BYTe?	:FILE:SAV:BYT? <integer> : Recorded capacity at the specified drive is returned. This capacity is output in number of bytes. <integer> 0|2 0:FDD 2:HDD Query response <integer>(Byte)
	Q	:LIST?	:FILE:SAV:LIST? <integer1>,<string1>,<integer2> : Names of recorded files are returned. <integer1> Drive 0|2 0:FDD 2:HDD <string1> Directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed. <integer2> File type 0~4 0:SETTING (HST) 1:TEXT (.TXT) 2:TRACE (.HWV) 3:GRAPHIC (.BMP) 4:GRAPHIC (.TIF) Query response <string>,<string>,<string>,… File name, File name, File name… "NOFILES" is returned when there is no pertinent file.
		:ENABle	
	Q	:COUNts?	:FILE:SAV:ENAB:COUN? <integer1>,<integer2> : Number of record able files is returned. <integer1> Drive 0|2 0:FDD 2:HDD <integer2> File type 0~4 0:SETTING (.HST) 1:TEXT (.TXT) 2:TRACE (.HWV) 3:GRAPHIC (.BMP) 4:GRAPHIC (.TIF) Query response <integer>

FILE Subsystem 3/3

No.	Type	Command hierarchy	Explanation
		:FILE	
	C	:COPY	:FILE:COPY : Taking a copy (Specify a file with SOUR and DEST).
	CQ	:SOURce	:FILE:COPY:SOUR {?|<integer1>,<string1>,<integer2>,<string2>} : Sets the information of a copied-from- file <integer1> Drive 0|2 0:FDD 2:HDD <string1> Directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed. <integer2> File type 0~4 0:SETTING (.HST) 1:TEXT (.TXT) 2:TRACE (.HWV) 3:GRAPHIC (.BMP) 4:GRAPHIC (.TIF) <string2> File name (MAX 8chara) Query response <integer1>,<string1>,<integer1>,<string2>
	CQ	:DESTination	:FILE:COPY:DEST {?|<integer1>,<string1>,<string2>} : Sets the information of a copied-to-file <integer1> Drive 0|2 0:FDD 2:HDD <string1> Directory name (MAX 12chara) Full-path specification is required a hierarchical file structure is employed. <string2> File name (MAX 8chara) Query response <integer1>,<string1>,<string2>
	C	:DELete	:FILE:DEL : Delete of a file is executed. (Every file must be specified with DRIV, DIR, NAME and TYP).
	C	:FORMat	:FILE:FORM <integer> : Formatting is executed. <integer> Drive 0|2 0:FDD 2:HDD ※FD:1.44MB(Only 2HD)
	CQ	:LABEl	:FILE:LABE {?|<string>} :Sets the label <string> Label (MAX 36chara) Query response <string> ※";" cannot be used as a label.

PRINT Subsystem			
No.	Type	Command hierarchy	Explanation
15		:PRINt	
	CQ	:OUT	:PRIN:OUT {?|<integer>} : Sets the destination of print out <integer> 1~3 1:CENTRONICS 2:RS-232C 3:FILE Query response <integer>
	CQ	:DIRectory	:PRIN:DIR {?|<integer>} : Sets the printer's printing direction <integer> 0~2 0:VERTICAL 1:HORIZONTAL 2:SCREEN Query response <integer>
	CQ	:EXTernal	:FILE:EXT {?|<integer>} : Sets the type of external printer <integer> 0~7 0:EPSON 1:CANON 2:NEC 3:HPGL 4:PCL 5:POSTSCRIPT 6:SEIKO DPU411(TYPE2) 7:SEIKO DPU412 Query response <integer>

6.2 Remote measurement using RS-232C

This device has an RS-232C interface mounted as a standard. This allows remote measurements to be carried out by connecting this device with a personal computer (controller).

Connecting the RS-232C connector

Turn OFF the power for this device and for all of the devices connected to this device.
Connect the cable to the RS-232C connector on the back of the device.

⚠CAUTION

Always turn OFF the power of all devices connected to the cable before connecting or disconnecting the cable.
Connecting/disconnecting the cable while the power is ON could lead to device malfunctioning and trouble.
Use a cross cable for the RS-232C cable.

Setting the interface

(1) Press the <SYSTEM> key.

(2) Press the <PARAM> soft key.

(3) Select the RS-232C settings with the rotary encoder or numeric keys.

(4) Press the <ENTER> soft key to set the each setting value.

Setting items:

Baud rate	Setting range:300,600,1200,2400,4800,9600,19200 Default value:9600
Data bit	Setting range:5,6,7,8 Default value:8
Parity	Setting range:NONE,ODD,EVEN Default value:NONE
Stop bit	Setting range:1,1.5,2 Default value:1 "1.5" is applicable only when the data bit length is "5"
Flow control	Setting range:NONE,Xon/Xoff,HARDWARE Default value:NONE

Status data structure

The structure is the same as the GP-IB remote measurement. Note that a service request cannot be generated to confirm the status. If a command error occurs, the standard event status register will be set, so the register can be read out with the "*ESR?" command.

Remote command

Command reference

The control command and request commands are the same as the GP-IB remote measurement.

Delimiter

"CRLF" is used for the delimiter.

Send and Receive Buffers

The AQ6140 has the 512-byte(to store CR.LF and other control codes and commas",") receive buffers.

The AQ6140 has the 1024-byte(to store CR.LF and other control codes and commas",") send buffers.

Sample Program

The following programs measure the DFB laser. Measured wavelength and power are displayed on the screen.
The program language is N88BASIC.

```
1000 '
1010 '    AQ6140 MULTI-WAVELENGTH METER
1020 '              SAMPLE PROGRAM
1030 '              (DFB LASER)
1040 '
1050 CLS
1060 ISET IFC
1070 ISET REN
1080 ADRS=7
1090 '
1100 PRINT @ ADRS;"*RST"
1110 '
1120 PRINT @ ADRS;":MEAS:SCAL:POW:WAV?"          :Measurement of wavelength
1130 INPUT @ ADRS;WAV$
1140 '
1150 PRINT @ ADRS;":FETC:SCAL:POW?"              :Measurement of power
1160 INPUT @ ADRS;POW$
1170 '
1180 GOSUB *ERRCHK                               :Error check
1190 '
1200      WAV#=VAL(WAV$)*1000000000#             :Display of measurement value
1210      WAV#=INT(WAV#*1000#+.5#)/1000#
1220      POW=VAL(POW$)
1230      POW#=INT(POW*1000#+.5#)/1000#
1240      PRINT "WAVLENGTH=",WAV#,"nm"
1250      PRINT "POWER      =",POW#,"dBm"
1260 '
1270 IRESET REN
1280 END
1290 '
1300 *ERRCHK
1310      PRINT @ ADRS;":SYST:ERR?"              :Judgment of error
1320      INPUT @ ADRS;N$,E$
1330      IF N$="+0" THEN RETURN
1340      PRINT "ERROR",N$,E$
1350      IRESET REN
1360 END
```

Chapter7
Maintenance and inspection

The maintenance of this device is explained in this chapter.

7.1 Mechanical inspections

Inspect the appearance of the operation section and the mechanical operation from outside the device.
For the appearance, visually check for damage and deformation, and confirm that the switches, connectors and other assembly parts are not loose and move smoothly.
If any abnormality is found, notify Ando Electric of the details immediately.

7.2 Cleaning the device

This device must be cleaned daily to ensure long usage, and to prevent trouble and accidents. The methods for cleaning the device, floppy disk drive, optical connector and optical adaptor are described below.

Device

If the device's case or LCD surface is contaminated, wipe it off with a soft cloth, soaked in water or lukewarm water, and then dry off with a dry cloth.

⚠CAUTION

Do not use thinner, benzene or alcohol, etc., as the surface could be damaged.

Floppy disk drive

Contamination of the floppy disk drive's magnetic head will lead to writing and reading errors. Using a commercially available "floppy head cleaner (for double-sided drive), clean the head once every three months.

Wet and dry type head cleaners are available. The wet type is effective in removing contamination from the head surface, and thus is recommended.

Follow the instructions provided by the cleaner maker when using the cleaner.

7.3 Optical connector and optical adaptor

The performance could drop if the optical connector and optical adaptor are contaminated. Always clean off the optical connector and optical adaptor before starting measurement.

Cleaning the optical connector

Clean the end of the optical connector with dedicated cleaner.

⚠CAUTION

Always clean the end of the optical connector before starting measurement. If dust or dirt is adhered, the optical adaptor on the device could be damaged, and accurate measurement could be inhibited.

Note "NTT International "OPTICAL FIBER CONNECTOR CLEANER" is a type of dedicated cleaner that can be used.

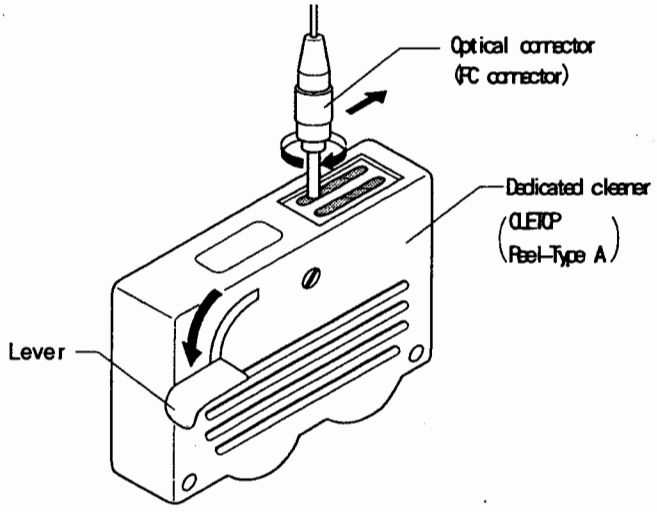
Product name	Applicable connector type
CLETOP Reel-Type A	SC, FC, ST, DIN, D4
CLETOP Reel-Type B	MT, Biconic
CLETOP refill tape	
CLETOP Stick-Type	

Cleaning method

(1) Vertically press the end of the optical connector against the cleaning surface of the dedicated cleaner.

(2) With the end of the optical connector pressed against the cleaning surface, rotate the optical connector about one turn, and then slide it horizontally.

(3) Clean the end of the optical connector again with the dedicated cleaner.



Cleaning the optical adaptor

Remove the front shell, and clean the optical adaptor with the dedicated stick.

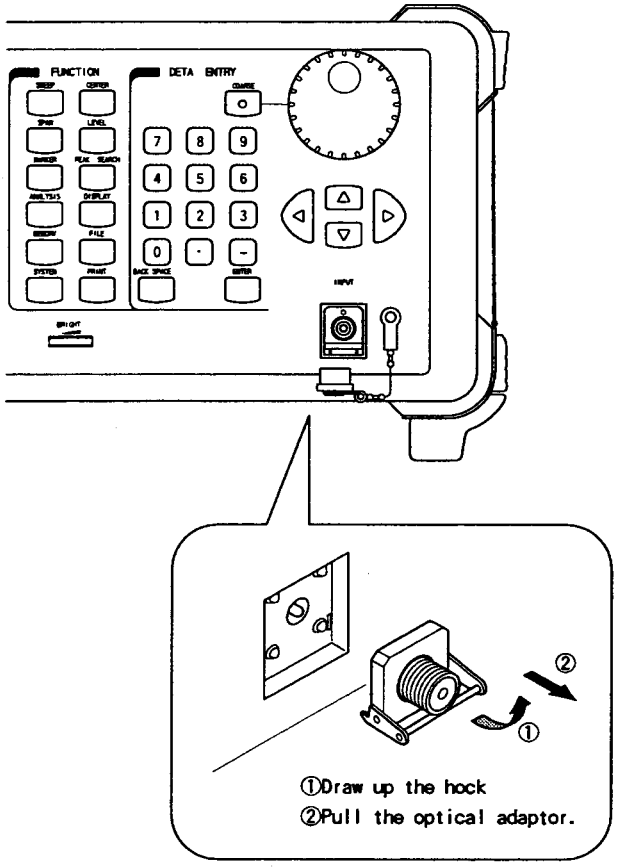
Note "NTT International "CLETOP Stick-Type"" is a type of dedicated stick that can be used for the optical adaptor.

Replacing the optical adaptor

1 Remove the front shell.

(1) Tilt the lock lever on the front shell upward. The front shell and rear shell lock will be released.

(2) Pull the front shell off the rear shell.



2 Install a new front shell.

(1) Clean the inside and outside of the new front shell with the dedicated stick.
(2) Clean the rear shell and the end of the optical fiber with the dedicated stick
(3) While taking care not to contact the front shell against the optical fiber, insert the shell into the rear shell.
(4) Tilt the lock lever on the front shell downward to lock.

⚠CAUTION

When installing the front shell, take care not to damage the end of the optical fiber. Correct measurements will not be possible if the end of the optical fiber is damaged. There is also a risk of damaging the optical fiber on the measurement cable side.

Error Messages

1. Error message (Messages being indicated in the red colored window on the screen)

Error codes	Error messages	Error causes	Remedies
003	"Unsuitable Ref Level."	Out of the preset range (-40～+20dBm) of the reference value. (When the "PEAK" -> "REF. LEVEL".)	When the "PEAK" -> "REF. LEVEL", set the REF value to -40dBm in case the value is less than -40 and to +20dBm in case the value exceeds +20dBm.
121	"Disk not initialized."	Formatting error of the FD	Change the FD.
122	"Disk is write protected."	It is being write-protected.	Cancel the write-protection.
123	"File not found."	That file name cannot be found.	Check the file name.
126	"Directory already exists."	An identical directory exists.	Change the directory name.
129	"Disk full."	Available capacity is not enough.	Delete unnecessary files to secure sufficient capacity.
131	"No data."	That data cannot be found.	Re-check if the data should exist.
135	"File is not a settings file."	The condition file is not correct.	Set a correct condition file.
137	"File is not mark files."	Marked file cannot be found.	Mark the file.
160	"Printer paper empty."	Paper is not being set to your printer.	Set paper to your printer.
172	"Unable to create directory."	Invalid character for a directory name is being included.	Create a directory under a name using valid characters only.
173	"Read or Write error."	File processing was not executed properly.	Check the remaining capacity of the medium to re-try or to replace the FD.
174	"Printer Not Ready!"	Your printer is not ready for operation.	Check the power switch and power cable connection of the printer.
176	"THIS MEDIA(IC CARD,HD CARD) IS NOT FORMATTED" "THE OPERATION IS CANCELLED."	The medium has not been formatted yet.	Format the medium.
177	"Not Agree Data & Condition."	The printer port setting is incorrect.	Make the printer port setting other than "FILE".
178	"Unable to delete directory."	You tried to delete the directory with some files remaining in the directory.	Delete all the files remaining in the directory before deleting the directory.
180	"Please Input LOCKOUT CODE."	When turning the LOCKOUT "ON" -> "OFF", the LOCKOUT cannot be turned "OFF" since the LOCKOUT code is wrong.	Enter the correct LOCKOUT code before turning the LOCKOUT "OFF".
181	"Please Change OPERATION LOCKOUT." "THE OPERATION IS CANCELLED."	You changed the conditions while the LOCKOUT is being turned "ON".	Turn the LOCKOUT "OFF" before changing the conditions.

Error codes	Error messages	Error causes	Remedies
182	"Password is invalid"	When turning the LOCKOUT "OFF"->"ON", it is necessary to enter a 4-digit password as the LOCKOUT code and it has not been entered yet.	Enter a 4-digit password as the LOCKOUT code before turning the LOCKOUT "OFF"->"ON".
203	"Motor Error!"	Motor operation failure	Turn the power switch "OFF" once and re-start the AQ6140. In case the same error message appears again, contact our sales personnel.
206	"AD Range over!"	The input levels to the AD are exceeding the specification.	Check the the optical power inputs.
207	"Total Power overflow!"	Total sum of the optical power inputs exceeds the specification.	Attenuate the optical power inputs.
208	"Meas T.O. error!"	The preset measurement time has been exceeded.	↑
209	"SUB Cond.set error!"	Condition setting error to the SUB CPU	↑
210	"SUB WI Set error!"	Wavelength setting error to the SUB CPU	↑
211	"SUB T.O. error!"	The preset processing time by the SUB CPU has been exceeded.	↑
213	"SUB Program error!"	Programmed operation error of the SUB CPU	↑
214	"SUB Power overflow!"	SUB CPU power overflow	↑
216	"Fan alarm STOP!"	Fan operation failure	↑
217	"Temp.over STOP!"	Internal temperature rise	↑
400	"The number of measurement peaks" "and the number of reference peaks" "are different."	While making the drift measurement, the peak values of the REFFER data and of the measurement data do not coincide.	Revise the settings so that the peak values coincide before the setting the latest measurement result as the new REFFER data using the REF SET key.
401	"Drift reference data not found!"	Drift REFFER data cannot be found.	Preset the measurement result as the REFFER using the REF SET key.
402	"Start or Stop WL Limit Over." "Please Change."	When making ordinary measurements, presettings for the "Starting wavelength" and "Ending wavelength" are out of the specification.	Change the wavelengths within the specified range.
	"WARNING" "The destination file already exists." "Overwriting this file will result in the" "loss of the previously stored data"	You are designating to store the data under an already existing file name. If you overwrite, the previous data under the file name will be deleted and lost.	If the previous date under the file name is still necessary, use some other file name to store the new data or make a backup memory of the previous file before storing the new data.
	"CAUTION" "Booting now!" "Please wait." "Don't turn off power!" "If turn off, it causes broken system."		Do not turn off the power while this message is appearing under any circumstances whatsoever! If you do, it will become necessary to bring the system over to our repair shop for repairs.

2. Messages appearing when the system is started up

	Messages	Contents of the messages	Remedies
	"Motor error!"	Initial setting error for the motor	Turn the power switch "OFF" once and re-start the AQ6140. In case the same error message appears again, contact our sales personnel.
	"DSP error!"	Initial setting error for the DPM	↑
	"Sub Ver error! Turn off Power."	SUB CPU Program Version selection error.	↑

3. Messages appearing at the lower section of the screen

	Messages	Contents of the messages	Remedies
	"Stop of Trap1(TRP DLT)!"	Trap1 (TRP DLT) of the drift has been stopped. The peak wavelength interval has exceeded the preset range.	Check the cause of stop.
	"Stop of Trap2(TRP DRIFT)!"	Trap2 (TRP DRIFT) of the drift has been stopped. The peak wavelengths have exceeded the preset range.	Check the cause of stop.
	"Stop of Trap3(TRP DLT Pw)!"	Trap3 (TRP DLT Pw) of the drift has been stopped. The peak power has exceeded the preset range.	Check the cause of stop.
	"If Sort,Please Drift Off."	Sorting was made while drift measurement is in progress.	Always turn the DRIFT "OFF" before starting sorting.
	"Please Measurement off."	Peak searching was made while measurement is in progress.	Always interrupt measurement before making peak searching.
	"Remote Command Error!"	Remote command error.	Check if the command and parameter are legal.

4. Error message(Remote function)

No.	Messages	Contents of the messages	Remedies
0	"NO ERRORS"	There is no error.	—
1100	"COMMAND ERROR"	Command error(Other parameter errors)	Please confirm the parameter and send the command again.
1102	"SYNTAX ERROR"	Command error(Unknown command)	Please confirm the command and send the command again.
1109	"MISSING PARAMETER"	Parameter omission	Please set the parameter.
1113	"UNDEFINED HEADER"	Header undefinition	Please confirm the command and send the command again.
1120	"NUMERIC DATA ERROR"	Numeric error	Please confirm the parameter and send the command again.
1131	"INVALID SUFFIX"	The suffix is invalid. (unit wrong of parameter)	Please confirm the parameter and send the command again.
1138	"SUFFIX NOT ALLOWED"	The suffix is not acceptable. (numeric parameter mistake)	Please confirm the parameter and send the command again.
1151	"INVALID STRING DATA"	Character-string data invalidity	Please confirm the parameter and send the command again.
1190	"UNIT ERROR"	Mistake of unit (execution of command of unit system different from unit of present)	Please confirm the unit of present and send the command of a correct unit system.
1200	"EXECUTION ERROR"	Execution error	Please confirm the command and send the command again.
1213	"INIT IGNORED"	INIT was disregarded.	Please execute the command after stopping the REPEAT measurement.
1221	"SETTING CONFLICT"	Collision of setting (Two functions or more are turned on by the CALC3 command)	Please confirm the command and turn on only one.
1222	"PARAMETER LIMIT OVER"	A set value of the parameter is outside the range.	Please input the parameter within the range of setting.
1224	"ILLEGAL PARAMETER VALUE"	The parameter value is incorrect. (Parameter input etc. other than ON/OFF)	Please confirm the parameter and send the command again.
1350	"TOO MANY ERRORS"	There are a lot of errors. (There are 30 more errors)	Please confirm the content of the error and send the command again.
1400	"QUERY ERROR"	Query error	The mistake is found in Query command. Or, there is no return value.

5. Warning messages

Error codes	Warning messages	Warning causes	Remedies
	(Yellow colored window)		
215	"Peak 256 over!"	More than 256 peaks have been measured.	* Change the setting not to measure unnecessary peaks. * Lessen the number of inputting peaks.
	"CAUTION" "Boot end." "Please turn off power." "After then, power on."	The system has finished boot-loading of the files from the FD. Turn off the power switch once before resuming the operation.	Make sure movement of the FD drive has ended before taking out the FD and turning the power switch OFF. After that, re-start the system and check if it operates normally.
	(Red colored window)		
	"Now Doing Print Process."	Printing is now in progress.	Do not make any other operations.
503	"Drive Not Ready."	No disc in drive!	Check if a FD is properly inserted into the drive.
504	"File Type Unmatched."	File type is incorrect.	Check the file type.
505	"Setup is invalid."	Settings relevant to filing are incorrect.	Check the drive name, directory name, file name, etc.
506	"Not enough core."	The memory capacity is in short.	Turn the power switch "OFF" once and re-start the AQ6140. In case the same error message appears again, contact our sales personnel.

A N D O E L E C T R I C
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or local agencies

Note. The above information is subject to change without notice.