AQ6317
OPTICAL SPECTRUM ANALYZER
INTRODUCTION OF ADDITIONAL FUNCTION

= For Reference =

Safety precausions are subject to change due to amandements made in laws and ordinaces.
Please operate the device at your own risk.
If you have any inquiries regarding the safety operation, please do not hesitate to contact your local Yokogawa sales office.

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Outline

Our products to the software versions of R02.00(M), R02.00(0) and later have the following additional and changed functions. So, the Instruction Manual has been partly revised as follow:

[List of Additional and Changed Functions]

(1) Extension of [ANALYSIS] Function

① Enforcement of WDM Analysis Function

- The maximum number of analysis channels has been increased from the conventional 100ch. to 200ch.
- Enforcement of Preset Wavelength Table
  a. The function has been added that displays the ITU-T grid wavelengths in a table and copies their values from the table to the preset wavelength table simply by touching.
  b. The function has been added that enables to register fixed markers' values set by WDM search in the preset wavelength table as they are or after rounding them to the nearest ITU-T grid wavelengths.
  c. Analysis channel numbers have come to be specified.
  d. Wavelength values only used to be displayed and input in the preset wavelength table, but this time frequency values have come to be done similarly.
  e. The operability of editing preset wavelength table has been improved.
  f. The function has been added that enables to set level threshold values and not to display channels below the threshold values. (<DISP MASK> Key)
- Addition of Drift measuring function (<DISPLAY DRIFT> Key)
  The function has been added that enable to display the wavelength difference and the level difference from the ITU-T grid or optionally set wavelength and to display relative value MAX/MIN.
- Addition of Output Slope Measuring Function (<OUTPUT SLOPE> Key)
  The function has been added that enables to obtain least square approximate line from WDM waveform level value in each channel and to display the approximate line together with the slope.
- The function has been added that enables to calculate wavelength and level value of each channel from TRACE A and noise level from TRACE B irrespective of the active trace state. (<DUAL TRACE> Key)

② Addition of Multichannel NF Analysis Function (<ANAYSIS2 WDM-NF> Key)
The function has been added that enables to analyze the following items for each WDM channel in block with the spectrums before and after amplification of WDM signal with the light amplifier and to display all the results together:

a Center wavelength
b. Input power, Output power
c. ASE level
d. Measurement resolution value
e. Gain
f. Noise figure

③ Addition of Optical Filter Analysis Function (<ANALYSIS2 FIL> Key)

The function has been added that enable to analyze the following items for measured waveform and to display the analysis results

a. Peak/Bottom wavelength, Level
b. Center wavelength, xxdB width
c. Cross talk
d. Ripple width

④ Reinforcement of Notch Width Analysis Function

The conventional notch width measuring function enabled to obtain notch widths from waveform peak level, but this time the function to obtain notch widths from the waveform bottom level has been added.

(2) Extension of LONG TERM Measuring Function

- The maximum number of measurement channels has been increased from the conventional 100ch. to 200ch.
- The vertical axis scale (wavelength, level, SNR) used to be of automatic scale but, this time, has come to be optionally set. (<Y SCALE MANUAL> Key)
- Measurement data has come to be read through the GP-IB interface even during long-term measurements.
- When measurement data did not come to the threshold, a warning used to be displayed (in red) on the screen and, this time, an alarm has come to be output on the GP-IB interface.

(3) Enforcement of Marking Function

- The maximum number of fixed markers has been increased from the conventional 100 to 200.
- The function has been added that makes waveforms track fixed marker level positions when an active trace is updated. (<MKR AUTO UPDATE> Key)
- The function has been added that enables to display only marker values independently as frequency. (<MKR UNIT> Key)

(4) Addition of Sensitivity Mode MID

SENS:MID has been added between SENS:NORM AUTO and SENS:HIGH1.

(5) Others

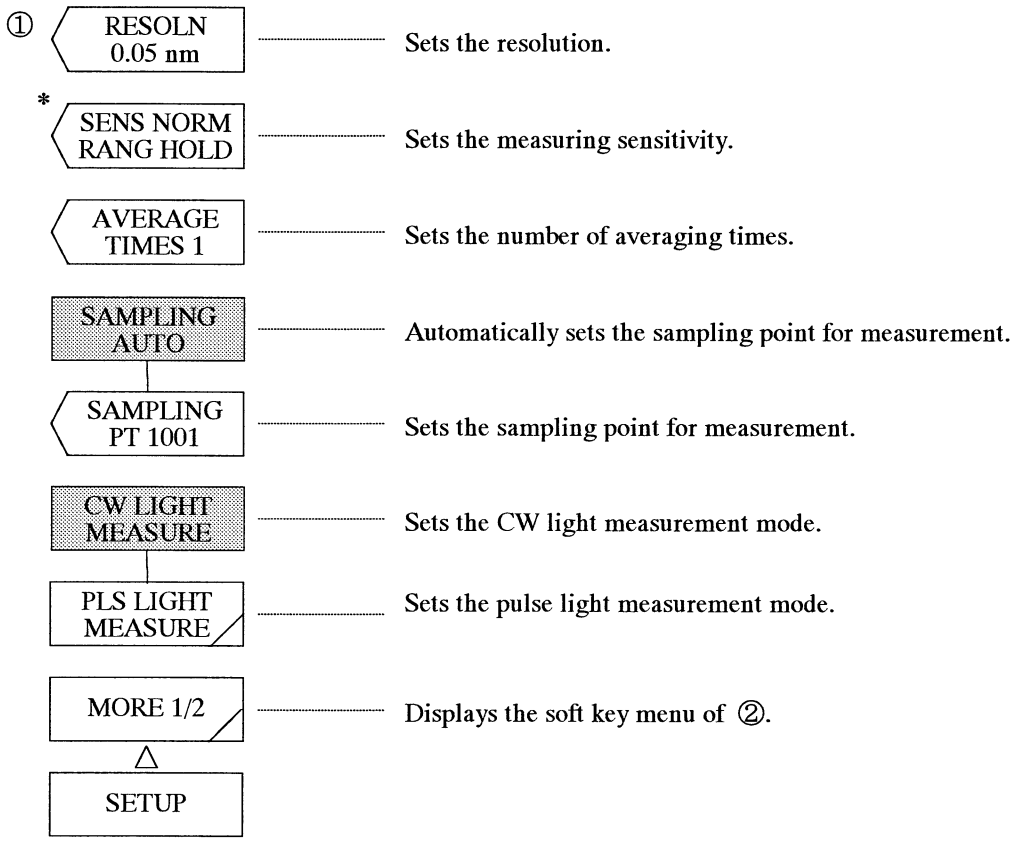
- LOG Data Upper/Lower Limit Value Changing Function (<LOG LIMIT ±***dB> Key)
  The conventional LOG upper/lower limit value was ±210dB, but this time this value has come to be changed to ±100dB.
- Resolution Ability Value Display Mode (<ACTUAL RES DISP> Key)
  The function has been added that enables to display the resolution ability value in setting the present center wavelength below the preset resolution value at the resolution setting time.

2. List of Additional/Changed Soft Key Menus

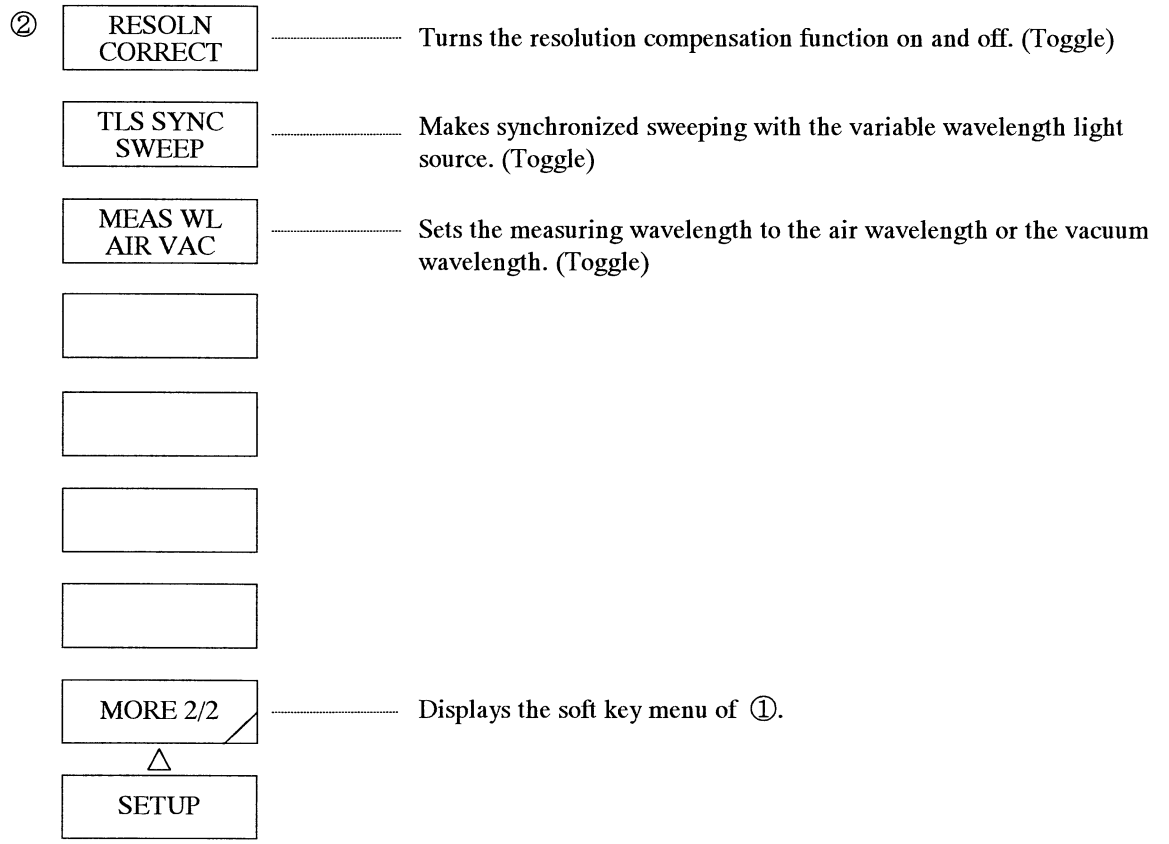
The list of soft key menus newly added or changed this time is as follows:
Keys marked with * are the soft keys newly added or changed this time.

2.1 [SETUP] Switch

When this key is pressed, the soft key menu of ① is displayed.



4



(1) <SENS> Key

Sets the measuring sensitivity.

This equipment permits selecting 6 measuring sensitivity levels according to the use.

When this key is pressed, the current measuring sensitivity is displayed in the interrupt display section.

The allowable setting range is NORMAL RANGE HOLD, NORMAL RANGE AUTO, MID, HIGH 1, HIGH 2 and HIGH 3. Pressing the rotary knob or the step key can change the display in turn "NORMAL RANGE HOLD" ↔ "NORMAL RANGE AUTO" ↔ "MID" ↔ "HIGH 1" ↔ "HIGH 2" ↔ "HIGH 3" to select a desired sensitivity level.

2.2 [MARKER] Switch

When this switch is pressed, the soft key menu of ① is displayed.

① MARKER ..... Displays the moving marker.

MARKER→ CENTER ..... Sets the wavelength of the moving marker to the center wavelength.

MARKER→ REF LEVEL ..... Sets the level of the moving marker to the reference level.

SET MARKER 1&2 ..... Sets the moving marker to the fixed marker 1 or 2.

SET MKR ..... Sets the moving marker to the fixed marker with the specified number.

CLR MKR ..... Clears the fixed marker of the specified number.

ALL MKR CLEAR ..... Clears the moving marker and the fixed marker being

MORE 1/3 ..... Displays the soft key menu of 2/3. (To ②)

△

MARKER

② LINE MARKER 1 ..... Displays the wavelength line marker 1.

LINE MARKER 2 ..... Displays the wavelength line marker 2.

LINE MARKER 3 ..... Displays the wavelength line marker 3.

LINE MARKER 4 ..... Displays the wavelength line marker 4.

MKR L1-L2 →SPAN ..... Sets the section between the wavelength markers 1 and 2 within the sweep range.

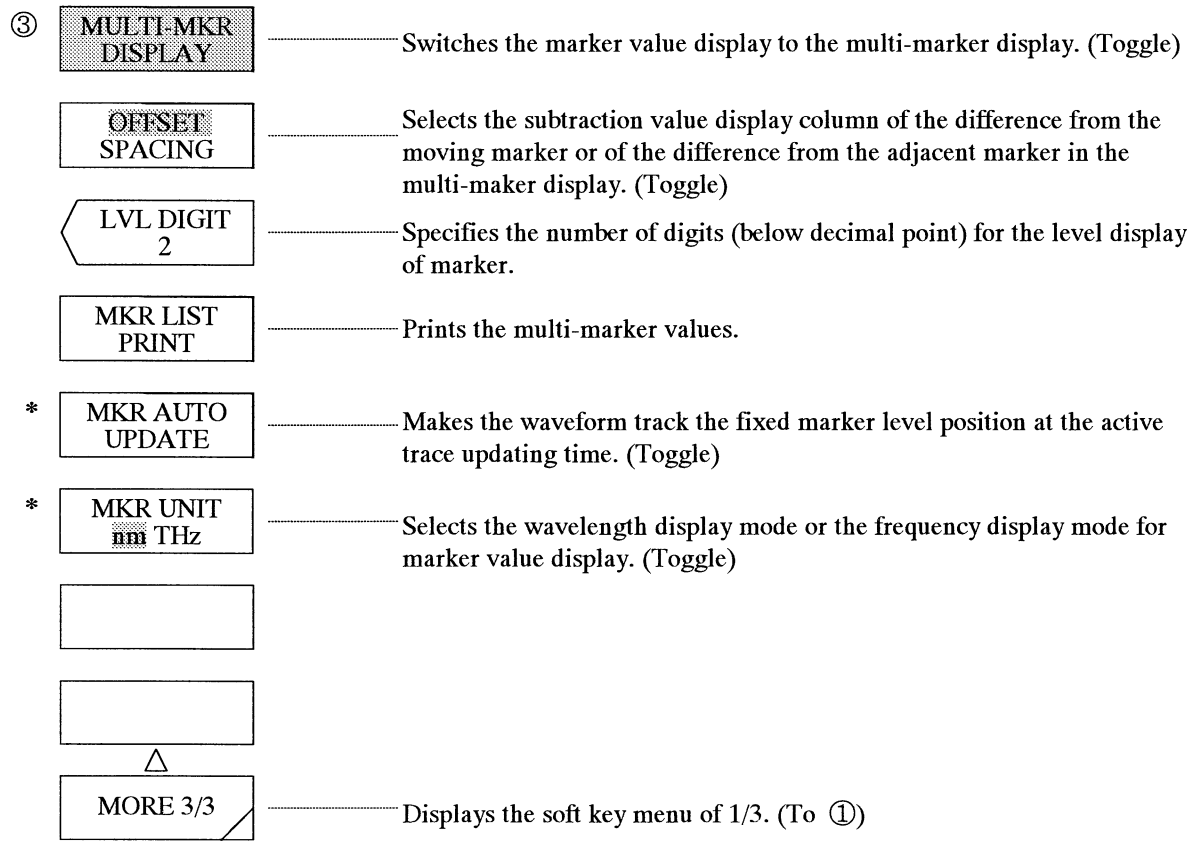
SEARCH L1-L2 ..... Executes PEAK SEARCH and ANALYSIS between the wavelength markers 1 and 2.

LINE MKR CLEAR ..... Clears all line markers and line marker values being displayed. (Toggle).

MORE 2/3 ..... Displays the soft key menu of 3/3. (To ③)

△

MARKER



(1) <MKR AUTO UPDATE> Key

While this key is selected, the fixed marker level value being displayed in the data area is updated each time the active trace waveform is updated.

(2) <MKR UNIT nm THz> Key

Switches the marker value display between in the wavelength display mode and in the frequency display mode.

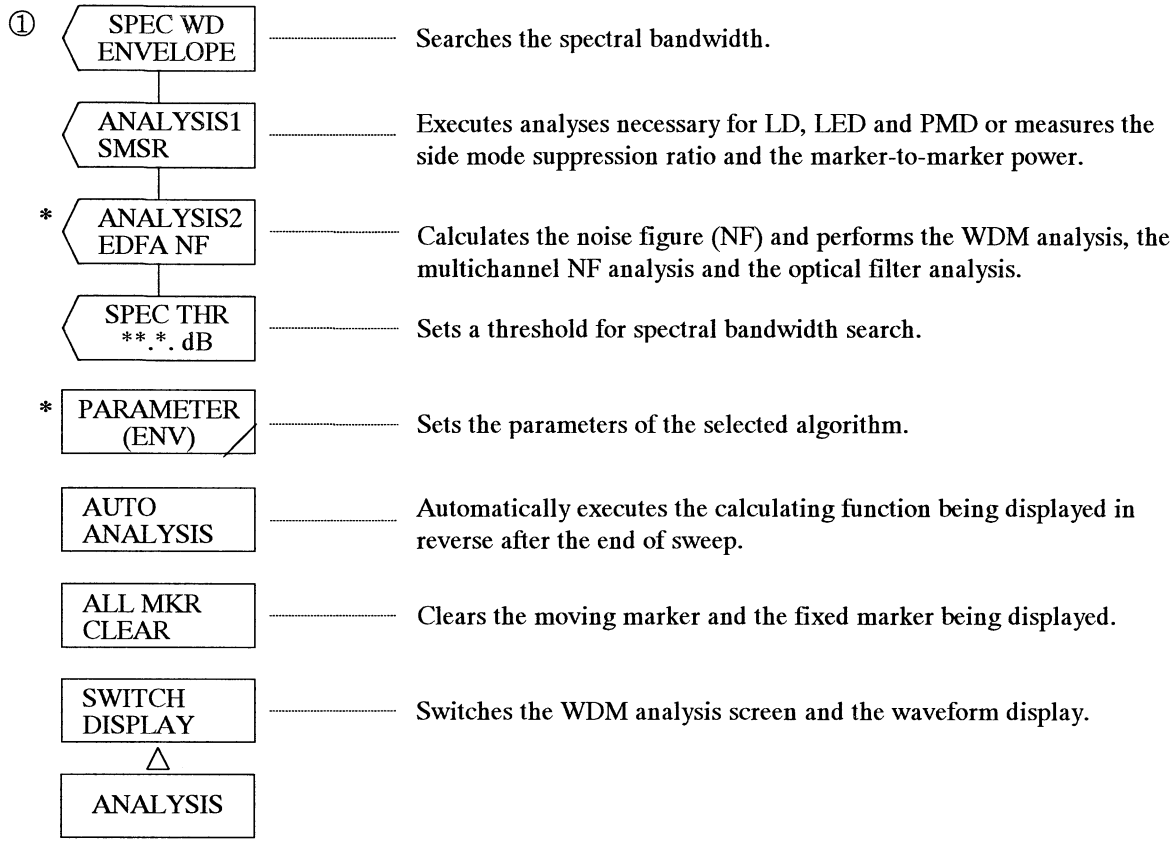
When this key is pressed, the marker value display unit (wavelength/frequency) can be set independently from the horizontal axis unit (wavelength/frequency) for waveform display set with the <HORZN SCL nm THz> Key.

The setting with this key changes as the setting with the <HORZN SCL nm THz> key changes, but the setting with the <HORZN SCL nm THz> key does not change even when the setting with this key changes.

(When the X axis is in the frequency display mode, marker values can be set to the wavelength display mode.)

2.3 [ANALYSIS] Switch

When this switch is pressed, the soft key menu of ① is displayed. At the same time, the keys displayed in reverse among the first three keys from the top of ① are executed.



(1) <ANALYSIS2 ******> Key

This key allows executing the following analyses:

① Calculation of noise figure (NF)
② WDM analysis
③ WDM-NF (multichannel NF) analysis
④ Optical filter (PEAK) analysis
⑤ Optical filter (BOTTOM) analysis

When this key is pressed, the types of analyses are displayed in the interrupt display area.
At the same time, the type of analysis currently selected is executed, the dedicated marker is set and the measured value is displayed in the data area. The following analysis parameters can be set with the rotary knob or the step key:
Parameters : EDFA-NF, WDM, WDM-NF, FIL-PK, FIL-BTM

(2) <ANALYSIS2 WDM-NF> Key

Calculates NF (noise figure) for each WDM channel in block on the assumption that the WDM waveforms before and after amplification with the light amplifier are placed in the traces A and B, and displays the result in the data area.

(3) <ANALYSIS2 FIL-PK> Key

Analyzes the following items in block for the waveform with which the optical filter (transmission type) and displays the results in the data area:

① Peak level
② Peak wavelength
③ Center wavelength
④ Peak width
⑤ Cross talk
⑥ Ripple width

For the algorithm of the optical filter analysis function, see Paragraph 3.3.

(4) <ANALYSIS2 FIL-BTM> Key

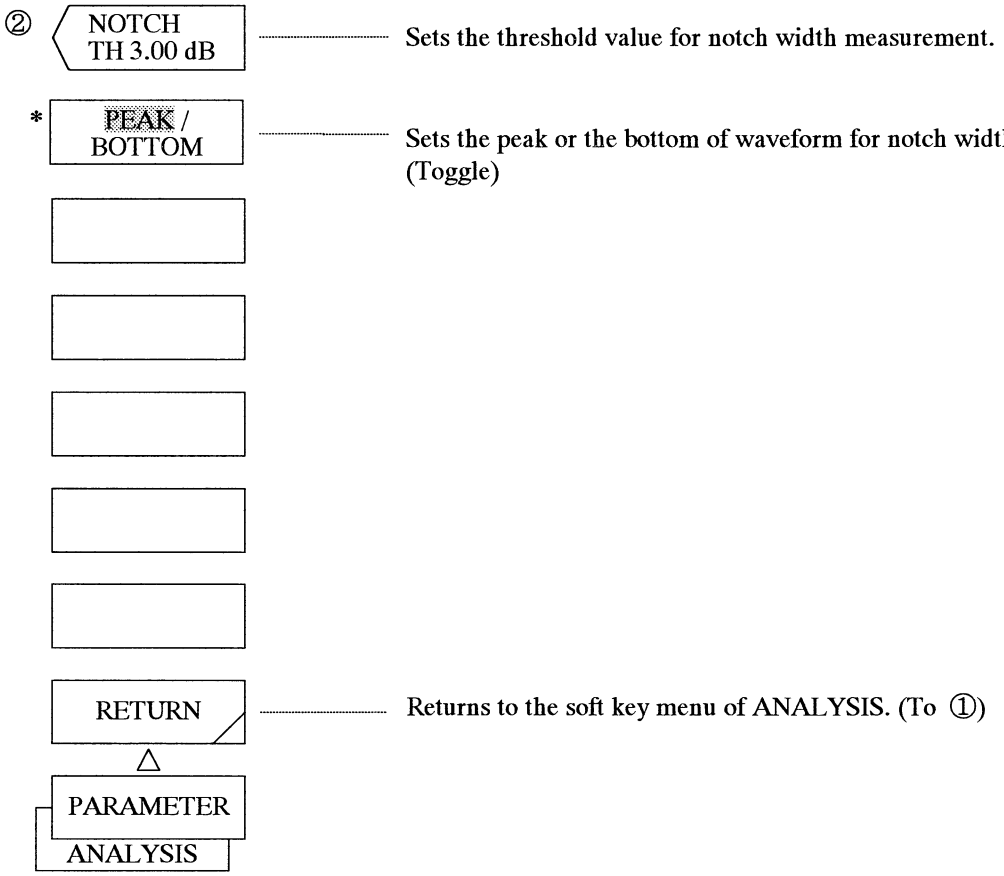
Analyzes the following items in block for the waveform with which the optical filter (notch type) and displays the results in the data area:

① Bottom level
② Bottom wavelength
③ Center wavelength
④ Notch width
⑤ Cross talk

For the algorithm of the optical filter analysis function, see Paragraph 3.3.

(5) <PARAMETER> Key

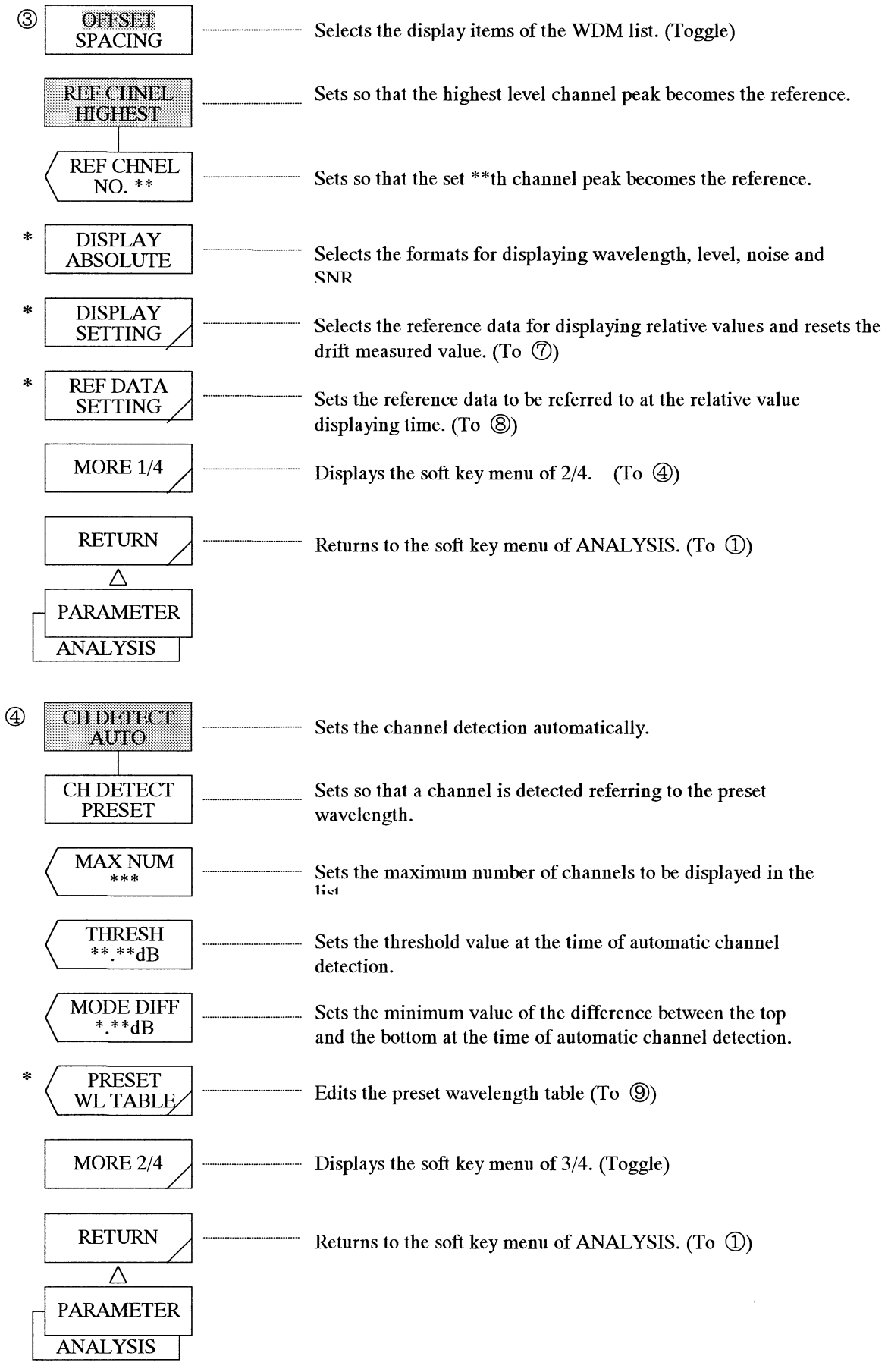
Displays the soft key menu (the soft key menu from ② to ⑭) for setting parameters for the key being displayed in reverse out of the three keys, <SPEC WD>, <ANALYSIS1> and <ANALYSIS2>.
Different soft key menus are displayed depending on the select status of the key selected out of the above three keys.



(6) <PEAK/BOTTOM> Key

Set the peak or the bottom of the waveform for notch width search.

Each time this key is pressed, "PEAK" or "BOTTOM" is displayed in reverse alternately.


③
OFFSET SPACING
Selects the display items of the WDM list. (Toggle)
REF CHNEL HIGHEST
Sets so that the highest level channel peak becomes the reference.
REF CHNEL NO. **
Sets so that the set **th channel peak becomes the reference.
*
DISPLAY ABSOLUTE
Selects the formats for displaying wavelength, level, noise and SNR
*
DISPLAY SETTING
Selects the reference data for displaying relative values and resets the drift measured value. (To ⑦)
*
REF DATA SETTING
Sets the reference data to be referred to at the relative value displaying time. (To ⑧)
MORE 1/4
Displays the soft key menu of 2/4. (To ④)
RETURN
Returns to the soft key menu of ANALYSIS. (To ①)
PARAMETER
ANALYSIS
④
CH DETECT AUTO
Sets the channel detection automatically.
CH DETECT PRESET
Sets so that a channel is detected referring to the preset wavelength.
MAX NUM ***
Sets the maximum number of channels to be displayed in the list
THRESH **.**dB
Sets the threshold value at the time of automatic channel detection.
MODE DIFF *.**dB
Sets the minimum value of the difference between the top and the bottom at the time of automatic channel detection.
*
PRESET WL TABLE
Edits the preset wavelength table (To ⑨)
MORE 2/4
Displays the soft key menu of 3/4. (Toggle)
RETURN
Returns to the soft key menu of ANALYSIS. (To ①)
PARAMETER
ANALYSIS

(7) <DISPLAY ********> Key

Sets formats for displaying the wavelength, the level, the noise and the SNR as the result of the WDM analysis. The display format has the following four types:

① ABSOLUTE -- Displays absolute values of analysis results.

② RELATIVE -- Displays relative values for reference data (REF DATA).

③ ABS & REL -- Displays absolute values of analysis results and relative values for reference data (REF DATA).

④ DRIFT --------- Displays the MAX/MIN of relative values for reference data (REF DATA).

Parameters : ABSOLUTE, RELATIVE, ABS & REL and DRIFT

(8) <DISPLAY SETTING> Key

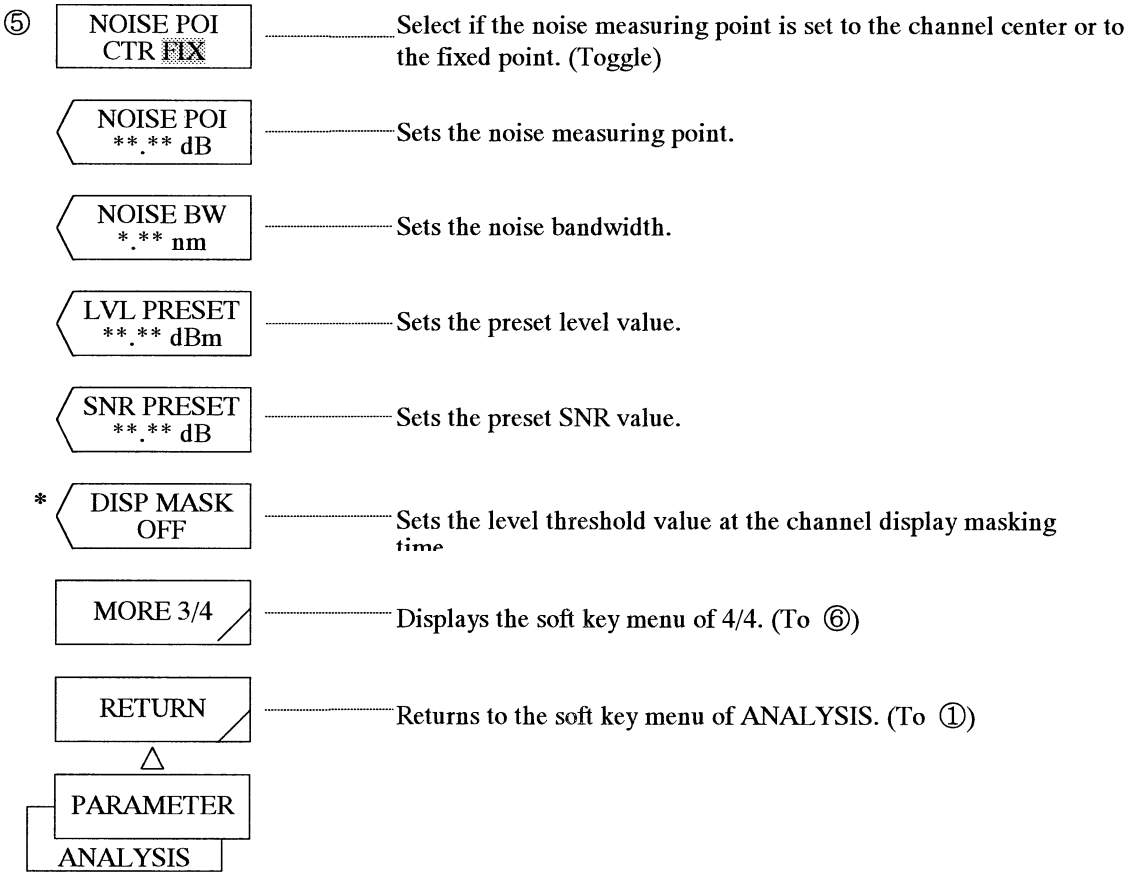
Selects reference data (REF DATA) for displaying relative values and resets drift measured values.
When this key is pressed, the soft key menu of ⑦ is displayed.

(9) <REF DATA SETTING> Key

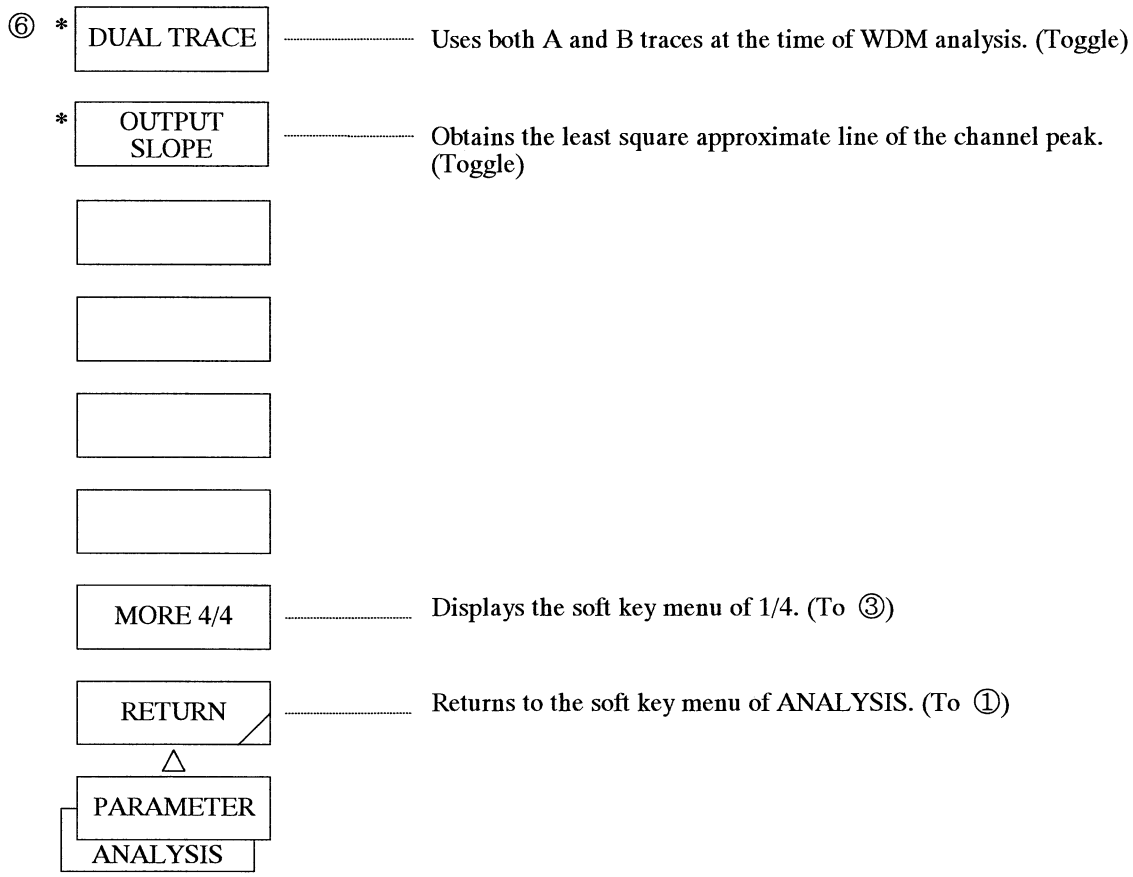
Sets reference data (REF DATA) at the relative value displaying time.
When this key is pressed, the soft key menu of ⑧ is displayed.

(10) <PRESET WL TABLE> Key

Edits the preset wavelength table.
When this key is pressed, the soft key menu of ⑨ is displayed.



8



(11) <DISK MASK ***> Key

Sets the level threshold value at the channel display masking time.

This key is effective only when <CH DETECT PRESET> is selected.

The mask value can be changed to OFF and the range from 0 to –100 dBm (1 step).

(12) <DUAL TRACE> Key

Calculate the wavelength and the level from the waveform of Trace A and the noise level from the waveform of Trace B irrespective of the active trace status.

When this key is pressed, the reverse display appears and is turned on and off.

(13) <OUTPUT SLOPE> Key

Obtains the least square approximate line for each channel peak obtained from the WDM analysis and displays the least square approximate line and its slope (dB/nm or dB/THz) together.

When this key is pressed, the reverse display appears and is turned on and off.

⑦ * ITU-T TBL / REF TBL ..... Selects data to be referred to when the relative value is displayed. (Toggle)

* MAX / MIN RESET ..... Resets the MAX/MIN data at the drift measuring time.

[ ]

[ ]

[ ]

[ ]

[ ]

RETURN ..... Returns to the soft key menu for the <PARAMETER> setting. (To ③)

△

DISPLAY SETTING / ANALYSIS

⑧ * WDM RESLT →REF DATA ..... Makes the latest WDM analysis result the reference data.

* PRESET →REF DATA ..... Makes the preset table values the reference data.

* ITU-T →REF DATA ..... Makes the ITU-T table values the reference data.

[ ]

[ ]

[ ]

[ ]

RETURN ..... Returns to the soft key menu for the <PARAMETER> setting. (To ③)

△

REF DATA SETTING / ANALYSIS

9

(14) <ITU-T TBL REF TBL> Key

Selects data to be referred to when the relative value is displayed.

ITU-T TBL : Makes the ITI-T TABLE wavelength values the reference data.
For the level, values on the <LVL PRESET> key become the reference data, and for the SNR, values on the <SNR PRESET> key become the reference data.

REF TBL : The reference table set with the <REF DATA SETTING> key of (9) becomes the reference data.

(15) <MAX/MIN RESET> Key

Resets the MAX/MIN value to be displayed at the drift measuring time (when the <DISPLAY DRIFT> key is selected) to 0.

(16) <WDM RESLT→REF DATA> Key

Makes the latest WDM analysis result the reference data.

(17) <PRESET→REF DATA> Key

Makes the preset value the reference data.
The preset value is set with the <PRESET WL TABLE>, <LEVEL PRESET> or <SNR PRESET> key.

(18) <ITU-T→REF DATA> Key

Makes ITU-T TABLE values the reference data.
For the level, the value of the <LVL PRESET> key becomes the reference data, and for SNR, the value of the <SNR PRESET> key becomes the reference data.

⑨

* TABLE SELECT ..... Switches active tables.

* AREA SELECT ..... Sets the present cursor position to the top of the line to be copies/deleted and brings about the area select status.

* AREA CUT ..... Copies the present position or the whole selected area in the buffer and deletes it.

* AREA COPY ..... Copies the present position or the whole selected area in the buffer.

* PASTE INSERT ..... Inserts the line copies with the <AREA CUT> or the <AREA COPY> key in the buffer on the present line.

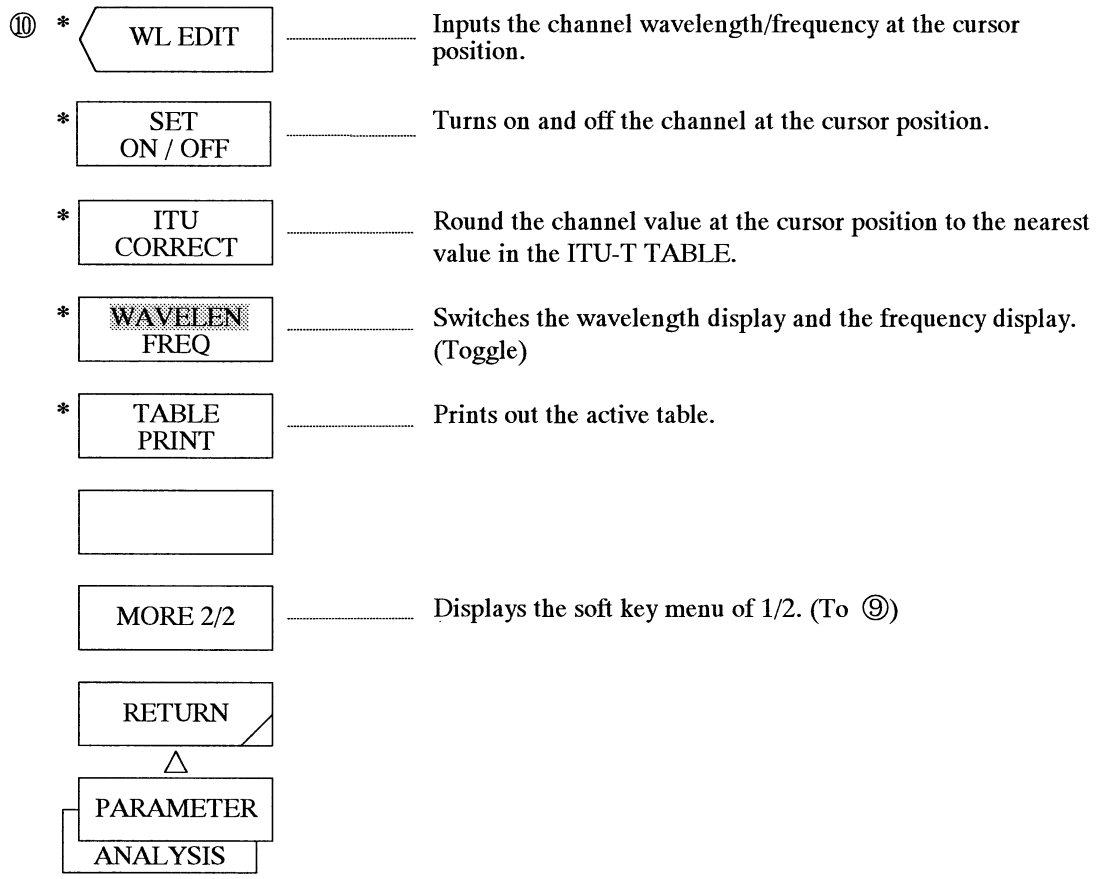
* PASTE OVER WRT ..... Overwrites the line copies with the <AREA CUT> or the <AREA COPY> key in the buffer from the present line.

MORE 1/2 ..... Displays the soft key menu of 2/2. (To ⑩)

RETURN

△

PARAMETER ANALYSIS



(19) <TABLE SELECT> Key

Switches active tables. Active tables have thick outer frames when displayed.

(20) <AREA SELECT> Key

Sets the present cursor position to the top of the area for controlling plural data at a time and brings about the area select status. When this key is pressed in the area select status, the area select status is released.

(21) <AREA CUT> Key

Copies the data at the present cursor position or the data in the area selected with the <AREA SELECT> key in the buffer and deletes it.

(22) <AREA COPY> Key

Copies the data at the present cursor position or the data in the area selected with the <AREA SELECT> key in the buffer.

(23) <PASTE INSERT> Key

Inserts the data copied with the <AREA CUT> or the <AREA COPY> key in the buffer to the present cursor position. When the number of data exceeded 200ch after the insertion, no more data can be inserted.

10

(24) <PAST OVER WRT> Key

Overwrites the data copies with the <AREA CUT> or <AREA COPY> key in the buffer from the present cursor position.

(25) <WL EDIT> Key

Inputs the channel wavelength/frequency at the cursor position.

(26) <SET ON/OFF> Key

Turns on and off the channel at the cursor position.

The channel, which has been turned off at the channel detecting time, cannot be used.

(27) <ITU CORRECT> Key

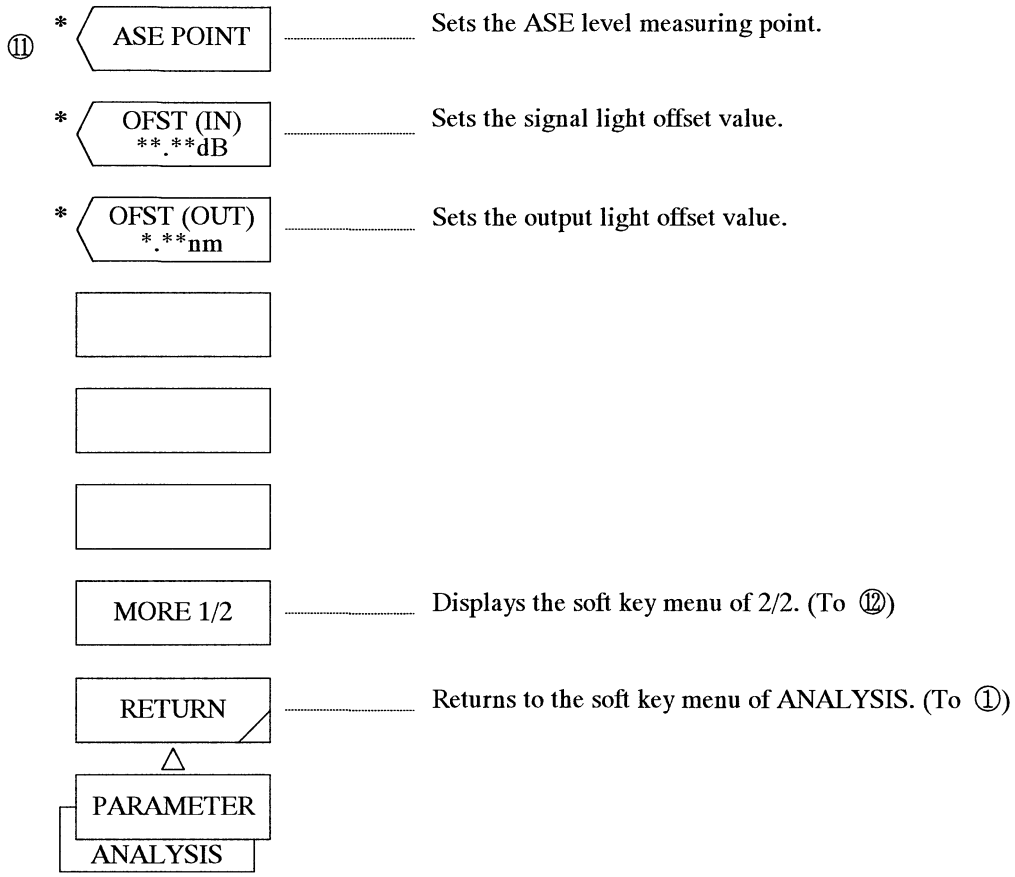
Round the channel value at the cursor position to the nearest value in the ITU-T TABLE.

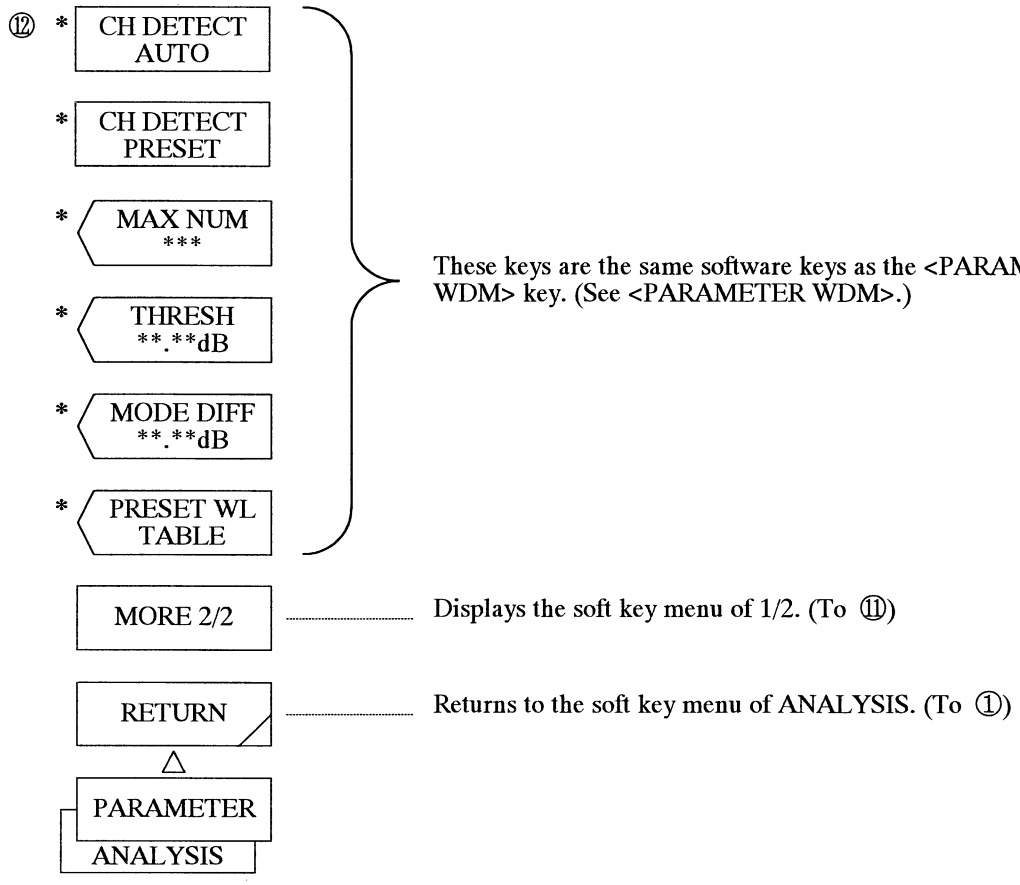
(28) <WAVELEN FREQ> Key

Switches the data display on the table to the wavelength display and to the frequency display.

(29) <TABLE PRINT> Key

Prints out the active table.





(30) <ASE POINT ±**.**nm> Key

Sets the ASE level measuring point.

After the execution, the present ASE level measuring point is displayed in the interrupt display area.

The ASE level measuring point can be changed in the range from 0.00 to 10.00 nm (0.1 step) with the rotary knob, the step key or the ten-key pad.

(31) <OFST (IN) ***.**dB> Key

Sets the offset value of the signal light (light that is input to the optical fiber amplifier) at the NF and Gain calculating times.

After the key is executed, the present offset value is displayed in the interrupt display area.

The offset value can be changed in the range from -99.99 to +99.99 dB (0.01 step) with the rotary knob, the step key or the ten-key pad.

(32) <OFST (OUT) ***.**dB> Key

Sets the offset value of the output light (light amplified with the optical fiber amplifier) at the NF and Gain calculating times.

After the key is executed, the present offset value is displayed in the interrupt display area.

The offset value can be changed in the range from -99.99 to +99.99 dB (0.01 step) with the rotary knob, the step key or the ten-key pad.

(33) <CH DETECT AUTO> Key
(34) <CH DETECT PRESET> Key
(35) <MAX NUM ***> Key
(36) <THRESH **.*dB> Key
(37) <MODE DIFF **.*dB> Key
(38) <PREEST WL TABLE> Key

These keys are the same as the software keys of <PARAMETER WDM>.

The List to be displayed with the <WDM-NF> Key

<WDM NF> CH: AUTO ASE: ±0.40 nm MAX NUM: 20 0FST(IN): 0.00 dB THRESH: 20.00 dB 0FST(OUT): 0.00 dB MODE DIFF: 3.00 dB

NO.	WAVELENGTH [nm]	INPUT LEV [dBm]	OUTPUT LEV [dBm]	ASE LEV [dBm]	RESOLN [nm]	GAIN [dB]	NF [dB]
01	1547.464	–19.94	–2.44	–33.28	0.145	17.49	5.58
02	1549.076	–19.93	–2.19	–33.01	0.158	17.73	5.25
03	1550.679	–19.94	–1.92	–32.65	0.148	18.02	5.62
04	1552.268	–19.98	–1.70	–32.45	0.146	18.28	5.63

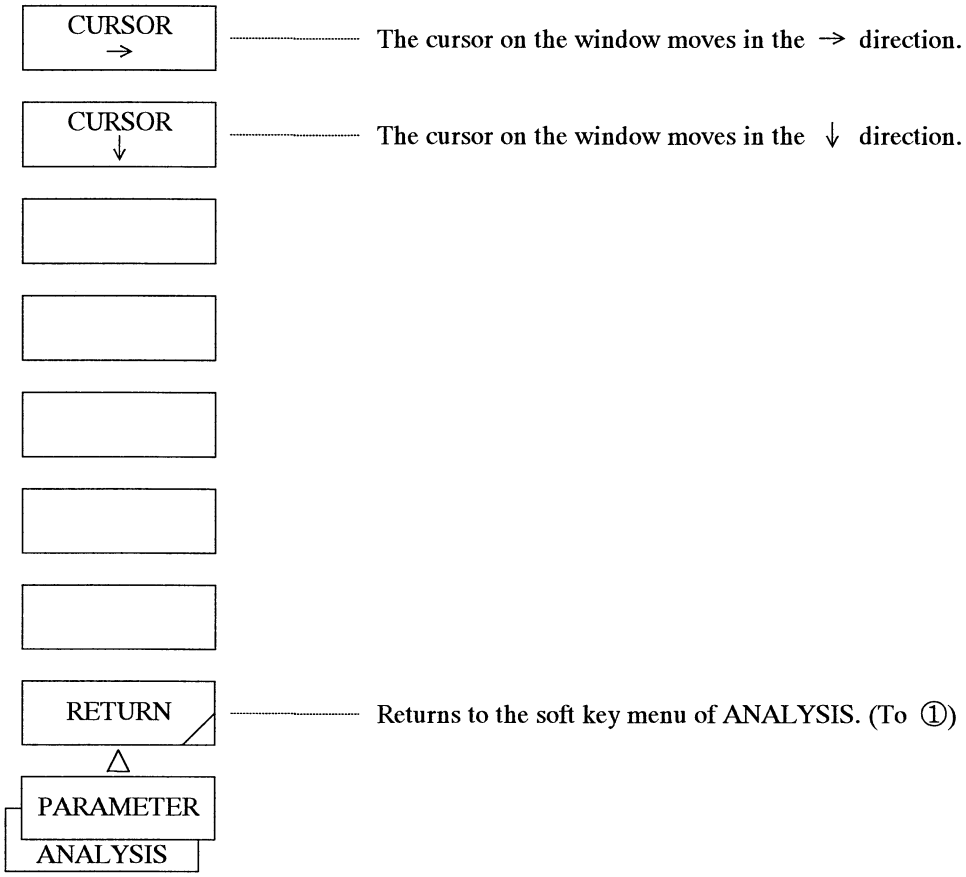
The list can be scrolled with the rotary knob or the step key when larger than a screen.

Explanation of Each Item

WAVELENGTH (Note 1): Peak wavelength of each channel (to be obtained from Trace A).
INPUT LEV : Level before amplification of each channel (to be obtained from Trace A).
OUTPUT LBE : Level after amplification of each channel (to be obtained from Trace B).
ASE LEV : ASE level of each channel
RESOLN : Measurement resolution of each channel (to be obtained from Trace B)
GAIN : Gain of each channel
NF : NF value of each channel

Note 1 : Frequency is displayed when the marker is in the frequency length display mode.

⑭



- < ANALYSIS2 FIL-PK >

FILTER (PEAK) ANALYSIS								
ITEM		ALGO	TH [dB]	K	MODE FIT	MODE DIFF [dB]	CH SPACE [nm]	SEARCH AREA [nm]
PEAK LVL	ON	PK LVL	—	—	—	—	—	—
PEAK WL	ON	PK WL	—	—	—	—	—	—
MEAN WL	ON	THRESH	3.00	1.00	OFF	3.00	—	—
SPEC WD	ON	THRESH	3.00	1.00	OFF	3.00	—	—
CRS TALK	ON	THRESH	3.00	1.00	OFF	3.00	±0.40	—
RIPPLE WD	ON	THRESH	3.00	—	—	0.50	—	—

- < ANALYSIS2 FIL-BTM >

FILTER (BOTTOM) ANALYSIS						
ITEM		ALGO	TH [dB]	MODE DIFF [dB]	CH SPACE [nm]	SEARCH AREA [nm]
BTM LVL	ON	BTM LVL	—	—	—	—
BTM WL	ON	BTM WL	—	—	—	—
MEAN WL	ON	BOTTOM	3.00	3.00	—	—
NOTCH WD	ON	BOTTOM	3.00	3.00	—	—
CRS TALK	ON	BOTTOM	3.00	1.00	±0.40	—

- PEAK LVL (Peak level)
- BTM LVL (Bottom level)
- PEAK WL (Peak wavelength)
- BTM WL (Bottom wavelength)
- MEAN WL (Center wavelength) ---- Specifies any algorithm for the calculation and sets the parameter in order to make λc calculated from the spectral band width the center wavelength.
- SPEC WD (Spectral band width) ---- Specifies an algorithm and set the parameter for measurement of spectral band width.
- NOTCH WD (Notch width) ---------- Specifies an algorithm and set the parameter for measurement of notch width.
- CRS TALK (Cross talk) ---------- Specifies an algorithm and set the parameter for measurement of cross talk.
- RIPPLE WD (Ripple width) ---------- Specifies an algorithm and set the parameter for measurement of ripple width.

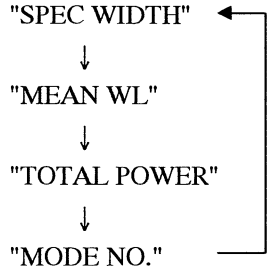
(39) <CURSOR →> Key

Moves the cursor shown in the window one by one in the "→" direction.
If this key is kept pressing, the cursor returns to the original place.

"SW"→"ALGO"→"TH"→"K"→"MODE FIT"→"MODE DIFF"→"CH SPACE"→"SEARCH AREA"

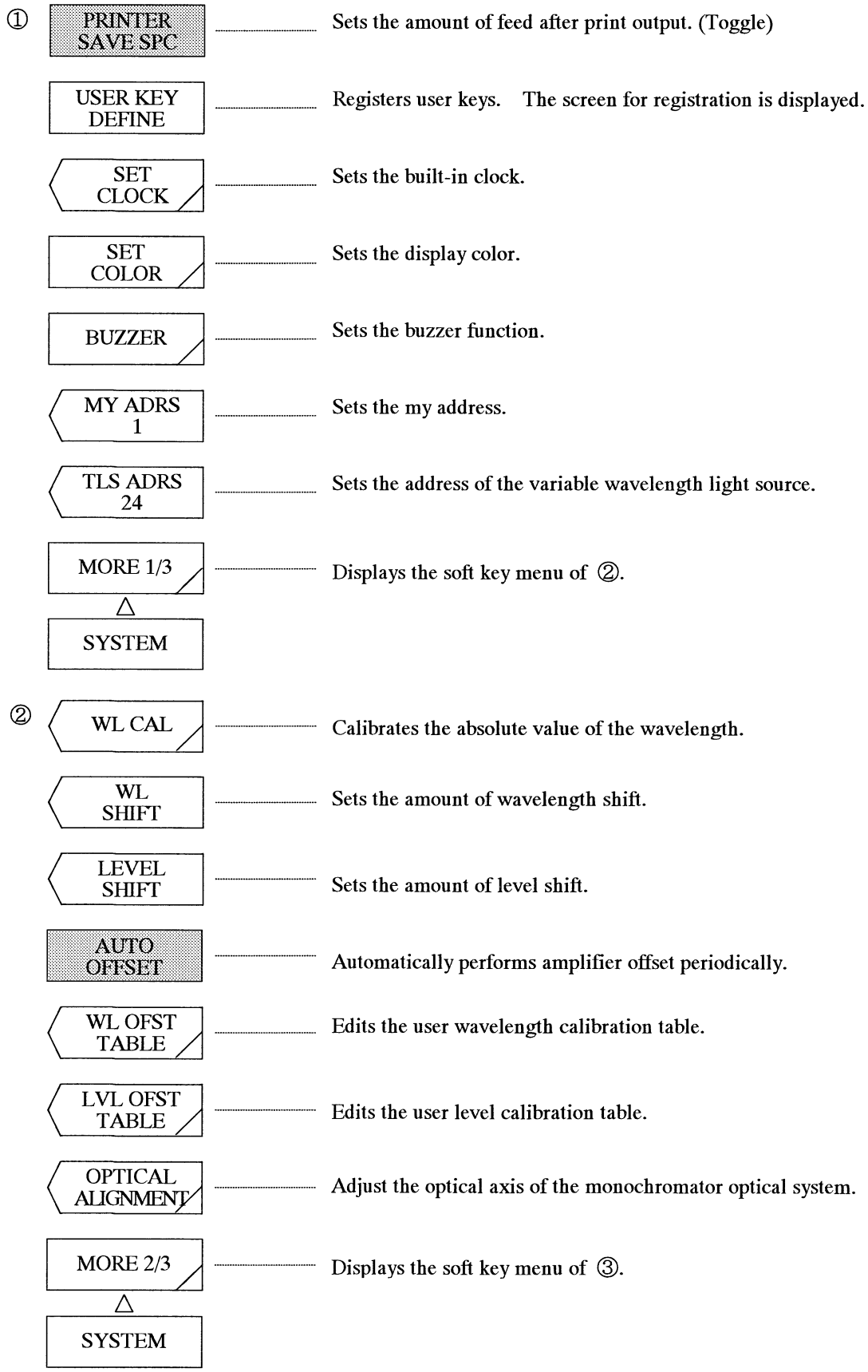
(40) <CURSOR ↓> Key

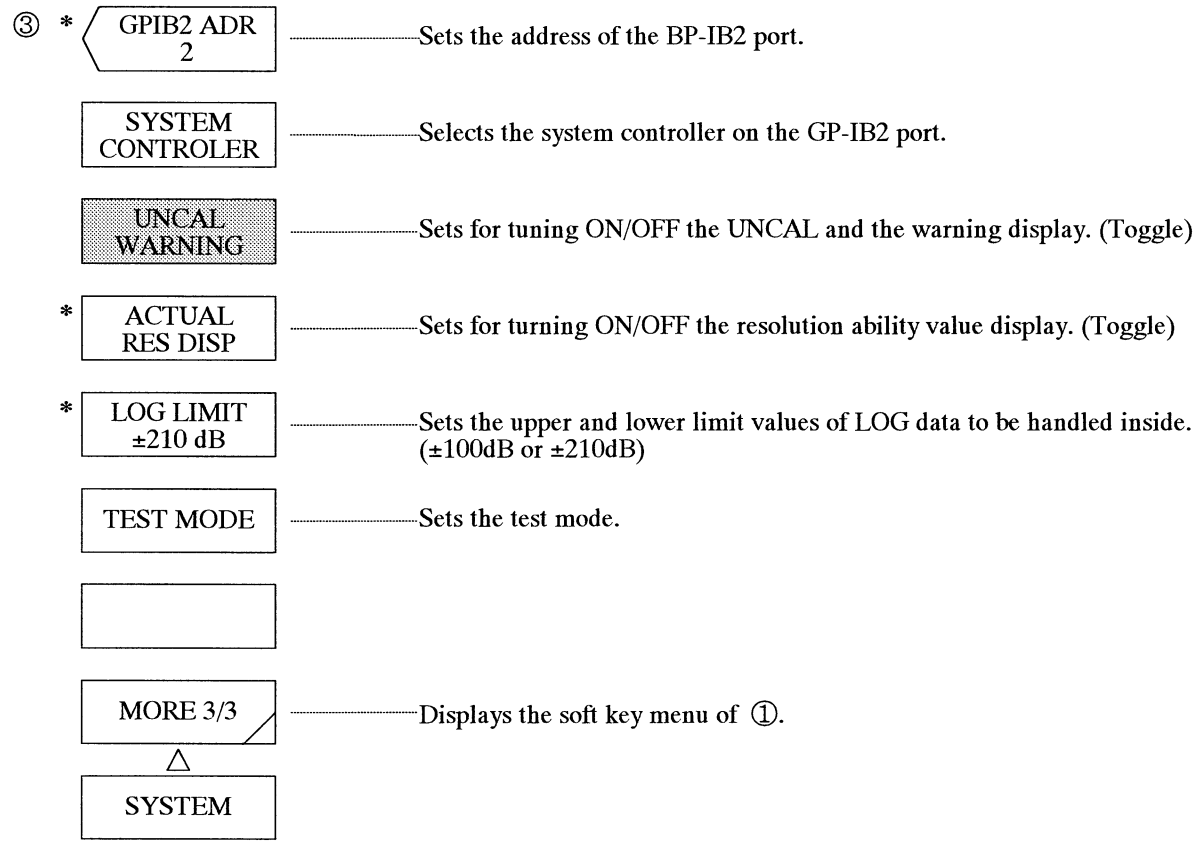
Moves the cursor shown in the window one by one in the " ↓ " direction.
If this key is kept pressing, the cursor returns to the original place.
(Example)



2.4 [SYSTEM] Switch

When this switch is pressed, the soft key menu of ① is displayed.





(1) <ACTUAL RES DISP> Key

While this key is selected, the resolution ability value in setting the present center wavelength is displayed on the interrupt display with the <RESOLN> key for [SETUP].

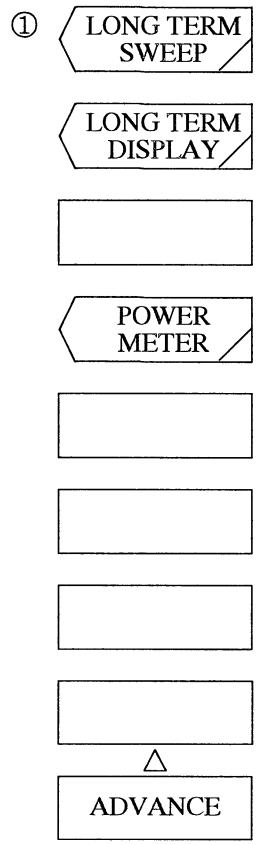
Display example ----- RES 0.02 nm
(0.014 nm) ← Resolution ability value in setting the present center wavelength.

(2) <LOG LIMIT> Key

Sets the upper and lower limit values of LOG data to be handled inside.
Either of the two values ±210dB and ±100dB can be set.

2.5 [ADVANCE] Switch

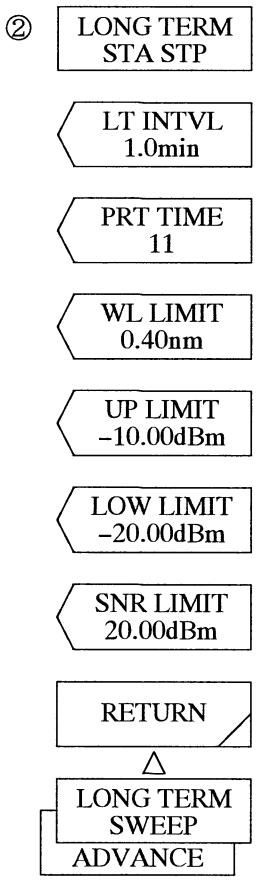
When this key is pressed, the soft key menu of ① is displayed.



LONG TERM SWEEP ..... Moves to the long-term measurement. (To ②)

LONG TERM DISPLAY ..... Moves to the long-term display screen. (To ③)

POWER METER ..... Moves to the power meter function.



LONG TERM STA STP ..... Starts or stops the long-term measurement. (Toggle)

LT INTVL 1.0min ..... Sets the measurement interval for the long-term measurement.

PRT TIME 11 ..... Sets the number of repeating times for the long-term measurement.

WL LIMIT 0.40nm ..... Sets the threshold value of the wavelength drift.

UP LIMIT -10.00dBm ..... Sets the upper limit value of the level.

LOW LIMIT -20.00dBm ..... Sets the lower limit value of the level.

SNR LIMIT 20.00dBm ..... Sets the lower limit value of the SNR.

RETURN ..... Returns to the software key menu of ①.

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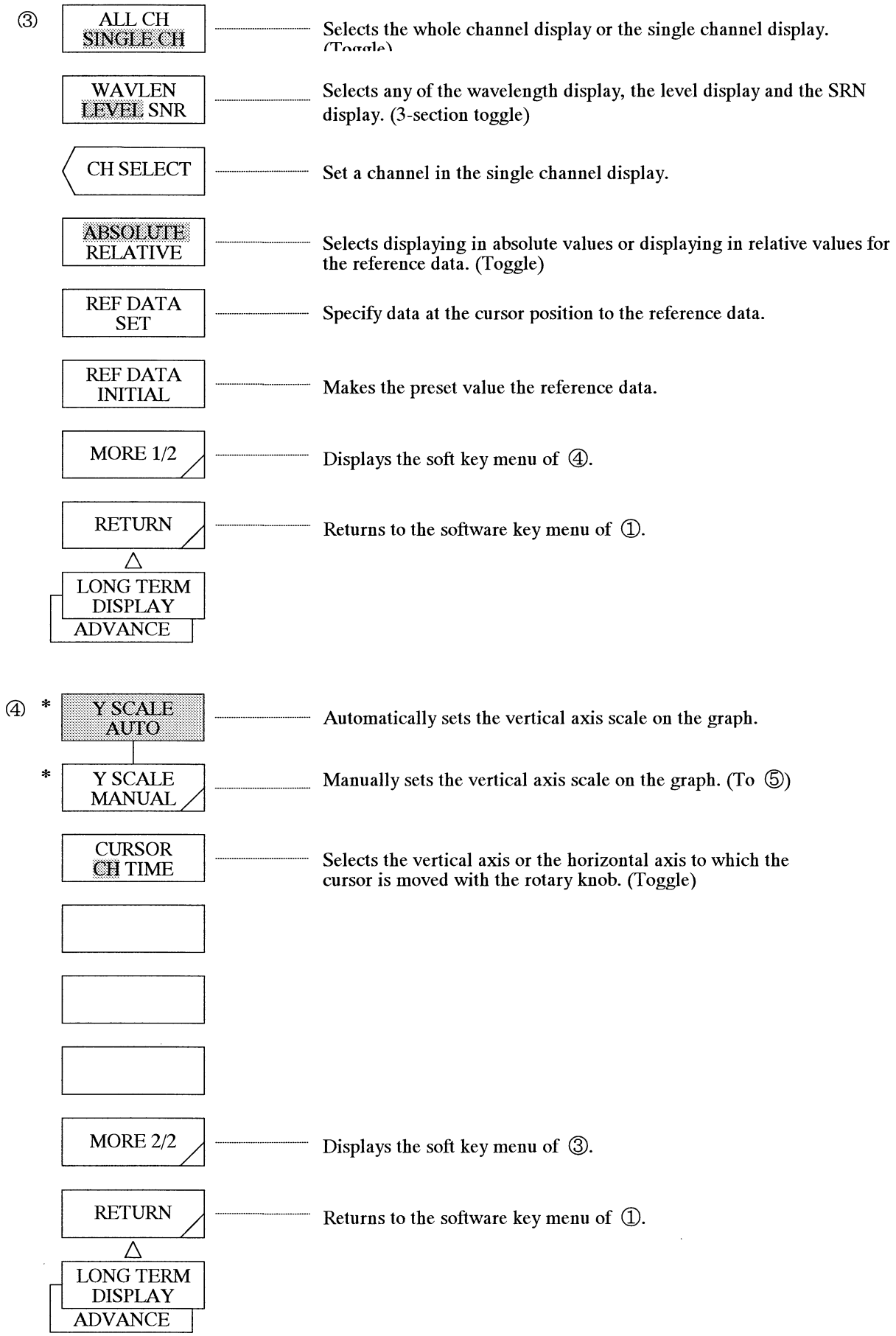

③
ALL CH
SINGLE CH
Selects the whole channel display or the single channel display.
(Toggle)
WAVLEN
LEVEL SNR
Selects any of the wavelength display, the level display and the SRN display. (3-section toggle)
CH SELECT
Set a channel in the single channel display.
ABSOLUTE
RELATIVE
Selects displaying in absolute values or displaying in relative values for the reference data. (Toggle)
REF DATA
SET
Specify data at the cursor position to the reference data.
REF DATA
INITIAL
Makes the preset value the reference data.
MORE 1/2
Displays the soft key menu of ④.
RETURN
Returns to the software key menu of ①.
△
LONG TERM
DISPLAY
ADVANCE
④
*
Y SCALE
AUTO
Automatically sets the vertical axis scale on the graph.
*
Y SCALE
MANUAL
Manually sets the vertical axis scale on the graph. (To ⑤)
CURSOR
CH TIME
Selects the vertical axis or the horizontal axis to which the cursor is moved with the rotary knob. (Toggle)
MORE 2/2
Displays the soft key menu of ③.
RETURN
Returns to the software key menu of ①.
△
LONG TERM
DISPLAY
ADVANCE

(1) <Y SCALE AUTO> Key

When this key is selected, the vertical axis scale is automatically set on the long-term measurement result display graph.

(2) <Y SCALE MANUAL> Key

When this key is selected, the vertical axis scale can be manually set on the long-term measurement result display graph.

When this key is pressed, the soft key menu of ⑤ is displayed.

⑤

- * WL CTR ****.**nm ..... Sets the Y-axis center wavelength on the wavelength display graph.
- * WL SPAN ***.*mm ..... Sets the Y-axis span on the wavelength display graph.
- * LVL CTR ***.**dB ..... Sets the Y-axis center level on the level display graph.
- * LVL SCALE **.*dB/D ..... Sets the Y-axis scale on the level display graph.
- * SNR CTR **.**dB ..... Sets the Y-axis center level on the SNR display graph.
- * SNR SCALE **.*dB/D ..... Sets the Y-axis scale on the SNR display graph.
- AUTO SET ..... Sets the same value as that at the <Y SCALE AUTO> selecting time to scale on each graph.
- RETURN ..... Display the soft key menu of ①.

△

LONG TERM DISPLAY

ADVANCE

(3) <WL CTR ****.**nm> Key

Sets the Y-axis center wavelength on the wavelength display graph.

The Y-axis center wavelength can be with the rotary knob, the step key or the ten-key pad in the range from 600.00 to 1750.00 nm (0.01 step).

(4) <WL SPAN ***.*nm> Key

Sets the Y-axis span on the wavelength display graph.

The Y-axis span can be changed with the rotary knob, the step key or the ten-key pad in the range from 0.0 to 1200.0 nm (0.1 step).

(5) <LVL CTR ***.**dB> Key

Sets the Y-axis center level on the level display graph.

The Y-axis center level can be changed with the rotary knob, the step key or the ten-key pad in the range from –90.00 to 20.00 dB (0.01 step).

(6) <LVL SCALE **.*dB> Key

Sets the Y-axis scale on the level display graph.

The Y-axis scale can be changed with the rotary knob, the step key or the ten-key pad in the range from 0.1 to 10.0 dB (0.1 step).

(7) <SNR CTR ***.**dB> Key

Sets the Y-axis center level on the SNR display graph.

The Y-axis center level can be changed with the rotary knob, the step key or the ten-key pad in the range from –90.0 to 20.0 dB (0.01 step).

(8) <SNR SCALE **.*dB> Key

Sets the Y-axis scale on the SNR display graph.

The Y-axis scale can be changed with the rotary knob, the step key or the ten-key pad in the range from 0.1 to 10.0 dB (0.1 step).

3. Detailed Explanation of Analysis Functions

This section details the following analysis functions which have been added or changed his time:

① WDM Analysis Function
② WDM-NF Analysis Function
③ Optical Filter Analysis Function
④ Notch Width Measuring Function

3.1 WDM Analysis Function

(1) Analysis Items

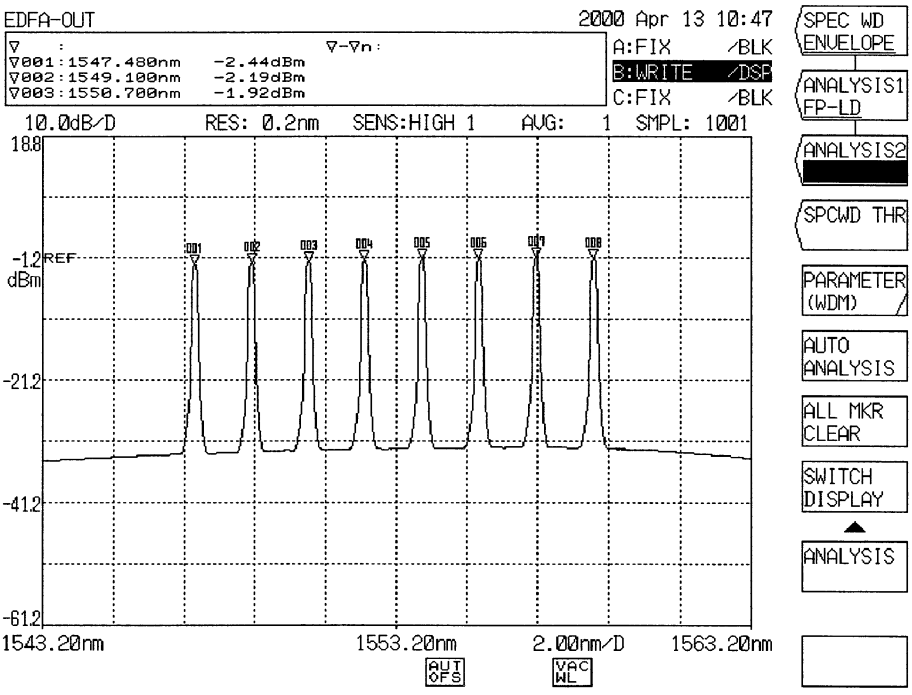
The following values are obtained from measured WDM wavelength:

- Center wavelength of each channel λi
- Level of each channel Li
- Noise level of each channel peak LNi
- Difference between level of each channel peak and noise level (SNR) SNi
- Wavelength difference for the channel peak that becomes the standard
- Level difference for the channel peak that becomes the standard

However, I = 1, 2, ... n

(2) Analysis Example and Display Items

An actual WDM waveform example and a WDM analysis example are as follows:



Example WDM Measurement Waveform

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① When <DISPLAY ABSOLUTE> is set,

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<WDM ANALYSIS> REF CH:HIGHEST REF TBL:ITU-T NOISE POI: 0.40nm
TH:20.00dB MAX NUM: 20 MODE DIFF: 3.00dB

NO.	WAVELENGTH [nm]	LEVEL [dBm]	OFFSET WL [nm]	OFST LVL [dB]	NOISE(/BW) [dBm]	SNR [dB]
01	1547.477	-2.45	-9.683	-1.23	-23.96	21.51
02	1549.090	-2.20	-8.069	-0.98	-23.67	21.47
03	1550.696	-1.92	-6.464	-0.71	-23.30	21.38
04	1552.284	-1.70	-4.876	-0.49	-23.07	21.37
05	1553.903	-1.49	-3.257	-0.28	-22.95	21.45
06	1555.529	-1.38	-1.631	-0.16	-22.81	21.43
07	1557.145	-1.22	(REF)	(REF)	-22.71	21.49
08	1558.766	-1.37	1.607	-0.15	-22.83	21.46

Example of WDM List at the time of <DISPLAY ABSOLUTE>

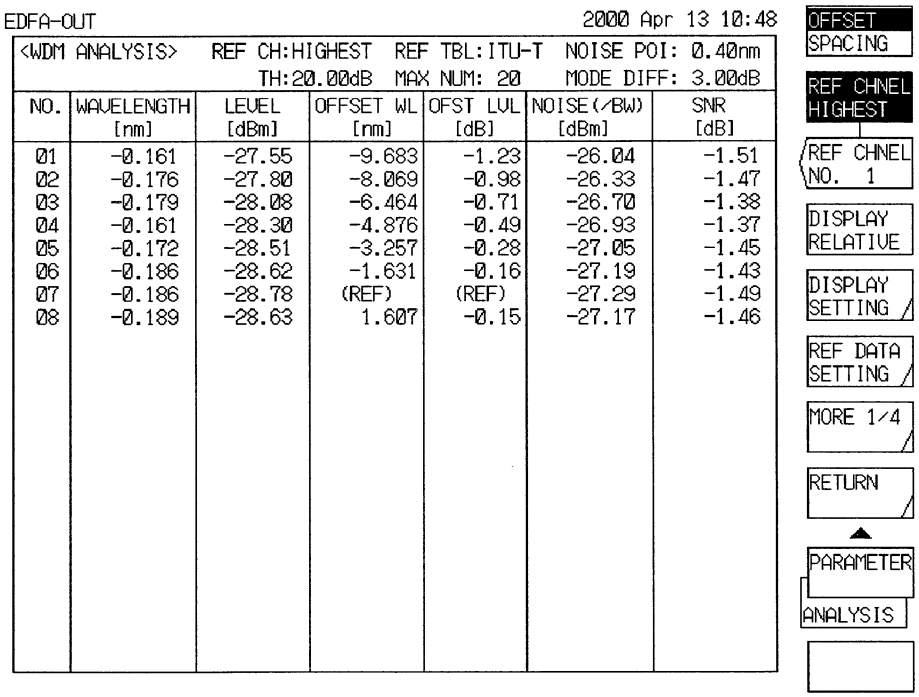
<Explanation of Display Items>

- No. : WDM channel number
- Wavelength (*1) : Center wavelength of each channel
- Level : Level of each channel
- Offset WL (*2) : Offset wavelength for any one mode (to be set with the <REF CHNEL> key)
- OFST LVL (*2) : Offset level for any one mode (to be set with the <REF CHNEL> key)
- Noise : Noise level of each channel
- SNR : SNR of each channel

*1 : *Frequency is displayed when the marker is in the frequency display mode.*

*2 : *When <SPACING> is selected, these change to SPACING and LVL DIFF.*

② When <DISPLAY RELATIVE> is set,



Example of WDM List at the time of <DISPLAY RELATIVE>

<Explanation of Display Items>

- No. : WDM channel number
- Wavelength (*1) : Center wavelength of each channel (Relative value for reference data)
- Level : Level of each channel (Relative value for reference data)
- Offset WL (*2) : Offset wavelength for any one mode (to be set with the <REF CHNEL> key)
- OFST LVL (*2) : Offset level for any one mode (to be set with the <REF CHNEL> key)
- Noise : Noise level of each channel
- SNR : SNR of each channel

*1 : *Frequency is displayed when the marker is in the frequency display mode.*

*2 : *When <SPACING> is selected, these change to SPACING and LVL DIFF.*

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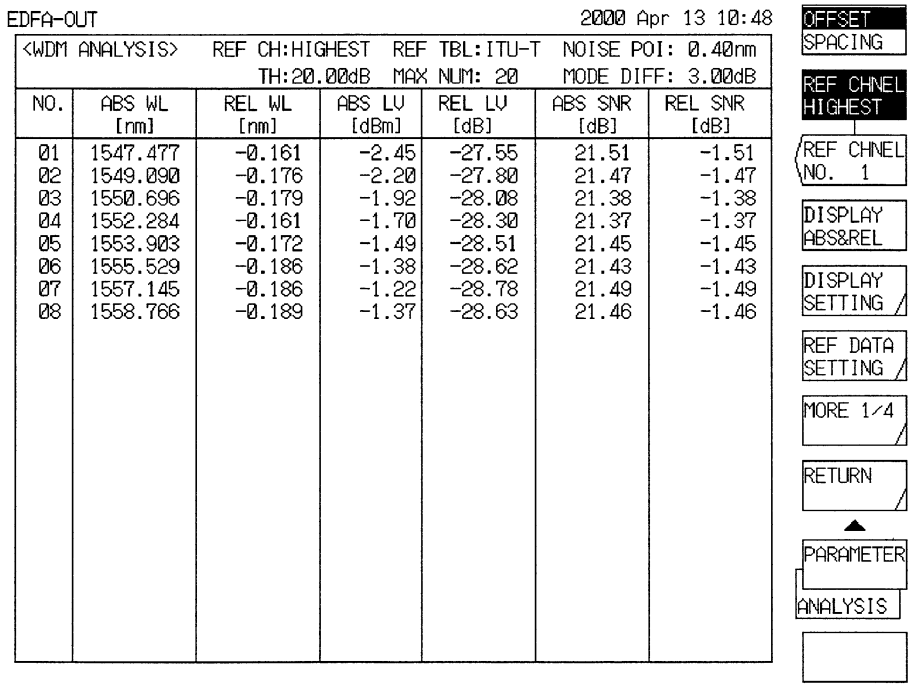
③ When <DISPLAY ABS & REL> is set,



EDFA-OUT 2000 Apr 13 10:48

<WDM ANALYSIS> REF CH:HIGHEST REF TBL:ITU-T NOISE POI: 0.40nm
TH:20.00dB MAX NUM: 20 MODE DIFF: 3.00dB

NO.	ABS WL [nm]	REL WL [nm]	ABS LV [dBm]	REL LV [dB]	ABS SNR [dB]	REL SNR [dB]
01	1547.477	-0.161	-2.45	-27.55	21.51	-1.51
02	1549.090	-0.176	-2.20	-27.80	21.47	-1.47
03	1550.696	-0.179	-1.92	-28.08	21.38	-1.38
04	1552.284	-0.161	-1.70	-28.30	21.37	-1.37
05	1553.903	-0.172	-1.49	-28.51	21.45	-1.45
06	1555.529	-0.186	-1.38	-28.62	21.43	-1.43
07	1557.145	-0.186	-1.22	-28.78	21.49	-1.49
08	1558.766	-0.189	-1.37	-28.63	21.46	-1.46

Example of WDM List at the time of <DISPLAY ABS & REL>

<Explanation of Display Items>

- No. : WDM channel number
- ABS WL (*1) : Center wavelength of each channel
- REL WL (*1) : Center wavelength of each channel (Relative value for reference data)
- ABS LV : Level of each channel
- REL LV : Level of each channel (Relative value for reference data)
- ABS SNR : SNR of each channel
- REL SNR : SNR of each channel (Relative value for reference data)

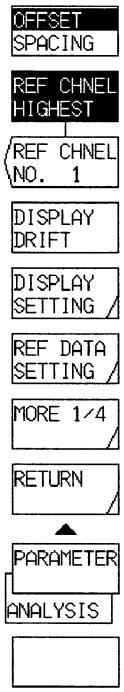
**1 : Frequency is displayed when the marker is in the frequency display mode.*

④ When <DISPLAY DRIFT> is set,

EDFA-OUT 2000 Apr 13 10:48

<WDM ANALYSIS> REF CH:HIGHEST REF TBL:ITU-T NOISE POI: 0.40nm
TH:20.00dB MAX NUM: 20 MODE DIFF: 3.00dB

NO.	REL WL[nm] ABS WL[nm]	MAX[nm] MIN[nm]	MAX-MIN [nm]	REL LV[dB] ABS LV[dBm]	MAX[dB] MIN[dB]	MAX-MIN [dB]
01	-0.161	-0.161	0.000	-27.55	-27.55	0.00
	1547.477	-0.161		-2.45	-27.55	
02	-0.176	-0.176	0.000	-27.80	-27.80	0.00
	1549.090	-0.176		-2.20	-27.80	
03	-0.179	-0.179	0.000	-28.08	-28.08	0.00
	1550.696	-0.179		-1.92	-28.08	
04	-0.161	-0.161	0.000	-28.30	-28.30	0.00
	1552.284	-0.161		-1.70	-28.30	
05	-0.172	-0.172	0.000	-28.51	-28.51	0.00
	1553.903	-0.172		-1.49	-28.51	
06	-0.186	-0.186	0.000	-28.62	-28.62	0.00
	1555.529	-0.186		-1.38	-28.62	
07	-0.186	-0.186	0.000	-28.78	-28.78	0.00
	1557.145	-0.186		-1.22	-28.78	
08	-0.189	-0.189	0.000	-28.63	-28.63	0.00
	1558.766	-0.189		-1.37	-28.63	



Example of WDM List at the time of <DISPLAY DRIFT>

<Explanation of Display Items>

- No. : WDM channel number
- REL WL (*1) : Center wavelength of each channel (Relative value for reference data)
- ABS WL (*1) : Center wavelength of each channel
- MAX/MIN (*1) : MAX/MIN value of REL WL
- MAX-MIN (*1) : Fluctuation width of REL WL
- REL LV : Level of each channel (Relative value for reference data)
- ABS LV : Level of each channel
- MAX/MIN : MAX/MIN Value of REL LV
- MAX-MIN : Fluctuation width of REL LV

**1 : Frequency is displayed when the marker is in the frequency display mode.*

(3) Channel Distinguishing Method

- When CH DETECT is AUTO,
  ① Obtain all the maximum points and the minimum points of a waveform.
  ② When the level difference for the minimum points on the both sides exceeds the difference between the top and the bottom MODE DIFF and the level difference of the largest maximum point exceeds THRESH, the maximum points are judged as the channel peak. The center at the point 3dB (or the MODE DIFF value when the MODE DIFF set point is less than 3 dB) lower to the right and to the left than the obtained channel peak is called the channel center wavelength λi.
  The maximum number of channels obtained shall be up to MAX No.
  ③ i numbers are called Channel 1, 2, ... in the order of channel peak from the short wavelength side.

- When CH DETECT is PRESET,
  ① Obtain the intermediate point between the right channel and the left channel for each channel being set with PRESET WL TABLE (up to the channels being set with MAX No).
  ② Obtain the peak of each channel in the range from the intermediate point of the left channel to the intermediate point of the right channel and judge the point as the channel peak. The center at the point 3 dB (or the MODE DIFF value when the MODE DIFF set point is less than 3 dB) lower to the right and to the left than the obtained channel peak is called the channel center wavelength λi.

* *Set "MODE DIFF," "THRESH," "MAX No." and "PRESET WL TABLE" according to the PARAMETER menu of the ANALYSIS switch.*

(4) Noise Calculating Method

- When NOISE POINT is FIX,
  ① Obtain the levels ELi and ERi of each channel at the points the NOISE POINT (nm) away to the left and to the right.
  ② Assuming that the equation, $LNi = \frac{ELi + ERi}{2}$ can be formed, obtain the noise level LNi.

- When NOISE POINT is CENTER,
  ① Obtain the noise level LNi of each channel peak.
    - Obtain the level Ei at the intermediate point of each channel.
    - Obtain the average value of the left Ei and the right Ei for each channel. (Linear interpolation)
    - Also, convert this value into the power density per 1 nm with the resolution stored in this equipment and make it LNi.

(5) Level Calculating Method
Obtain the level Li of each channel from the following equation:
Li = Mode Peak Level – Noise level of the channel LNi

(6) Setting of <DUAL TRACE> Key

When this key is turned ON, WDM can be analyzed as follows from the waveforms of Traces A and B irrespective of the active trace status:

- The channel center wavelength λi and the level value Li can be calculated from the waveform of Trace A.
- The noise level LNi can be calculated from the waveform of Trace B.

(7) Setting of <OFFSET/SPACING> Key

* When OFFSET is selected,
Displays the offset value for any one mode.

* When SPACING is selected,
Displays the offset value for an adjacent mode.

(8) Reference Data at the RELATIVE Value Calculating Time

When the <DISPLAY ********> key is set so as to select "RELATIVE," "ABS & REL" or "DRIFT," the wavelength, the level and SNR are calculated as the relative values for the reference table set with the <DISPLAY SETTING> key.

① When <ITU-T TABLE> has been selected as the reference table,

- Values in the ITU-T TABLE already registered in the internal memory of this equipment are referred to for the wavelength. These values in the ITU-T TABLE can be edited with the <PRESET WL TABLE> key.
- The value set with the <LEV PRESET **.**dBm> key is referred to for the level.
- The value set with the <SNR PRESET **.**dB> key is referred to for the SNR.

② When <REF TABLE> has been selected as the reference table,
The reference table set with the <REF DATA SETTING> key is referred to.

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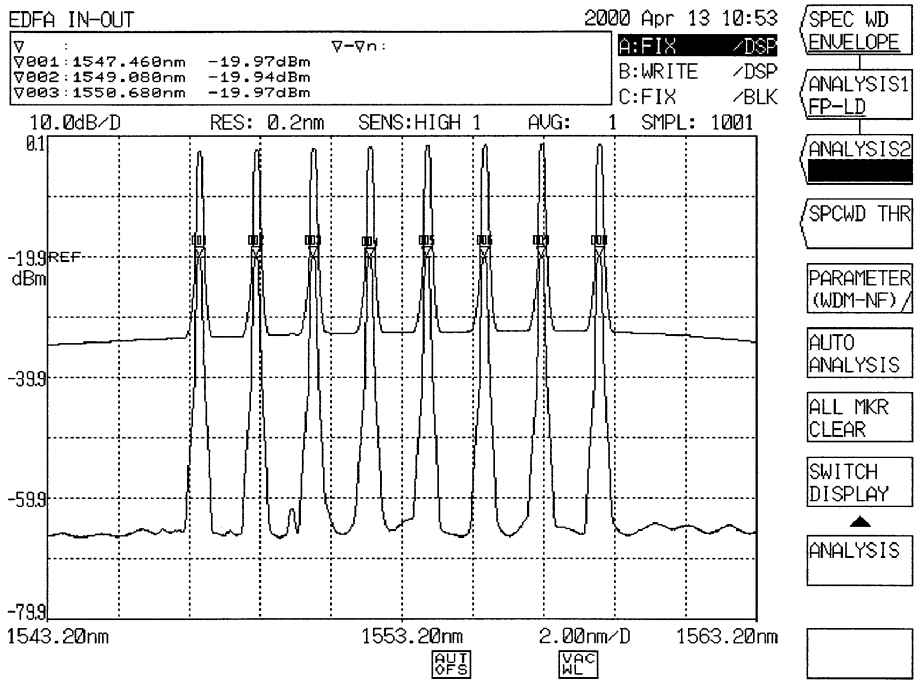
3.2 WDM-NF Analysis Function

1. Outline

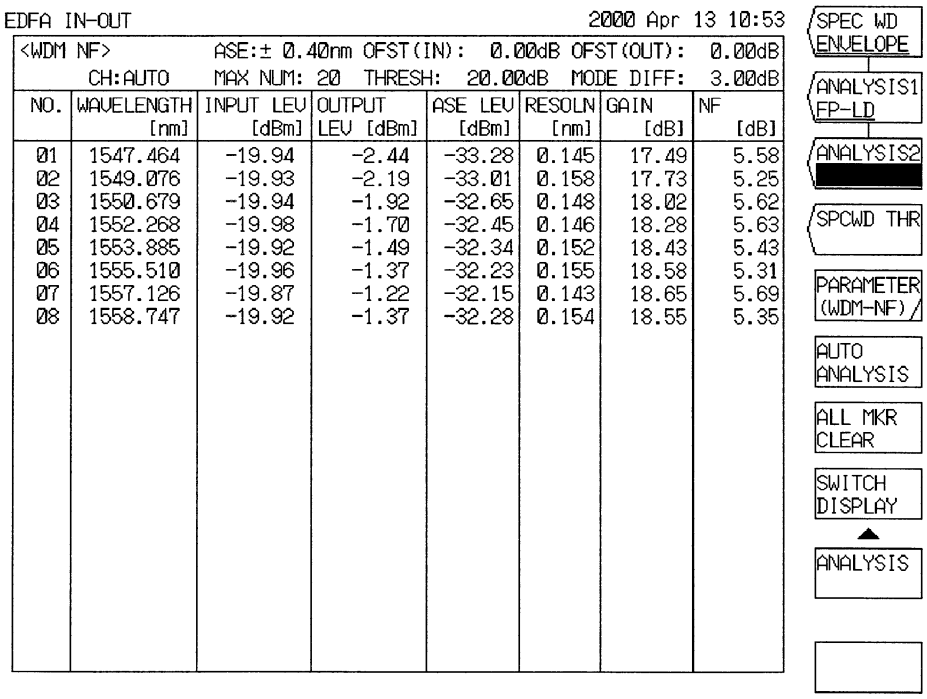
The WDM-NF analysis function is for obtaining the following values for each WDM channel in block from the WDM waveforms before and after being amplified with the optical fiber amplifier:

- Center wavelength (WAVELENGTH)
- Signal light level (INPUT LEV)
- Output light level (OUTPUT LEV)
- ASE (Spontaneously emitted light) level (ASE LEV)
- Measuring resolution (RESOLN)
- Gain (GAIN)
- Noise Figure (NF)

(Measurement Example)



Example of WDM Waveforms before and after being amplified with Optical Fiber Amplifier



Execution Example of WDM-NF Analysis Function

The ASE level is obtained from the data of Trace A, but at the time it is necessary to set the ASE level measuring point. The measuring resolution at the ASE level measuring time necessary for the NF calculation uses the half bandwidth of the optical spectrum after amplification as the value measured for each channel.

It is possible to put the optical spectrum before and after amplification. This enables to compensate losses in measure when isolators or couplers are connected to the input and output ports of the optical fiber amplifier.

2. Operation

① Set Trace A to WRITE and measure the optical spectrum of the signal light (entering the optical fiber amplifier). After the measurement, set Trace A to FIX.

② Set Trace B to WRITE and measure the optical spectrum of the output light (amplified with the optical fiber amplifier). After the measurement, set Trace B to FIX.

③ Press the <ANALYSIS2 WDM-NF> key of the [ANALYSIS] switch.

④ The NF measuring function is executed, and the result is displayed in a list.

When the following soft keys are displayed, press any keys as the need arises and input relevant parameters with the rotary knob, the step key or the ten-key pad:

- <ASE POINT> Key -------- ASE level measuring position (Δλ ASE)
- <OFST (IN)> Key ---------- Input spectrum level offset
- <OFST (OUT)> Key ------- Output spectrum level offset

3. Calculating Method

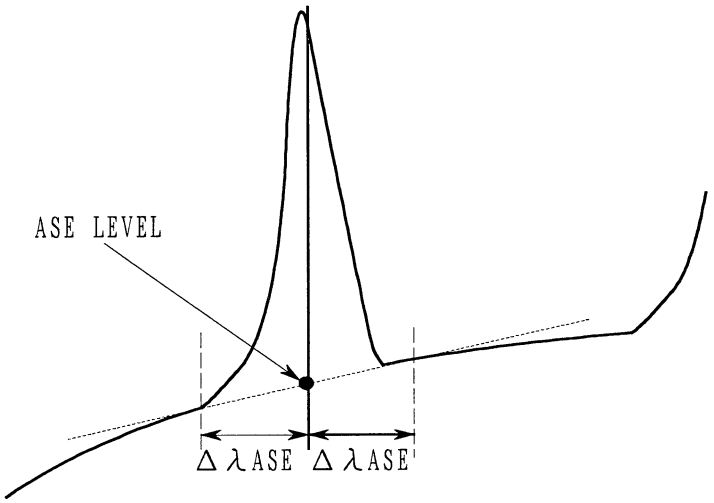
The WDM-NF analysis takes the following processes:

① Execute the WDM analysis for the waveform data of Trace A and detect channels.

② Obtain the center wavelength λi of each channel and the signal light level PAi from the waveform data of Trace A.

③ Obtain the output light level PBi of each channel from the waveform data of Trace B.
Also, obtain the spectrum half bandwidth and make the value converted into frequency the measuring resolution λνi.

④ Obtain the levels at the two points λi±Δλ ASE, which are the ASE level measuring position (Δλ ASE) away from the center wavelength λi of each channel, from the waveform data of Trace B, and make the intermediate point of the level the ASE level (PASEi).



ASE Level Obtaining Method in WDM-NF Analysis

⑤ Calculate the gain Gi and the NF value of each channel from the following equation:

$$Gi = (PBi - PASEi) / PAi$$

PAi : Signal light level of each channel
PBi : Output light level amplified with the optical fiber amplifier of each channel
PASEi : ASE level of each channel

$$NFi = \frac{PASEi}{\Delta\nu i \bullet Gi \bullet h \bullet \nu i} + \frac{1}{Gi}$$

Δνi : Measuring resolution of each channel
h : Blank's constant
νi : Center frequency of each channel (The value obtained by converting the center wavelength λi of each channel into frequency)

3.3 Optical Filter Analysis Function

1. Outline

The following parameters are analyzed in block from the measured waveform of the optical filter:

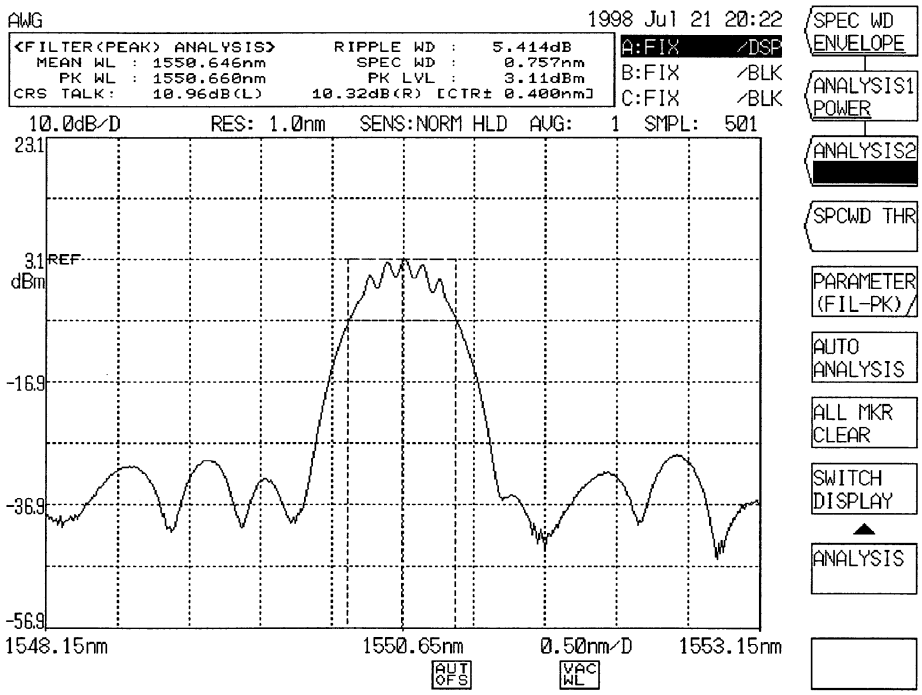
(a) FIL-PEAK

- Peak level
- Peak wavelength
- Center wavelength
- Spectral band width
- Cross talk value
- Ripple width

(b) FIL-BOTTOM

- Bottom level
- Bottom wavelength
- Center wavelength
- Notch width
- Cross talk value

(Measurement Example)



Example of FIL-PEAK Analysis

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2. Algorithm

(a) FIL-PEAK

The following explains the analysis items and parameter contents:

① Peak level (PEAK LVL) ---------- Level value at the waveform peak position

② Peak wavelength (PEAK WL) ------- Wavelength value at the waveform peak position

③ Center wavelength (MEAN WL)----- Center wavelength value at threshold value TH

④ Spectral band width (SPEC WD) ---- Spectral band width at threshold value TH

⑤ Cross talk value (CRS TALK)

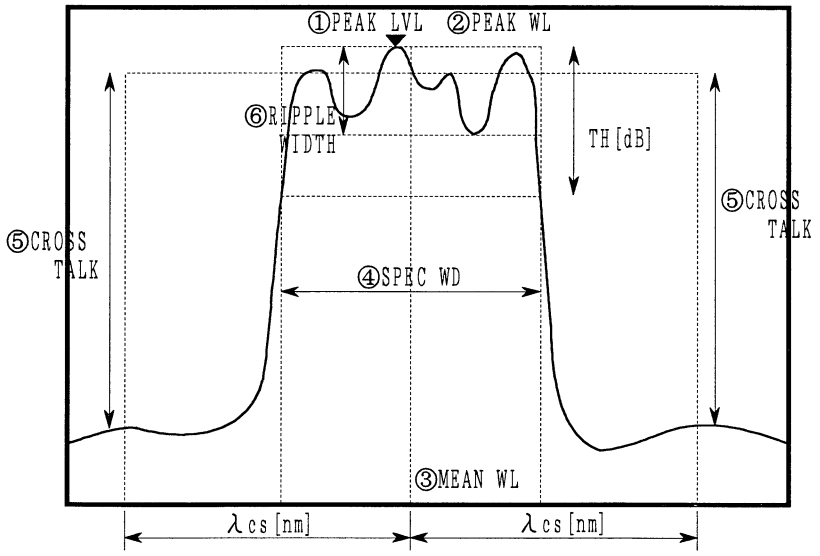
a. With THRESH / PEAK LV Algorithm,
Obtain the level value at the wavelength standard (MEAN WL in case of THRESH or PEAK WL in case of PEAK LV) and obtain the level value at the wavelength ±λCH SPACE [nm] away from the wavelength standard. Make the difference between the both level values the cross talk.

b. With ITU-T Algorithm,
Make the ITU-T grid wavelength nearest to the peak wavelength the reference wavelength, and make the difference between the bottom level in the range of the reference wavelength ±λSEARCH AREA[nm] and the peak level in the range ±λSEARCH AREA[nm] at the position the reference wavelength ±λCH SPACE[nm] away the cross talk.

⑥ Ripple Width (RIPPLE WD)---------- Search the spectral band width, and make the value obtained by subtracting the bottom level from the peak level in the obtained spectral band width the ripple width.

Contents of <PARAMETER> Key at the time of FIL PEAK

FILTER (PEAK) ANALYSIS								
ITEM	SW	ALGO	TH [dB]	K	MODE FIT	MODE DIFF [dB]	CH SPACE [nm]	SEARCH AREA [nm]
PEAK LVL	ON/OFF	—	—	—	—	—	—	—
PEAK WL	ON/OFF	—	—	—	—	—	—	—
MEAN WL	ON/OFF	THRESH/RMS	**.**	**.**	OFF	**.**	—	—
SPEC WD	ON/OFF	THRESH/RMS	**.**	**.**	OFF	**.**	—	—
CRS TALK	ON/OFF	THRESH/PK LVL/ITU-T	**.**	—	—	—	±**.**	±**.**
RIPPLE WD	ON/OFF	THRESH	**.**	—	—	**.**	—	—



Analysis Items at the time of FIL PEAK

(b) FIL-BOTTOM

The following explains the analysis items and parameter contents:

① Bottom level (BTM LVL) ---------- Level value at the waveform bottom position

② Bottom wavelength (BTM WL) ------ Wavelength value at the waveform bottom position

③ Center wavelength (MEAN WL)----- Center wavelength value at threshold value TH

④ Notch width (NOTCH WD)---------- Notch width at threshold value TH

⑤ Cross talk value (CRS TALK)

a. With PEAK/BOTTOM/BOTTOM LV Algorithm,
Obtain the level value at the wavelength standard (MEAN WL in case of PEAK/BOTTOM or BOTTOM WL in case of BOTTOM LV) and obtain the level value at the wavelength ±λCH SPACE [nm] away from the wavelength standard.
Make the difference between the both level values the cross talk.

b. With ITU-T Algorithm,
Make the ITU-T grid wavelength nearest to the bottom wavelength the reference wavelength, and make the difference between the peak level in the range of the reference wavelength ±λSEARCH AREA[nm] and the bottom level in the range ±λSEARCH AREA[nm] at the position the reference wavelength ±λCH SPACE[nm] away the cross talk.

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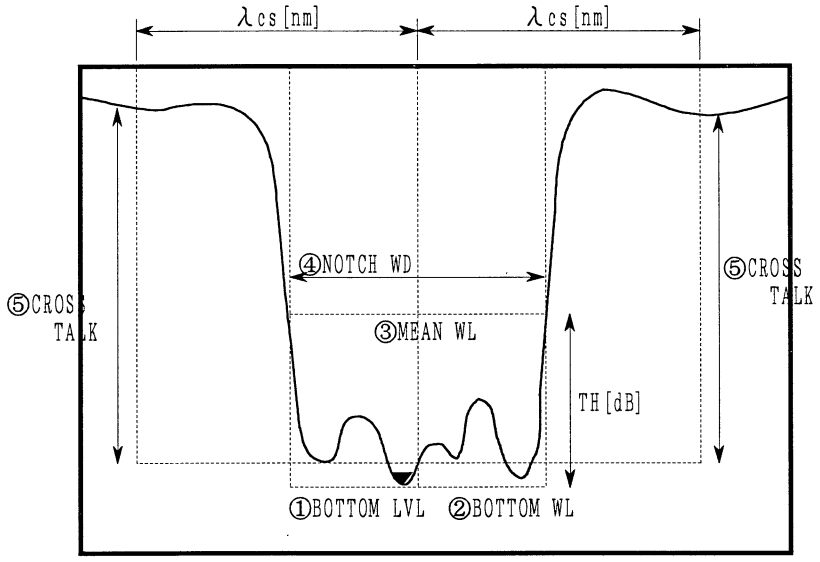
Contents of <PARAMETER> Key at the time of FIL BOTTOM

FILTER (BOTTOM) ANALYSIS						
ITEM	SW	ALGO	TH [dB]	MODE DIFF [dB]	CH SPACE [nm]	SEARCH AREA [nm]
BTM LVL	ON/OFF	—	—	—	—	—
BTM WL	ON/OFF	—	—	—	—	—
MEAN WL	ON/OFF	PEAK/BOTTOM	**.**	**.**	—	—
NOTCH WD	ON/OFF	PEAK/BOTTOM	**.**	**.**	—	—
CRS TALK	ON/OFF	PEAK/BOTTOM /BTM LV/ITU-T	**.**	—	±**.**	±**.**



Analysis Items at the time of FIL BOTTOM

3.4 NOTCH Width Measuring Function

The threshold value TH**.*dB is set for active trace waveforms to obtain the notch width Δλ and its center wavelength λC. In this case, the <PEAK BOTTOM> key is used to set whether the threshold value TH is calculated from the waveform peak level or the bottom level.

(a) At the time of NOTCH-PEAK

① Find the minimum point λmin of the level.

② Find the point λ0 where the level becomes the maximum on the left side from λmin and find the point λ1 where the level becomes the maximum on the right side from λmin.
Compare the both levels at λ0 and λ1 and make the larger level Lp.

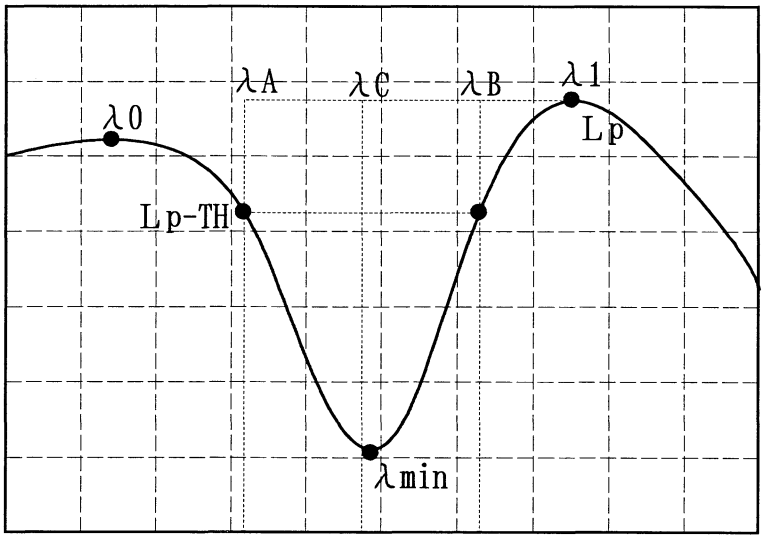
③ Make the wavelength on the most left side where the spectrum crosses with the level (Log value) of Lp-TH between λ0 and λmin λA.
Make the wavelength on the most right side where the spectrum crosses with the level (Log value) of Lp-TH between λmin and λ1 λB.

④ The center wavelength can be obtained from the following equation:

$$\lambda c = \frac{\lambda A + \lambda B}{2}$$

⑤ The notch width Δλ can be obtained from the following equation:

$$\Delta\lambda = \lambda B - \lambda A$$



Measurement of Notch Width (PEAK)

(b) At the time of NOTCH-BOTTOM

① Find the minimum point λmin of the level.

Make the level at he λmin point Lb.

② Make the wavelength on the most right side where the spectrum crosses with the level (Log value) of Lb-TH on the left side from λmin λA.

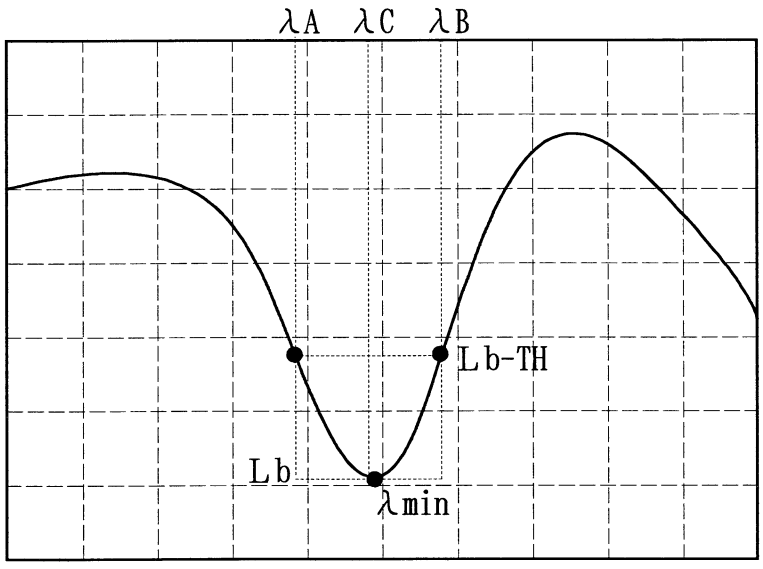
Make the wavelength on the most left side where the spectrum crosses with the level (Log value) of Lb-TH on the right side from λmin λB.

③ The center wavelength can be obtained from the following equation:

$$\lambda c = \frac{\lambda A + \lambda B}{2}$$

④ The notch width Δλ can be obtained from the following equation:

$$\Delta\lambda = \lambda B - \lambda A$$



Measurement of Notch Width (BOTTOM)

4. Program Functions/GP-IB Commands

In this software, program commands and GP-IB commands are also added and changed for the functions added and changed.

Table 1 shows the List of Program Commands and Table 2 shows the List of GP-IB Commands.

The commands marked with * are those added or changed this time.

Table 1-1 Panel Switch Command List (1/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
SWEEP	AUTO	AUTO	Auto sweep
	REPEAT	REPEAT	Repeat sweep
	SINGLE	SINGLE	Single sweep
	STOP	STOP	Stop of sweep
	SEGMENT MEASURE	SEGMENT MEASURE	Measurement of the specified number of points starting from the wavelength position at a stop.
	SEG POINT ****	SEGMENT POINT ****	Specifies the number of points to be measured by <SEGMENT MEASURE>. 1 to 20001 (1 step)
	SWEEP MKR L1-L2 ###	SWEEP MKR L1-L2 ###	Selects ON or OFF for the marker-to-marker sweep function. For ###, select ON or OFF by rotary knob.
	SWP INTVL *****sec	SWP INTVL *****sec	Sets the interval time at repeat sweep. MINIMUM, 1 to 99999 sec (1 step) [MINIMUM when "0" is set.]
CENTER	CENTER WL ****.**nm	CENTER WL ****.**nm	Sets the mean wavelength. 600.00 to 1750.00 nm (0.01 step)
	CENTER WL @@@@@	CENTER WL @@@@@	Sets the variable @@@@@ value to the center wavelength. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, and PKWL by rotary knob.
	CENTER FREQ ***.***THz	CENTER FREQ ***.***THz	Sets the center frequency. 171.500 to 499.500 THz (0.001 step)
	CENTER FREQ @@@@@	CENTER FREQ @@@@@	Sets the variable @@@@@ to the center frequency. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, and PKWL variables by rotary knob.
	START WL ****.**nm	START WL ****.**nm	Sets the measurement start wavelength. 0.00 to 1750.00 nm (0.01 step)
	START FREQ ***.*THz	START FREQ ***.*THz	Sets the measurement start frequency. 1.0 to 499.5 THz (0.1 step)
	STOP WL ****.**nm	STOP WL ****.**nm	Sets the measurement end wavelength. 600.00 to 2350.00 nm (0.01 step)
	STOP FREQ ***.*THz	STOP FREQ ***.*THz	Sets the measurement end frequency. 171.5 to 674.5 THz (0.1 step)
	PEAK → CENTER	PEAK → CENTER	Sets the peak wavelength of the waveform on active trance to the mean wavelength.

Table 1-1 Panel Switch Command List (2/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
CENTER (cont.)	AUTO CENTER ###	AUTO CENTER ###	Select ON or OFF for the peak → enter function to be executed at the end of each sweep. For ###, select ON or OFF by rotary knob.
SPAN	SPAN WL ****.*nm	SPAN WL ****.*nm	Sets the span. 0, 0.5 to 1200.0 nm (0.1 step)
	SPAN WL @@@@@	SPAN WL @@@@@	Sets the variable @@@@@ value to the span. For @@@@@, select one of I, J, K, S, X, Y, Z, W2-W1 and SPWD variables by rotary knob.
	SPAN FREQ ***.**THz	SPAN FREQ ***.**THz	Sets the span. 0, 0.10 to 350.00 THz (0.01 step)
	SPAN FREQ @@@@@	SPAN FREQ @@@@@	Sets the variable @@@@@ value to the span. For @@@@@, select S, X, Y, Z, W2-W1 and SPWD variables by rotary knob.
	START WL ****.**nm	START WL ****.**nm	Sets the measurement start wavelength. 0.00 to 1750.00 nm (0.01 step)
	START FREQ ***.*THz	START FREQ ***.*THz	Sets the measurement start frequency.1.0 to 499.5 THz (0.1 step)
	STOP WL ****.**nm	STOP WL ****.**nm	Sets the measurement end wavelength. 600.00 to 2350.00 nm (0.01 step)
	STOP FREQ ***.*THz	STOP FREQ ***.*THz	Sets the measurement end frequency. 171.5 to 674.5 THz (0.1 step)
	Δλ → SPAN	Δλ → SPAN	Performs spectral width search and sets the result as span.
	0nm SWEEP TIME **sec	0nm SWEEP TIME **sec	Sets the time for sweep at a span of 0 nm. MINIMUM, 1 to 50 sec (1 step) [MINIMUM when "0" is set.]
	X SCALE UNIT WAVELEN	X SCALE UNIT WAVELENGTH	Sets the unit of the vertical axis to the wavelength display.
	X SCALE UNIT FREQ	X SCALE UNIT FREQUENCY	Sets the unit of the vertical axis to the frequency display.

Table 1-1 Panel Switch Command List (3/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
LEVEL	REF LEVEL ***.*dBm	REFERENCE LEVEL ***.*dBm	Sets the reference level value in the LOG scale mode. –90.0 to 20.0 dBm (0.1 step)
	REF LEVEL ***.*##	REFERENCE LEVEL ***.*##	Sets reference level value in the linear scale. 1.00 pW to 100 mW (1.00 to 9.99 [pW, mW, μW, mW]: 0.01 step, 10.0 to 99.9 (100) [pW, nW, μW, (mW)]: 0.1 step, 100 to 999 [pW, nW, μW]: 1 step) ## selects either one of pW, nW, μW or mW.
	REF LEVEL @@@@@	REF LEVEL @@@@@	Sets the variable @@@@@ value to the reference level value. For @@@@@, select one of I, J, K, S, X, Y, Z, LM, L1, L2, PKLVL, MKPWR, PWMTR and ASELV variables by rotary knob.
	LVL SCALE **.*dB/D	LEVEL SCALE **.*dB/D	Sets the level scale value. LINEAR, 0.1 to 10.0 dB/DIV (0.1 step) [LINEAR when "0" is set.]
	LVL SCALE @@@@@	LEVEL SCALE @@@@@	Sets the variable @@@@@ value to the level scale value. For @@@@@, select one of I, J, K, S, X, Y, Z, L2-L1, SMSR, and EDFNF variables by rotary knob.
	BASE LEVEL *****	BASE LEVEL *****	Sets the bottom value of linear scale. 0 to REF level (scale top value) × 0.9 The unit which has been set at REF level is used.
	PEAK → REF LEVEL	PEAK → REF LEVEL	Sets the peak level of the waveform on active trace to the reference level.
	AUTO REF LEVEL ###	AUTO REF LEVEL ###	Selects ON or OFF for the peak → center function to be executed at the end of each sweep. For ###, select ON or OFF by rotary knob.
	LEVEL UNIT ######	LEVEL UNIT ######	Sets the unit of level scale. dBm or dB/nm
	SUB LOG **.*dB/D	SUB SCALE LOG **.*dB/D	Sets the subscale value in the LOG scale mode. 0.1 to 10 dB/DIV (0.1 step)
	SUB SCL ***dB/km	SUB SCALE ***dB/km	Sets the subscale value in the dB/km scale mode. 0.1 to 10.0 dB/km/D (at 0.1 step)

Table 1-1 Panel Switch Command List (4/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
LEVEL (cont.)	SUB LIN **.*/D	SUB SCALE LIN **.*/D	Sets the subscale value in the LIN scale mode. 0.005 to 1.250 (0.005 step)
	SUB SCL ****%/D	SUB SCALE ****%/D	Sets the subscale value in the % scale mode. 0.5 to 125.0%/D (at 0.1 step)
	OFST LVL ***.*dB	OFFSET LEVEL ***.*dB	Sets the subscale offset value in the LOG scale mode. –99.9 to 99.9 dB (0.1 step)
	OFST LVL ****dB/km	OFFSET LEVEL ****dB/km	Sets an offset of subscale in the dB/km scale mode. –99.9 to 99.9 dB/km (at 0.1 step)
	SCALE MIN ****	SUB SCALE MINIMUM ****	Sets the bottom value of subscale in linear scale mode. 0 to 1.25 (at 0.01 step)
	SCALE MIN ****%	SUB SCALE MINIMUM ****%	Sets the bottom value of subscale in % scale mode. 0 to 100 (at 1 step)
	LENGTH **.*** km	LENGTH **.*** km	Sets an optical fiber length. 0.001 to 99.999 km (at 0.001 step)
	AUTO SUB SCALE ###	AUTO SUB SCALE ###	Selects ON or OFF for the auto subscale function to be executed at the end of each sweep. For ###, select ON or OFF by rotary knob.
SETUP	RESOLN WL **.*nm	RESOLUTION WL **.*nm	Sets the resolution. 0.01 to 2 nm (1-2-5 steps)
	RESOLN WL @@@@@	RESOLUTION WL @@@@@	Sets the variable @@@@@ value to the resolution. For @@@@@, select one of I, J, K, S, X, Y, Z, W2-W1 and SPWD variables by rotary knob.
	RESOLN FREQ ***GHz	RESOLUTION FREQ ***GHz	Sets the resolution. 2, 4, 10, 20, 40, 100, 200, 400 GHz
	RESOLN FREQ @@@@@	RESOLUTION FREQ @@@@@	Sets the variable @@@@@ value to the resolution. For @@@@@, select one of I, J, K, S, X, Y, Z, W2-W1, and SPWD variables by rotary knob.
	SENS NORM RANG HOLD	SENS NORMAL RANGE HOLD	Sets the measuring sensitivity to the normal fixed range mode.
	SENS NORM RANG AUTO	SENS NORMAL RANGE AUTO	Sets the measuring sensitivity to the normal auto range mode.
*	SENS MID	SENS MID	Sets the measuring sensitivity to the medium-sensitivity mode.

Table 1-1 Panel Switch Command List (5/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
SETUP (cont.)	SENS HIGH 1	SENS HIGH 1	Sets the measuring sensitivity to the high-sensitivity mode 1.
	SENS HIGH 2	SENS HIGH 2	Sets the measuring sensitivity to the high-sensitivity mode 2.
	SENS HIGH 3	SENS HIGH 3	Sets the measuring sensitivity to the high-sensitivity mode 3.
	AVERAGE TIMES ****	AVERAGE TIMES ****	Sets the number of averaging times. 1 to 1000 (1 step)
	AVERAGE TIMES @	AVERAGE TIMES @	Sets the averaging count in variable @. "@" can be I, J, K, S, X, Y, Z or N.
	SAMPLING PT ****	SAMPLING POINT ****	Sets the number of sampling points per sweep. 11 to 20001 (1 step)
	SAMPLING PT @	SAMPLING POINT @	Sets the sample count in variable @. "@" can be I, J, K, S, X, Y, Z, or N.
	CW LIGHT MEASURE	CW LIGHT MEASURE	Sets continuous light.
	PLS MEAS LPF	PULSE LIGHT MEASURE LPF MODE	Measures pulse light.
	PLS MEAS PK HOLD ****	PULSE LIGHT MEASURE PEAK HOLD MODE ****	Measures pulse light. 1 to 9999 (1 step)
	PLS MEAS EXT TRG	PULSE LIGHT MEASURE EXT TRG MODE	Measures pulse light.
	TLS SYNC SWEEP ###	TLS SYNC SWEEP ###	Selects the synchronous measurement with the variable waveklength light source.### :ON/OFF select by rotary knob.
MARKER	MARKER ****.***nm	MARKER ****.***nm	Sets the marker to the specified wavelength position of the active trace waveform. (by wavelength value) 0.000 to 2350.000 nm (0.001 step)
	MARKER ****.****THz	MARKER ****.****THz	Sets the marker to the specified wavelength position of the active trace waveform. (by frequency value) 1.0000 to 674.5000 THz (0.0001 step)
	MARKER @@@@	MARKER @@@@	Sets marker to wavelength position of variable @@@@. For @@@@, one of variables I, J, K, S, X, Y, Z, WM, W1, W2, or PKWL shall be selected using the rotary knob.

Table 1-1 Panel Switch Command List (6/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
MARKER (cont.)	MARKER → CENTER	MARKER → CENTER	Sets the marker wavelength value to the center wavelength.
	MARKER → REF LEVEL	MARKER → REF LEVEL	Sets the marker level value to the reference level.
	SET MARKER 1	SET MARKER 1	Sets the marker to the fixed marker 1.
	SET MARKER 2	SET MARKER 2	Sets the marker to the fixed marker 2.
	SET MARKER ***	SET MARKER ***	Sets the fixed marker *** to the position of the moving marker. 1 to 200 (1 step)
	CLEAR MARKER ***	CLEAR MARKER ***	Clears the fixed marker ***. 1 to 200 (1 step)
	ALL MARKER CLEAR	ALL MARKER CLEAR	Clears the marker.
	LINE MKR1 ****.***nm	LINE MARKER1 ****.***nm	Sets the line marker 1 to the specified wavelength. 0.000 to 2350.000 nm (0.001 step)
	LINE MKR1 ****.****THz	LINE MARKER1 ****.****THz	Sets line marker 1 to specified frequency. 1.0000 to 674.5000 THz (0.0001 step)
	LINE MKR1 @@@@@	LINE MARKER1 @@@@@	Sets the line marker 1 to the wavelength position of the variable @@@@@. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, and PKWL variables by rotary knob.
	LINE MKR2 ****.***nm	LINE MARKER2 ****.***nm	Sets the line marker 2 to the specified wavelength. 0.000 to 2350.000 nm (0.001 step)
	LINE MKR2 ****.****THz	LINE MARKER2 ****.****THz	Sets line marker 2 to specified frequency. 1.0000 to 674.5000 THz (0.0001 step)
	LINE MKR2 @@@@@	LINE MARKER2 @@@@@	Sets the line marker 2 to the wavelength position of the variable @@@@@. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, and PKWK variables by rotary knob.
	LINE MKR3 ****.***dB	LINE MARKER3 ****.***dB	Sets the line marker 3 to the specified level. –139.900 to 139.900 dB (0.001 step)
	LINE MKR3 ****.**dBm	LINE MARKER3 ****.**dBm	Sets the line marker 3 to the specified level.. –150.00 to 40.00 dBm (0.01 step)

Table 1-1 Panel Switch Command List (7/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
MARKER (cont.)	LINE MKR3 *.****##	LINE MARKER3 *.****##	Sets the line marker 3 to the specified level. 0 to 9.9999 (0.001 step) For ##, select one of pW, nW, μW, mW and W by rotary knob.
	LINE MKR3 **.***	LINE MARKER3 **.***	Sets the line marker 3 to the specified level. 0 to 10.000 (0.001 step)
	LINE MKR3 @@@@@	LINE MARKER3 @@@@@	Sets the line marker 3 to the level position of the variable @@@@@. For @@@@@, select one of I, J, K, S, X, Y, Z, LM, L1, L2, PKLVL, MKPWR, PWMTR and ASELV variable by rotary knob.
	LINE MKR4 ****.***dB	LINE MARKER4 ****.***dB	Sets the line marker 4 to the specified level. –139.900 to 139.900 dB (0.001 step)
	LINE MKR4 ****.**dBm	LINE MARKER4 ****.**dBm	Sets the line marker 4 to the specified level. –150.00 to 40.00 dBm (0.01 step)
	LINE MKR4 *.*****##	LINE MARKER4 *.*****##	Sets the line marker 4 to the specified level. 0 to 9.9999 (0.001 step) For ##, select one of pW, nW, μW, mW and W by rotary knob.
	LINE MKR4 **.***	LINE MARKER4 **.***	Sets the line marker 4 to the specified level. 0 to 10.000 (0.001 step)
	LINE MKR4 @@@@@	LINE MARKER4 @@@@@	Sets the line marker 4 to the level position of the variable @@@@@. For @@@@@, select one of I, J, K, S, X, Y, Z, LM, L1, L2, PKLVL, MKPWR, PWMTR and ASELV variable by rotary knob.
	MKR L1-L2 → SPAN	MKR L1-L2 → SPAN	Sets the range enclosed by the line markers 1 and 2 to the span.
	SEARCH L1-L2 ###	SEARCH L1-L2 ###	Selects ON or OFF for the analysis function in the range enclosed by the line markers 1 and 2. For ###, select ON or OFF by rotary knob.
	LINE MKR CLEAR	LINE MARKER CLEAR	Clears the line mark.
	MARKER OFFSET LIST	MARKER OFFSET LIST	Displays the difference for the moving marker.
	MARKER SPACING LIST	MARKER SPACING LIST	Displays the difference for the adjacent marker.
	MARKER LVL DIGIT*	MARKER LEVEL DIGIT*	Specifies the number of level display digits (below a decimal point) of the marker.
	MARKER LIST PRINT	MARKER LIST PRINT	Prints out the multi-marker value.
*	MKR UNIT nm	MKR UNIT nm	Displays the wavelength marker value by wavelength.

Table 1-1 Panel Switch Command List (8/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
*	MARKER (cont.)	MKR UNIT THz	MKR UNIT THz	Displays the wavelength marker value by frequency.
*		MARKER AUTO UPDATE ###	MARKER AUTO UPDATE ###	Makes the active trace waveform track the fixed marker level position. For ###, select ON or OFF by rotary knob.
	PEAK SEARCH	PEAK SEARCH	PEAK SEARCH	Executes peak search for the waveform on active trace.
		BOTTOM SEARCH	BOTTOM SEARCH	Executes bottom search for the waveform on active trace.
		NEXT SRCH	NEXT SEARCH	Searches the peak/bottom subsequect to the marker of the waveform on active trace.
		NEXT SRCH RIGHT	NEXT SEARCH RIGHT	Searches the peak/bottom at the right of the marker of the waveform on active trace.
		NEXT SRCH LEFT	NEXT SEARCH LEFT	Searches the peak/bottom at the left of the marker of the waveform on active trace.
		SET MARKER 1	SET MARKER 1	Specifies the marker as fixed marker 1.
		SET MARKER 2	SET MARKER 2	Specifies the marker as fixed marker 2.
		ALL MARKER CLEAR	ALL MARKER CLEAR	Clears the marker.
		AUTO SEARCH ###	AUTO SEARCH ###	Selects ON or OFF for the peak/bottom search function to be executed at each sweep. For ###, select ON or OFF by rotary knob.
		MODE DIFF **.**dB	MODE DIFF **.**dB	Sets the level difference of mode criterion to be used for peak search or waveform analysis. 0 to 50.00 dB (0.01 setup)
		SET MARKER ***	SET MARKER ***	Sets the fixed marker *** to the position of the moving marker. 1 to 200 (1 step)
		CLEAR MARKER ***	CLEAR MARKER ***	Clears the fixed marker ***. 1 to 200 (1 step)

Table 1-1 Panel Switch Command List (9/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
ANALYSIS	SPEC WD ENV **.*dB	SPEC WD ENV **.*dB	Makes spectral width search by the envelope method with the specified threshold value. 0.01 to 50.00 dB (at 0.01 step)
	ENV TH2 **.*dB	PARAM ENV TH2 **.*dB	Sets the limit value of the spectral width search by the envelope method. 0.01 to 50.00 dB (at 0.01 step)
	ENV K **.**	PARAM ENV K **.**	Sets the magnification of the spectral width search by the envelope method. 0.01 to 10.00 (0.01 step)
	SPEC WD THRESH **.*dB	SPEC WD THRESH **.*dB	Makes spectral width search by the THRESH method with the specified threshold value. 0.01 to 50.00 dB (at 0.01 step)
	THRESH K **.**	PARAM THRESH K **.**	Sets the magnification of the spectral width search by the THRESH method. 0.01 to 10.00 (0.01 step)
	MODE FIT ###	PARAM THRESH MODE FIT ###	Sets ON or OFF for the marker mode peak set function upon execution of spectral width search by the THRESH method. For ###, select ON or OFF by rotary knob.
	SPEC WD RMS **.*dB	SPEC WD RMS **.*dB	Makes spectral width search by the RMS method with the specified threshold value. 0.01 to 50.00 dB (at 0.01 step)
	RMS K **.**	PARAM RMS K **.**	Sets the magnification of the spectral width search by the RMS method. 0.01 to 10.00 (0.01 step)
	SPEC WD PK RMS **.*dB	SPEC WD PK RMS **.*dB	Makes spectral width search by the PEAK-RMS method. 0.01 to 50.00 dB (at 0.01 step)
	PK RMS K **.**	PARAM PEAK RMS K **.**	Sets the magnification of the spectral width search by the PEAK-RMS method. 0.01 to 10.00 (0.01 step)
	SPEC WD NOTCH ***dB	SPEC WD NOTCH ***dB	Measures the notch width based on the specified threshold. 0.01 to 50.00 dB (at 0.01 step)

Table 1-1 Panel Switch Command List (10/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
* ANALYSIS (cont.)	NOTCH FROM #####	NOTCH FROM #####	Sets the standard for notch width measurement. For #####, select PEAK or BOTTOM by rotary knob.
	SMSR *	SMSR *	Makes side mode suppression ratio measurement by specifying a mode. 1.2
	SMSR MASK ±**.**nm	SMSR MASK ±**.**nm	Sets the mask range upon execution of SMSR 1 mode. 0 to 99.99 nm (0.01 step)
	POWER	POWER	Makes power measurement.
	PWR OFST ***.**dB	PARAM POWER OFST ***.**dB	Sets the offset value at power measurement. –10.00 to 10.00 dB (0.01 step)
	FP-LD ANALYSIS	FP-LD ANALYSIS	Makes an analysis required for FP-LD.
	DFB-LD ANALYSIS	DFB-LD ANALYSIS	Makes an analysis required for DFB-LD.
	LED ANALYSIS	LED ANALYSIS	Makes an analysis required for LED.
	PMD ANALYSIS	PMD ANALYSIS	Makes an analysis required for PMD.
	PMD THRESH **.**dB	PMD THRESH **.**dB	Sets the threshold of the PMD. 0.01 to 50.00 dB (0.01 step)
	EDFA OFST (IN) ***.**	EDFA NF TRACE A OFST ***.**dB	Sets offset value of signal light which is used in calculation of NF and gain. –99.99 to 99.99 dB
	EDFA OFST (OUT) ***.**	EDFA NF TRACE B OFST ***.**dB	Sets offset value of output light which is used in calculation of NF and gain. –99.99 to 99.99 dB
	EDFA PLUS MASK **.**	EDFA NF PLUS MASK **.**nm	In the ASE level measurement, mask range above peak wavelength is specified to perform NF measurement of optical amplifier. 0 to 10.00 nm (0.01 step)
	EDFA MINUS MASK **.**	EDFA NF MINUS MASK **.**nm	In the ASE level measurement, mask range below peak wavelength is specified to perform NF measurement of optical amplifier. 0 to 10.00 nm (0.01 step)
	EDFA CVFT TYPE GAUS	EDFA NF CURVE FIT TYPE GAUSSIAN	Sets type of curve fit to GAUSSIAN (normal distribution curve) for NF calculation.

Table 1-1 Panel Switch Command List (11/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
	ANALYSIS (cont.)	EDFA CVFT TYPE LORENZ	EDFA NF CURVE FIT TYPE LORENZIAN	Sets type of curve fit to LORENIZIAN (Lorenz curve) for NF calculation.
		EDFA CVFT TYPE 3rd POLY	EDFA NF CURVE FIT TYPE 3RD POLY	Sets type of curve fit to 3RD POLY (cubic expression) for NF calculation.
		EDFA CVFT TYPE 4th POLY	EDFA NF CURVE FIT TYPE 4TH POLY	Sets type of curve fit to 4TH POLY (biquadratic expression) for NF calculation.
		EDFA CVFT TYPE 5th POLY	EDFA NF CURVE FIT TYPE 5TH POLY	Sets type of curve fit to 5TH POLY (pentagonal expression) for NF calculation.
		EDFA CVFT THR **.*	EDFA NF CURVE FIT THRESH **.*dB	Sets threshold for curve fit in NF calculation. 0.1 to 99.9 dB (0.1 step)
		WDM ANALYSIS	WDM ANALYSIS	Performs WDM analysis.
		WDM REF HIGHEST	WDM REF CHANNEL HIGHEST	Sets the reference channel of WDM analysis to the peak.
		WDM REF NO **	WDM REF CHANNEL NO.**	Sets the reference channel of WDM analysis. 1 to 200 (at 1 step)
*		WDM RESULT TO REF DATA	WDM RESULT TO REF DATA	Sets the latest WDM analysis result to the reference data.
*		WDM PRESET TO REF DATA	WDM PREEST TO REF DATA	Sets the preset wavelength value to the reference data.
*		WDM ITU-T TO REF DATA	WDM ITU-T TO REF DATA	Sets the ITU-T table value to the reference data.
		WDM THRESH **.*dB	WDM THRESH **.*dB	Sets the WDM analysis threshold. 0.1 to 50.0 dB (at 0.1 step)
		WDM MAX ***	WDM MAX NUMBER ***	Sets the maximum number of channels for WDM analysis. 1 to 200 channels (at 1 step)
		WDM DIFF **.*dB	WDM MODE DIFF **.*dB	Sets the minimum difference between top and bottom waveforms for WDM analysis. 0.01 to 50.00 dB (at 0.01 step)
		WDM OFFSET LIST	WDM OFFSET LIST	Displays an offset from the reference channel during WDM analysis.
		WDM SPACING LIST	WDM SPACING LIST	Displays an offset from the adjacent channel during WDM analysis.
*		WDM DISPLAY ABSOLUTE	WDM DISPLAY ABSOLUTE	Sets the WDM analysis result display in the absolute value display.

Table 1-1 Panel Switch Command List (12/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
*	ANALYSIS (cont.)	WDM DISPLAY RELATIVE	WDM DISPLAY RELATIVE	Sets the WDM analysis result display in the relative value display.
*		WDM DISPLAY ABS&REL	WDM DISPLAY ABS&REL	Sets the WDM analysis result display in the absolute value and relative value display.
*		WDM DISPLAY DRIFT	WDM DISPLAY DRIFT	Sets the WDM analysis result display in the DRIFT display.
		WDM CH DETECT AUTO	WDM CHANNEL DETECTION AUTO	Sets a channel to be detected automatically.
		WDM CH DETECT PRESET	WDM CHANNEL DETECTION PRESET	Sets a channel to be detected by referencing the preset wavelength.
		WDM NOISE POINT FIXED	WDM NOISE POINT FIXED	Sets the noise measurement point to the fixed point.
		WDM NOISE POINT CENTER	WDM NOISE POINT CENTER	Sets the noise measurement point to the center of the channel.
		WDM NOISE POI **.**nm	WDM NOISE POINT **.**nm	Sets the noise measurement point. 0.00 to 10.00 nm (0.01 step)
		WDM NOISE BW *.**	WDM NOISE BANDWIDTH *.**	Sets the bandwidth during noise measurement. 0.0 to 1.00 nm (0.01 step)
		WDM CH WAVLEN ***;##.#	WDM CHANNEL WAVELENGTHS ***;####.##nm	Sets the preset wavelength to the ***-th (-st, - nd) channel. *** : CHANNELs 1 to 200 (1 step) ###.## : WAVELENGTHs 600.00 to 1750.00 nm (0.01 step)
		WDM CH FREQ ***;###.##	WDM CHANNEL FREQ ***;###.####THz	Sets the preset frequency to the ***-th (-st, - nd) channel. *** : CHANNELs 1 to 200 (1 step) ###.### : FREQUENCIES 171.500 to 499.500 nm (0.001 step)
		WDM UNIT WAVELEN	WDM UNIT WAVELEN	Sets so that the preset wavelength is displayed as a wavelength.
		WDM UNIT FREQ	WDM UNIT FREQ	Sets so that the preset wavelength is displayed as a frequency.
		WDM LEVEL PRESET **.**	WDM LEVEL PRESET **.**nm	Sets the preset value of the level. -90.00 to 20.00 dBm (0.01 step)
		WDM SNR PRESET **.**	WDM SNR PRESET **.**nm	Sets the preset value of the SNR. 0.00 to 50.00 dB (0.01 step)

Table 1-1 Panel Switch Command List (13/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
*	ANALYSIS (cont.)	WDM DISP MASK ***.**	WDM DISP MASK ***.**dBm	Sets the threshold value at the channel display masking time. ***.** : OFF, 10.00 to –100.00dBm(0.01 step)
*		WDM CH SW ***;###	WDM CHANNEL SW ***;###	Sets the ON/OFF switch of the ***th channel.
*		WDM PRSET COPY ON	WDM PRSET COPY ON	Outputs the active wavelength table to the printer.
*		WDM REF REF TABLE	WDM REF REF TABLE	Sets so that the reference data is referred to at the relative value displaying time.
*		WDM REF ITU-T TABLE	WDM REF ITU-T TABLE	Sets so that the ITU-T TABLE is referred to at the relative value displaying time.
*		WDM MAX/MIN RESET	WDM MAX/MIN RESET	Reset the MAX/MIN data at the drift measuring time.
*		WDM OUTPUT SLOPE ###	WDM OUTPUT SLOPE ###	Displays the least square approximate value line of the channel peak. For ###, select ON or OFF by rotary knob.
*		WDM DUAL TRACE ###	WDM DUAL TRACE ###	Sets so that the both A and B traces are used at the WDM analyzing time. For ###, select ON or OFF by rotary knob.
*		WDM NF ANALYSIS	WDM NF ANALYSIS	Execute the multichannel NF analysis.
*		WDM NF NOISE POINT ###	WDM NF NOISE POINT ##.##nm	Sets the ASE level measuring point. ##.## : 0.00 to 10.00nm
*		WDM NF OFFSET(IN)***	WDM NF OFFSET(IN)***.**dB	Set the signal light offset value. ***.** : -99.99 to 99.99dB
*		WDM NF OFFSET(OUT) ***	WDM NF OFFSET(OUT) ***.**dB	Set the output light offset value. ***.** : -99.99 to 99.99dB
*		FILTER(PEAK) ANALYSIS	FILTER(PEAK) ANALYSIS	Makes an analysis necessary for the optical filter (PEAK).
*		FILTER(BOTTOM)ANALYSIS	FILTER(BOTTOM)ANALYSIS	Makes an analysis necessary for the optical filter (BOTTOM).
		ALL MARKER CLEAR	ALL MARKER CLEAR	Clears the marker.
		AUTO ANALYSIS ###	AUTO ANALYSIS ###	Selects ON or OFF for the wave analysis function to be executed at sweep. For ###, select ON or OFF by rotary knob.

Table 1-1 Panel Switch Command List (14/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
TRACE	WRITE A	WRITE	Sets the trace A to the write mode.
	FIX A	FIX A	Sets the trace A to the fixed data mode.
	MAX HOLD A	MAX HOLD A	Sets the trace A to the maximum value detection mode.
	ROLL AVG A ***	ROLL AVG A ***	Sets the trace A to the sequential averaging mode. 2 to 100 (1 step)
	DISPLAY A	DISPLAY A	Sets the trace A to the data display mode.
	BLANK A	BLANK A	Sets the trace A to the data non-display mode.
	ACTIVE TRACE A	ACTIVE TRACE A	Sets the trace A to the active trace.
	WRITE B	WRITE B	Sets the trace B to the write mode.
	FIX B	FIX B	Sets the trace B to the fixed data mode.
	MIN HOLD B	MIN HOLD B	Sets the trace B to the minimum value detection mode.
	ROLL AVG B ***	ROLL AVG B ***	Sets the trace B to the sequential averaging mode. 2 to 100 (1 step)
	DISPLAY B	DISPLAY B	Sets the trace B to the data display mode.
	BLANK B	BLANK B	Sets the trace B to the data non-display mode.
	ACTIVE TRACE B	ACTIVE TRACE B	Sets the trace B to the active trace.
	WRITE C	WRITE C	Sets the trace C to the write mode.
	FIX C	FIX C	Sets the trace C to the fixed data mode.
	A-B → C	A-B → C	Sets the trace C to the trace A–B subtraction display mode (LOG).
	B-A → C	B-A → C	Sets the trace C to the trace B–A subtraction display mode (LOG).
	A-B(LIN) → C	A-B(LIN) → C	Sets the trace C to the trace A–B subtraction display mode (LIN).
	B-A(LIN) → C	B-A(LIN) → C	Sets the trace C to the trace B–A subtraction display mode (LIN).
	A+B(LIN) → C	A+B(LIN) → C	Sets the trace C to the trace A+B subtraction display mode (LIN).
	NORMALIZE C	NORMALIZE C	Sets the trace C to the normalization waveform display mode.

Table 1-1 Panel Switch Command List (15/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
TRACE (cont.)	CURVE FIT C **dB	CURVE FIT C **dB	Sets the trace C to the curve fit display mode. 0 to 99 dB (1 step)
	CURVE FIT PK C **dB	CURVE FIT PK C **dB	Sets the trace C to the peak curve fit display mode. 0 to 99 dB (1 step)
	DISPLAY C	DISPLAY C	Sets the trace C to the data display mode.
	BLANK C	BLANK C	Sets the trace C to the data non-display mode.
	ACTIVE TRACE C	ACTIVE TRACE C	Sets the trace C to the active trace.
	TRACE A → B	TRACE A → B	Copies the trace A to the trace B.
	TRACE A → C	TRACE A → C	Copies the trace A to the trace C.
	TRACE B → A	TRACE B → A	Copies the trace B to the trace A.
	TRACE B → C	TRACE B → C	Copies the trace B to the trace C.
	TRACE C → A	TRACE C → A	Copies the trace C to the trace A.
	TRACE C → B	TRACE C → B	Copies the trace C to the trace B.
DISPLAY	NORMAL DISPLAY	NORMAL DISPLAY	Sets the screen to the normal display mode.
	SPLIT DISPLAY	SPLIT DISPLAY	Sets the screen to the 2-split display mode.
	TRACE A UP	TRACE A UPPER	Sets the trace A to the upper screen of 2-split display.
	TRACE A LOW	TRACE A LOWER	Sets the trace A to the lower screen of 2-split display.
	TRACE B UP	TRACE B UPPER	Sets the trace B to the upper screen of 2-split display.
	TRACE B LOW	TRACE B LOWER	Sets the trace B to the lower screen of 2-split display.
	TRACE C UP	TRACE C UPPER	Sets the trace C to the upper screen of 2-split display.
	TRACE C LOW	TRACE C LOWER	Sets the trace C to the lower screen of 2-split display.
	UPPER HOLD ###	UPPER HOLD ###	Fixes the upper screen of 2-split display.
	LOWER HOLD ###	LOWER HOLD ###	Fixes the lower screen of 2-split display.

Table 1-1 Panel Switch Command List (16/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
DISPLAY (cont.)	3D DISPLAY	3D DISPLAY	Sets the screen to 3-dimensional display mode.
	3D ANGLE **	3D ANGLE **	Sets the angle of 3-dimensional display. +50 to –50 deg (10 steps)
	3D RECALL	3D RECALL	Redisplays 3-dimensional display waveforms.
	3D Z-SCALE **	3D Z-SCALE **	Sets the number of waveforms of 3-dimensional display. 3 to 16 (1 step)
	3D MEMORY 1st	3D MEMORY 1st	Sets the buffer memory to be used for 3-dimensional display to 0 to 15.
	3D MEMORY 2nd	3D MEMORY 2nd	Sets the buffer memory to be used for 3-dimensional display to 16 to 31.
	LABEL'--------------'	LABEL'---------- 50 characters ----------'	Displays a comment in the label area. When a semicolon ";" is added to the end of the command, the comment (variable value) specified by the next LABEL command is displayed in succession.
	LABEL @@@@@	LABEL @@@@@	Displays the contents of the variable @@@@@ in the label area. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2 L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, A$, FILE$ and TIME$ variables by rotary knob.
	LABEL @@@@@;	LABEL @@@@@;	Display the contents of the variable @@@@@ by label. The comment (variable value) specified by the next LABEL command is displayed in succession.
	LABEL CLEAR	LABEL CLEAR	Clear the label.
	NOISE MASK ***dB	NOISE MASK ***dB	Masks and displays the waveform data that is less than the specified level. OFF, 0 to –100 dBm (1 step)
	MASK LINE VERTICAL	MASK LINE VERTICAL	Sets less than mask value to ZERO.
	MASK LINE HORIZONAL	MASK LINE HORIZONAL	Sets less than mask value to mask value.
	GRAPH CLEAR	GRAPH CLEAR	Clears the waveforms of trace A, B and C and also data.

Table 1-1 Panel Switch Command List (17/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
MEMORY	SAVE A → MEM **	SAVE A → MEM **	Writes the waveform of trace A into the memory of the specified number. 0 to 31 (1 step)
	SAVE A → MEM @	SAVE A → MEM @	Writes the waveform of trace A into the memory of the number in variable @. For @, select of I, J, K, S, X, Y and Z variables by rotary knob.
	SAVE B → MEM **	SAVE B → MEM **	Writes the waveform of trace B into the memory of the specified number. 0 to 31 (1 step)
	SAVE B → MEM @	SAVE B → MEM @	Writes the waveform of trace B into the memory of the number in variable @. For @, select of I, J, K, S, X, Y and Z variables by rotary knob.
	SAVE C → MEM **	SAVE C → MEM **	Writes the waveform of trace C into the memory of the specified number. 0 to 31 (1 step)
	SAVE C → MEM @	SAVE C → MEM @	Writes the waveform of trace C into the memory of the number in variable @. For @, select of I, J, K, S, X, Y and Z variables by rotary knob.
	RECALL MEM ** → A	RECALL MEM ** → A	Reads the waveform of the memory of the specified memory into the trace A. 0 to 31 (1 step)
	RECALL MEM @ → A	RECALL MEM @ → A	Reads the waveform of the memory of the number in variable @ into the trace A. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob.
	RECALL MEM ** → B	RECALL MEM ** → B	Reads the waveform of the memory of the specified memory into the trace B. 0 to 31 (1 step)
	RECALL MEM @ → B	RECALL MEM @ → B	Reads the waveform of the memory of the number in variable @ into the trace B. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob.
	RECALL MEM ** → C	RECALL MEM ** → C	Reads the waveform of the memory of the specified number into the trace C. 0 to 31 (1 step)

Table 1-1 Panel Switch Command List (18/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
MEMORY (cont.)	RECALL MEM @ → C	RECALL MEM @ → C	Reads the waveform of the memory of the number in variable @ into the trace C. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob.
FLOPPY	WRITE TRACE A '#####	WRITE TRACE A '########.WA*'	Writes the waveform of trace A into the floppy disk by specifying a file name. '########': File name
	WRITE TRACE A	WRITE TRACE A	Writes the waveform of trace A into the floppy disk. A file name is automatically given. ("W****")
	WRITE TRACE B '#####	WRITE TRACE B '########.WA*'	Writes the waveform of trace B into the floppy disk by specifying a file name. '########': File name
	WRITE TRACE B	WRITE TRACE B	Writes the waveform of trace B into the floppy disk. A file name is automatically given. ("W****")
	WRITE TRACE C '#####	WRITE TRACE C '########.WA*'	Writes the waveform of trace C into the floppy disk by specifying a file name. '########': File name
	WRITE TRACE C	WRITE TRACE C	Writes the waveform of trace C into the floppy disk. A file name is automatically given. ("W****")
	TRACE WRITE BINARY	TRACE WRITE:BINARY	Sets the format for writing trace waveform into the floppy disk to binary.
	TRACE WRITE TEXT	TRACE WRITE:TEXT	Sets the text format to write the trace waveforms on a floppy disk.
	TRACE WRITE ASCII	TRACE WRITE:ASCII	Sets the format for writing trace waveforms into the floppy disk to ASCII.
	WRITE MEMORY** '####	WRITE MEMORY** '########.WA'	Enters a file name and writes the memory of the specified number into the floppy disk. **: 0 to 31, '########': File name
	WRITE MEMORY**	WRITE MEMORY**	Writes the memory of the specified number into the floppy disk. **: 0 to 31. A file name is automatically given. ("W****")
	WRITE MEMORY @	WRITE MEMORY @	Writes the memory of the number in variable @ into the floppy disk. A file name is automatically given. For @, select of I, J, K, S, X, Y and Z variables by rotary knob.

Table 1-1 Panel Switch Command List (19/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
FLOPPY (cont.)	WRITE 3D 1st '######	WRITE 3D 1st '########.3D3'	Writes 3-dimensional display waveforms (0 to 15) into the floppy disk by specifying a file name. '########': File name
	WRITE 3D 1st	WRITE 3D 1st	Writes 3-dimensional display waveforms (0 to 15) into the floppy disk. A file name is automatically given. ("T****")
	WRITE 3D 2nd '######	WRITE 3D 2nd '########.3D3'	Writes 3-dimensional display waveforms (16 to 31) into the floppy disk by specifying a file name. '########': File name
	WRITE 3D 2nd	WRITE 3D 2nd	Writes 3-dimensional display waveforms (16 to 31) into the floppy disk. A file name is automatically given. ("T****")
	WRITE DATA '######	WRITE DATA '########.DT3'	Writes the contents of the data area into the floppy disk by specifying a file name. '########': File name
	WRITE DATA	WRITE DATA	Writes the contents of the data area into the floppy disk A file name is automatically given. ("D****")
	DATA DATE&TIME ###	DATA DATE&TIME ###	Selects date and time as data for writing by the <WRITE DATA> key. For ###, select ON of OFF by rotary knob.
	DATA LABEL ###	DATA LABEL ###	Select label information as data for writing by the <WRITE DATA> key. For ###, select ON or OFF by rotary knob.
	DATA DT AREA ###	DATA DT AREA ###	Selects the contents of the data area as data for writing by the <WRITE DATA> key. For ###, select ON or OFF by rotary knob.
	DATA CONDTN ###	DATA CONDITION ###	Selects measuring conditions as data for writing by the <WRITE DATA> key. For ###, select ON or OFF by rotary knob.
	DATA:ADD WRITE	DATA:ADD WRITE	Selects the additional writing of data files.
	DATA:OVERWRITE	DATA:OVERWRITE	Selects the overwriting of data files.
	WRITE GRAPH '########	WRITE GRAPH '########.***'	Specifies the file name and stores it on a floppy disk. '########': File name
	WRITE GRAPH	WRITE GRAPH	Stores a graphic file on a floppy disk. The file is named automatically.

Table 1-1 Panel Switch Command List (20/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
FLOPPY (cont.)	GRAPH COLOR:B&W	GRAPH COLOR:B&W	Sets the graphic file(s) to the monochrome mode.
	GRAPH COLOR:PRESET	GRAPH COLOR:PRESET	Sets the graphic file(s) to the preset color mode.
	GRAPH COLOR:SCREEN	GRAPH COLOR:SCREEN	Sets the graphic file(s) to the screen color mode.
	GRAPH TYPE:BMP	GRAPH TYPE:BMP	Specifies the BMP graphic file format.
	GRAPH TYPE:TIFF	GRAPH TYPE:TIFF	Specifies the TIFF graphic file format.
	WRITE SETTING '#####	WRITE SETTING '########.SET'	Writes measuring conditions, soft key latch status and user key registration information into the floppy disk by specifying a file name. '########': File name
	WRITE SETTING	WRITE SETTING	Writes measuring conditions, soft key latch status and user key registration information into the floppy disk. A file name is automatically given. ("S****")
	WRITE LONG TRM '######	WRITE LONG TERM '######.LT2'	Writes the long term measurement result in the floppy disk by specifying a file name. '######': File name
	WRITE LONG TRM	WRITE LONG TERM	Writes the long term result in the floppy disk. A file name is assigned automatically.
	READ TRACE A '#.WA*	READ TRACE A '########.WA*'	Reads a waveform form the floppy disk into the trace A. '########.WA*': File name
	READ TRACE B '#.WA*	READ TRACE B '########.WA*'	Reads waveform from the floppy disk into the trace B. '########.WA*': File name
	READ TRACE C '#.WA*	READ TRACE C '########.WA*'	Reads waveform from the floppy disk into the trace C. '########.WA*': File name
	READ MEMORY** '#.WA*	READ MEMORY** '########.WA*'	Reads a waveform from the floppy disk into the floppy disk. **: 0 to 31, '########.WA*': File name
	READ 3D 1st '#######	READ 3D F '########.3D3'	Reads 3-dimensional waveforms (0 to 15) from the floppy disk. '########.3D3': File name
	READ 3D 2nd '#######	READ 3D S '########.3D3'	Reads 3-dimensional waveforms (16 to 31) from the floppy disk. '########.3D3': File name
	READ DATA '########	READ DATA '#########.DT3'	Reads and displays data from the floppy disk. '########.DT3': File name

Table 1-1 Panel Switch Command List (21/24)

Panel switch	Soft key list display	Program area display	Explanation and range of parameter
FLOPPY (cont.)	READ SETTING '######	READ SETTING '########.ST3'	Reads and sets measuring conditions, soft key latch status and user key registration information from the floppy disk. '########.ST3': File name
	READ LONG TRM '######	READ LONG TERM '#######.LT2'	Reads and sets the long term measurement result from the floppy disk. '#######.LT2': File name
	DELETE '#######	DELETE '########.$$$'	Deletes a file in the floppy disk. '########.$$$': File name
	DISK INITIALIZE 1.2M	DISK INITIALIZE 1.2M	Initializes the floppy disk in the 1.2M byte mode.
	DISK INITIALIZE 1.44M	DISK INITIALIZE 1.44M	Initializes the floppy disk in the 1.44M byte mode.
SYSTEM	PRINTER SAVE SPACE	PRINTER SAVE SPACE	Sets the amount of paper feed after printing to a low value.
	PRINTER NORMAL SPACE	PRINTER NORMAL SPACE	Sets the amount of paper feed after printing to a high value.
	DEFAULT COLOR *	DEFAULT COLOR *	Selects a display color among the default 5 patterns. 1 to 5
	MEAS WL AIR	MEASURE WAVELENGTH AIR	Sets measurement wavelength to air wavelength
	MEAS WL VACUUM	MEASURE WAVELENGTH VACUUM	Sets measurement wavelength to vacuum wavelength
	SELF CALIBRATION	SELF CALIBRATION	Calibrates the wavelength by the internal light source.
	WL CAL ****.***nm	WL CAL ****.***nm	Sets the wavelength of light source to perform waveform absolute value calibration. 350.000 to 1750.000 nm (0.001 step)
	WL SHIFT **.***nm	WL SHIFT **.***nm	Sets the amount of wavelength shift. –5.000 to 5.000 nm (0.001 step)
	LEVEL SHIFT ***.**dB	LEVEL SHIFT ***.**dB	Sets the amount of level shift. –60.00 to 60.00 dB (0.01 step)
	AUTO OFFSET ###	AUTO OFFSET ###	Selects ON or OFF for the function to periodically cancel the DC offset of the AMP. For ###, select ON or OFF by rotary knob.

Table 1-1 Panel Switch Command List (22/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
	SYSTEM (cont.)	BUZZER CLICK ###	BUZZER CLICK ###	Generates a click sound when a key is pressed. For ###, select ON or OFF by rotary knob.
		BUZZER WARNING ###	BUZZER WARNING ###	Activates the buzzer upon occurrence of a warning error. For ###, select ON or OFF by rotary knob.
		TLS ADRS **	TLS ADRS	Sets the address of the wavelength variable light source. 0 to 29 (1 step)
		OPTICAL ALIGNMENT	OPTICAL ALIGNMENT	Adjusting optical axis of monochromator optical system employed on this unit.
		UNCAL WARNING###	UNCAL WARNING###	Displays UNCAL and WARNING. ###:Select ON or OFF by rotary knob
*		ACTUAL RESOLUTION ###	ACTUAL RESOLUTION DISPLAY ###	Displays the resolution ability value. For ###, select ON or OFF by rotary knob.
*		LOG DATA LIMIT ***	LOG DATA LIMIT ***	Sets the upper/lower limit value of the LOG data. For ###, select 210 or 100 by rotary knob.
	ADVANCE	LONG TRM SWEEP	LONG TERM SWEEP	Starts the long term measurement.
		LONG TRM INTVL ****SEC	LONG TERM INTERVAL ****SEC	Sets the long term measurement interval. 0.1 to 9999. 9 sec (0.1 step)
		LONG TRM RPT TIMES ***	LONG TERM REPEAT TIMES ***	Sets the number of long term measurement times. 1 to 1000 (1 step)
		LONG TRM ALL CH WAVLEN	LONG TERM ALL CH DISP WAVELENGTH	Sets all channel display to the wavelength display.
		LONG TRM ALL CH LEVEL	LONG TERM ALL CH DISP LEVEL	Sets all channel display to the level display.
		LONG TRM ALL CH SNR	LONG TERM ALL CH DISP SNR	Sets all channel display to the SNR display.
		LONG TRM SINGLE CH ***	LONG TERM SINGLE CH DISPLAY ***	Sets a channel during single channel display. 1 to 200 (1 step)
		LONG TRM ABSOLUTE	LONG TERM ABSOLUTE	Sets the absolute value display.

Table 1-1 Panel Switch Command List (23/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
	ADVANCE (cont.)	LONG TRM REF DATA SET	LONG TERM REF DATA SET	Specifies the data of the cursor position for the reference data.
		LONG TRM RELATIVE	LONG TERM RELATIVE	Sets the relative value display for the reference data.
		LONG TRM REF DATA INI	LONG TERM REF DATA INITIAL	Specifies the preset value for the reference data.
		LONG TRM DATA CLR	LONG TERM DATA CLEAR	Clears the data of the long term measurement result.
		LONG TRM WAV LIMIT **	LONG TERM WAVELENGTH LIMIT **.**nm	Sets the threshold the wavelength drift. 0.00 to 99.99 nm (0.01 step)
		LONG TRM LOWER LIMIT *	LONG TERM LOWER LIMIT **.**dBm	Sets the upper limit of the level. -90.00 to -30.00 dBm (0.01 step)
		LONG TRM UPPER LIMIT *	LONG TERM UPPER LIMIT **.**dBm	Sets the lower limit of the level. -30.00 to 20.00 dBm (0.01 step)
		LONG TRM SNR LIMIT **	LONG TERM SNR LIMIT **.**dB	Sets the lower limit of the SNR. 0.00 to 50.00 dB (0.01 step)
*		LONG TERM Y SCALE AUTO	LONG TERM Y SCALE AUTO	Sets the vertical axis scale on the graph in the automatic mode.
*		LONG TERM Y SCALE MAN	LONG TERM Y SCALE MANUAL	Sets the vertical axis scale on the graph in the manual mode.
*		LONG TERM WL CTR *	LONG TERM WL CENTER ****.**nm	Sets the Y-axis center wavelength on the wavelength display graph. ****.** : 600.00 to 1750.00nm (0.01 step)
*		LONG TERM WL SPAN *	LONG TERM WL SPAN ****.*nm	Sets the Y-axis span on the wavelength display graph. ****.* : 0.0 to 1200.0nm (0.1 step)
*		LONG TERM LVL CTR ****	LONG TERM LVL CENTER ***.**dBm	Sets the Y-axis center level on the level display graph. ***.** : -90.00 to 20.00dBm (0.01 step)
*		LONG TERM LVL SCALE **	LONG TERM LVL SCALE **.*dB/D	Sets the Y-axis scale on the level display graph. **.* : 0.1 to 10.0dB (0.1 step)
*		LONG TERM SNR CTR ****	LONG TERM SNR CENTER ***.**dB	Sets the Y-axis center level on the SNR display graph. ***.** : -90.00 to 20.00dB (0.01 step)

Table 1-1 Panel Switch Command List (24/24)

	Panel switch	Soft key list display	Program area display	Explanation and range of parameter
*	ADVANCE (cont.)	LONG TERM SNR SCALE **	LONG TERM SNR SCALE **.*dB/D	Sets the Y-axis scale on the SNR display graph. **.* : 0.1 to 10.0dB (0.1 step)
*		LONG TERM SCL AUTO SET	LONG TERM SCALE AUTO SET	Sets the same value as that at the automatic setting time on the graph scale.
		LONG TRM REF DATA SET	LONG TERM REF DATA SET	Specifies the data of the cursor position for the reference data.
		POWER METER REPEAT	POWER METER REPEAT	Makes repeat measurement by the power meter function.
		POWER METER SINGLE	POWER METER SINGLE	Makes single measurement by the power meter function.
		POWER METER STOP	POWER METER STOP	Stops measurement by the power meter function.
		AREA 600-1000	AREA 600-1000	Sets the wavelength range to 600 to 1000 nm by the power meter function.
		AREA 1000-1750	AREA 1000-1750	Sets the wavelength range to 1000 to 1750 nm by the power meter function.
		AREA FULL	AREA FULL	Sets the wavelength range to FULL (350 to 1750 nm) by the power meter function.
		RELATIVE ###	RELATIVE ###	Selects ON or OFF for the relative value display function by the power meter function. For ###, select ON or OFF by rotary knob.
		MAX MIN RESET	MAX MIN RESET	Selects the maximum value and minimum value by the power meter function.
		POWER METER UNIT dBm	POWER METER UNIT dBm	Sets the unit to "dBm" by the power meter function.
		POWER METER UNIT W	POWER METER UNIT W	Sets the unit to "W" by the power meter function.

Table 1-2 Special Command List (1/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
COPY ON	COPY ON	Hardcopies the screen by the printer.
PRINTER FEED **	PRINTER FEED **	Feeds the printer paper. (1 to 10.1 step) The amount of feed is approximately 5 mm per step.
GOTO ***	GOTO ***	Jumps to the *** line. (1 to 200, 1 step)
GOTO PROGRAM **	GOTO PROGRAM **	**: (1 to 200, 1 step) Jumps to program ** and starts execution from the first line. Jumps back to original program when contents of program ** has been executed. However, if END command is populated in the program **, this program ends without causing jump to the original program. When a program is executed with this command, variables are not initialized.
WAIT *****S	WAIT *****S	Waits for ***** seconds. (1 to 99999.1 step)
PAUSE'--------------'	PAUSE'---------- 50 characters ---------- '(Message to be displayed at a stop)	Causes execution to pause and displays a message window. In the window, the message in ' ' and an explanation of the <CONTINUE> key are displayed. When the soft key <CONTINUE> is pressed, the window is closed and the execution is restarted. However, when the program is started by GP-IB, it cannot pause.
VARIABLE CLEAR	VARIABLE CLEAR	All variables used in a program are initialized.
END	END	Terminates a program.
N=********	N=********	Substitutes a value for the variable N. (1 to 99999999, 1 step)
N=N-1;IF N<>0 GOTO ***	N=N-1;IF N<>0 GOTO ***	(1 to 200, 1 step) Subtracts 1 from the variable N. When the result is not 0, a jump takes place to the *** line.
@=********** ###	@=********** ###	Substitutes a value for the variable @. For **-**, a real number of up to 10 digits including a sign and a decimal point can be set. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob. For ###, select one of nm, dB, dBm, pW, nW, μW, mW, W and ' ' (no unit) by rotary knob.

Table 1-2 Special Command List (2/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
@=#+**********	@=#+**********	Adds the **-** value to the variable # and substitutes the result for the variable @. For **-**, a real number of up to 10 digits including a sign and a decimal point can be set. When a minus value is set, subtraction is performed from the variable #. For @, #, select one of I, J, K, S, X, Y and Z variables by rotary knob.
@=@@@@@	@=@@@@@	Copies the contents of the variable @@@@@ to the variable @. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, and PMD variables by rotary knob.
@=@@@@@+#####	@=@@@@@+#####	Performs four operations between variables. For @. select one of I, J, K, S, X, Y and Z variables by rotary knob. For @@@@@, Select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, and PMD variables by rotary knob.
@=@@@@@-#####	@=@@@@@-#####	Performs four operations between variables. For @. select one of I, J, K, S, X, Y and Z variables by rotary knob. For @@@@@, Select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, and PMD variables by rotary knob.
@=@@@@@*#####	@=@@@@@*#####	Performs four operations between variables. For @. select one of I, J, K, S, X, Y and Z variables by rotary knob. For @@@@@, Select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN ASELV, PWMTR, and PMD variables by rotary knob.
@=@@@@@/#####	@=@@@@@/#####	Performs four operations between variables. For @. select one of I, J, K, S, X, Y and Z variables by rotary knob. For @@@@@, Select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, and PMD variables by rotary knob.

Table 1-2 Special Command List (3/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
PRINT'----------'	PRINT'---------- 50 characters ---------'	Prints the command enclosed by single quotation marks. When a semicolon ";" is attached to the end of a comment, the comment (variable value) specified by the next PRINT command is printed in succession without line feed.
PRINT @@@@@	PRINT @@@@@	Prints the variable @@@@@ value with unit. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, A$, FILE$ and TIME$ variables by rotary knob.
PRINT @@@@@;	PRINT @@@@@;	Prints the variable @@@@@ value with unit. After printing, the comment (variable value) specified by the next PRINT command is printed in succession without line feed. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN ASELV, PWMTR, A$, FILE$ and TIME$ variables by rotary knob.
PRINT DATA AREA	PRINT DATA AREA	Prints the contents of the data area.
IF F1<=@@@@@<=F2 GOTO	IF F1<=@@@@@<=F2 GOTO ***	***: (1 to 200, 1 step) When the variable @@@@@ value is more than F1 or less than F2, a jump takes place to the *** line. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV and PWMTR variables by rotary knob.
F1********** ###	F1********** ###	Substitutes a value for the variable F1. For **-**, real number of up to 10 digits including a sign and a decimal point can be set. For ###, select one of nm, THz, dB, dBm, pW, nW, μW, mW, W and ' " (no unit) by rotary knob.

Table 1-2 Special Command List (4/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
F2=********** ###	F2=********** ###	Substitutes a value for the variable F2. For **-**, a real number of up to 10 digits including a sign and a decimal point can be set. For ###, select one of nm, THz, dB, dBm, pW, nW, μW, mW, W and ' ' (no unit) by rotary knob.
F1=@@@@@	F1=@@@@@	Copies the contents of the variable @@@@@ to the variable F1. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV and PWMTR variables by rotary knob.
F2=@@@@@	F2=@@@@@	Copies the contents of the variable @@@@@ to the variable F2. For @@@@@, select one of I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV and PWMTR variables by rotary knob.
@=LEVEL (****.*** nm)	@=LEVEL (****.*** nm)	Assigns the level of "****.***nm" wavelength points (obtained by active trace) into variable @. "@" can be I, J, K, S, X, Y or Z.
@=LEVEL (@@@@@)	@=LEVEL (@@@@@)	Assigns the level of "aaaa" variable wavelength points (obtained by active trace) into variable @. "aaaa" can be I, J, K, S, X, Y, Z, WM, W1, W2, PKWL.
IF @@@@@<@@@@@ GOTO	IF @@@@@<@@@@@ GOTO ***	Jumps to line "***" if two variables satisfy the inequality sign condition.
IF @@@@@=<@@@@@ GOTO	IF @@@@@=<@@@@@ GOTO ***	Jumps to line "***" if two variables satisfy the inequality sign condition.
IF @@@@@=@@@@@ GOTO	IF @@@@@=@@@@@ GOTO ***	Jumps to line "***" if two variables satisfy the quality sign condition.
IF @@@@@<>@@@@@ GOTO	IF @@@@@<>@@@@@ GOTO ***	Jumps to line "***" if two variables satisfy the inequality sign condition. "@@@@@" can be I, J, K, S, X, Y, Z, WM, W1, W2, W2-W1, LM, L1, L2, L2-L1, SPWD, PKWL, PKLVL, MODN, SMSR, MKPWR, EDFNF, GAIN, ASELV, PWMTR, N, F1 or F2.

Table 1-2 Special Command List (5/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
@=SAMPL POINT	@=SAMPL POINT	Substitutes the current sampling point for the variable @. For @, select one of I, J, K, S, X, Y, and Z variables.
@=REF LEVEL	@=REF LEVEL	Substitutes the current reference level for the variable @. For @, select one of I, J, K, S, X, Y, and Z variables.
INIT	INIT	Initializes all parameters (does not clear any variables).
SEND **'---------'	SEND **'--------- 50 characters ----------'	**; (0 to 29, 1 step) Specifies the external unit of address **, connected to the [GP-IB 2] connector, as a listener and sends out the command in ' '. The delimiter is CR/LF.
SEND **'---------';@	SEND **'--------- 50 characters ----------';@	**: (0 to 29, 1 step) Specifies the external unit of address **, connected to the [GP-IB 2] connector, to the listener and sends out the variable @ value after the command in ' '. The delimiter is CR/LF. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob.
SEND **'----';@;'----'	SEND **'-- 20 characters --';@;'-- 20 characters --'	**: (0 to 29, 1 step) Specifies external unit of address** being connected to [GP-IB2] connector as a listener and sends out the command in ' ', value of variable @ and command ' ' to the external unit, in that order. Delimiter is CR/LF. For @, one variable out of I, J, K, S, X, Y and Z is selected using the rotary knob.
RECEIVE **;A$	RECEIVE **;A$	**: (0 to 29, 1 step) Specifies the external unit of address**, connected to the [GP-IB 2] connector, as a talker, receives a message, and substitutes it for the character variable A$. Up to 512 characters can be received. The delimiter is CR/LF.
@=CENTER	@=CENTER	Substitutes the current center wavelength for the variable @. For @, select one of I, J, K, S, X, Y, and Z variables.
@=SPAN	@=SPAN	Substitutes the current sweep width for the variable @. For @, select one of I, J, K, S, X, Y, and Z variables.

Table 1-2 Special Command List (6/6)

Command list display	Program area display	Explanation and precaution of command (including parameter range)
@=RESOLN	@=RESOLUTION	Substitutes the current resolution for the variable @. For @, select one of I, J, K, S, X, Y, and Z variables.
@=VAL(A$)	@=VAL(A$)	Converts the character variable A$ into a numeric value and substitutes it for the variable @. For @, select one of I, J, K, S, X, Y and Z variables by rotary knob.
SPOLL **;S	SPOLL **;S	**:(0 to 29, 1 step) Performs serial polling to the external unit of address **, connected to the [GP-IB 2] connector, and substitutes the status byte for the variable S.
RESET OPTION	RESET OPTION	Performs remote clear, device clear and interface clear processing for the external unit connected to the [GP-IB 2] connector.
BEEP **	BEEP **	Activates the buzzer for ** × 100 msec. (1 to 10, 1 step)

Table 2-1 GP-IB Program Codes (1/36)

① [FUNCTION] section

Function	Control command	Explanation	Talker command	Talker output data format
[SWEEP]				
<AUTO>	AUTO	Starts an auto sweep.	SWEEP?	Output of measurement status Status: Output STOP: 0 SINGLE: 1 REPEAT: 2 AUTO: 3 SEGMENT MEASURE: 4 WL CAL: 11 OPTICAL ALIGNMENT: 12
<REPEAT>	RPT	Starts a repeat sweep.		
<SINGLE>	SGL	Starts a single sweep.		
<SEGMENT MEASURE>	SMEAS	Measures according to the set sampling count.		
<STOP>	STP	Stops a sweep.		
<SEG POINT****>	SEGP****	Sets the sampling count for measurement by SEGMENT MEASURE. ****: 1 to 20001 (1 step)	SEGP?	1 to 20001
<SWEEP MKR L1-L2>	SWPM*	Selects ON or OFF for the marker-to-marker sweep function. ON...*: 1 OFF....*: 0	SWPM?	ON: 1, OFF: 0
<SWP INTVL*****sec>	SWPI*****	Sets the time from a start of a sweep till a start of the next sweep in the repeat sweep mode. (Unit: sec) *****: 0 to 99999(1 step) 0 = MINIMUM	SWPI?	0 to 99999

Table 2-1 GP-IB Program Codes (2/36)

Function	Control command	Explanation	Talker command	Talker output data format
[CENTER]				
<CENTER****.**nm>	CTRWL****.**	Sets the center wavelength (Unit: nm) ****.**: 600.00 to 1750.00 (0.01 step)	CTRWL?	600.00 to 1750.00
<CENTER****.***THz>	CTRF***.***	Sets the center frequency. (unit: THz) ***.***: 171.500 to 499.500 (0.001 step)	CTRF?	171.500 to 499.500
<START WL****.**nm>	STAWL****.**	Sets the measurement start wavelength. (Unit: nm) ****.**: 0.00 to 1750.00 (0.01 step)	STAWL?	0.00 to 1750.00
<START ***.***THz>	STAF***.***	Sets the measurement start frequency. (Unit: THz) ***.***: 1.000 to 499.500 (0.001 step)	STAF?	1.000 to 499.500
<STOP WL****.**nm>	STPWL****.**	Sets the measurement end wavelength. (Unit: nm) ****.**: 600.00 to 2350.00 (0.01 step)	STPWL?	600.00 to 2350.00
<STOP ***.***THz>	STPF***.***	Sets the measurement end frequency. (Unit: THz) ***.***: 171.500 to 674.500 (0.001 step)	STPF?	171.500 to 674.500
<PEAK→CENTER>	CTR=P	Sets the waveform peak to the center wavelength.	None	
<AUTO CENTER>	ATCTR*	Selects ON or OFF for the peak-center function at each sweep. PEAK→CENTER ON....*: 1 OFF....*: 0	ATCTR?	ON: 1, OFF: 0
[SPAN]				
<SPAN****.*nm>	SPAN****.*	Sets the span. (Unit: nm) ****.*: 0, 0.5 to 1200.0 (0.1 step)	SPAN?	0, 0.5 to 1200.0
<SPAN ***.***THz>	SPANF	Sets the span. (Unit: THz) ***.***: 0, 0.100 to 350.000 (0.001 step)	SPANF?	0, 0.100 to 350.000
<△λ→SPAN>	SPN=W	Sets the span according to the spectral width.	None	
<0 nm SWEEP TIME**S>	ZSWPT**	Measurement time from the left end of the screen to the right end at a sweep with a span of 0 nm. (Unit: sec) **: 0 to 50 (1 step) 0 = MINIMUM	ZSWPT?	0 to 50

Table 2-1 GP-IB Program Codes (3/36)

Function	Control command	Explanation	Talker command	Talker output data format
[LEVEL]				
<REF LEVEL>	REFL***.*	Sets the reference level. [in LOG] (Unit: dBm) ***.*: −90.0 to 20.0 (0.1 step)	REFL?	−90.0 to 20.0
	REFLP*.**	Sets the reference level. [in linear] (Unit: pW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		PW 1.00 to 999
	REFLN*.**	Sets the reference level. [in linear] (Unit: nW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		NW 1.00 to 999
	REFLU*.**	Sets the reference level. [in linear] (Unit: μW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		UW 1.00 to 999
	REFLM*.**	Sets the reference level. [in linear] (Unit: mW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 100 (0.1 step)		MW 1.00 to 100
<LVL SCALE**.**dB/D>	LSCL**.*	Sets the scale of the level axis. **.*: 0.1 to 10.0 (0.1 step. Unit: dB/DIV) or LIN (linear scale)	LSCL?	0.1 to 10.0 a 0 (Linear scale)
<BASE LVL***.*mW>	BASL***.*	Sets the bottom scale value in Linear Scale mode. ***.*: 0 to REF LEVEL × 0.9	BASL?	PW 1.00 to 999 NW 1.00 to 999 UW 1.00 to 999 MW 1.00 to 999
<PEAK→REF LEVEL>	REF=P	Sets the peak level to the reference level.	None	
<AUTO REF LEVEL>	ATREF*	Selects ON or OFF for the PEAK→REF LEVEL function to be executed at each sweep. ON....*: 1 OFF....*: 0	ATREF?	ON: 1, OFF: 0

Table 2-1 GP-IB Program Codes (4/36)

Function	Control command	Explanation	Talker command	Talker output data format
[LEVEL]				
<dBm dBm/nm>	LSUNT*	Switches the level axis scale display between "dBm(W)" and "dBm/nm" (or "W/nm"). dBm(W) ....*: 0 dBm/nm (W/nm) ....*: 1	LSUNT?	dBm(W): 0 dBm/nm(W/nm): 1
<SUBLOG**.*dBD>	SLOG**.*	Sets the subscale (at LOG) **.*: 0.1 to 10.0 (0.1 step)	SLOG?	0.1 to 10.0
<SUB LIN*.***D>	SLIN*.***	Sets the subscale (at LINEAR) *.***:0.005 to 1.250 (0.005 step)	SLIN?	0.005 to 1.250
<SUB SCALE**.*dB/km>	SKM**.*	Sets the subscale to "dB/km". **.*: 0.1 to 10.0 (0.1 step)	SKM?	0.1 to 10.0
<SUB SCALE***.*%/D>	SPS***.*	Sets the subscale to "%/D". ***.*: 0.5 to 125.0 (0.1 step)	SPS?	0.5 to 125.0
<OFST LVL***.*dB>	LOFST***.*	Sets the offset level of the scale. (Unit: dB) ***.*: -99.9 to 99.9 (0.1 step)	LOFST?	−99.9 to 99.9
<OFST LVL***.*dB/km>	LOFSKM***.*	Sets an offset of subscale. (in dB/km) ***.*: −99.9 to 99.9 (0.1 step)	LOFSKM?	−99.9 to 99.9
<SCALE MIN***.*>	SMIN***.*	Sets the bottom scale value in Linear subscale mode. ***.*: 0 to (/DIV) × 10	SMIN?	0 to 12.5
<SCALE MIN***.*%>	SMINP***.*	Sets the bottom scale value in "%" subscale mode. ***.*: 0 to (/DIV) × 10	SMINP?	0 to 125
<LENGTH**.***km>	LNGT**.***	Sets an optical fiber length. **.***: 0.001 to 99.999 (0.001 step)	LNGT?	0.001 to 99.999
<AUTO SUBSCALE>	ATSCL*	Selects ON or OFF for the auto scaling display function ON....*: 1 OFF....*: 0	ATSCL?	ON: 1, OFF: 0

Table 2-1 GP-IB Program Codes (5/36)

Function	Control command	Explanation	Talker command	Talker output data format
[SETUP]				
<RESOLN*.**nm>	RESLN*.**	Sets the resolution. (Unit: nm) *.**: 0.01 to 2.0 (1-2-5 steps)	RESLN?	0.01 to 2.0
<RESOLN ***GHz>	RESLNF***	Sets the resolution. (Unit: GHz) ***: 2, 4, 10, 20, 40, 100, 200, 400	RESLNF?	2, 4, 10, 20, 40, 100, 200, 400
<SENS>		Sets the measuring sensitivity.	SENS?	Output of measuring sensitivity
* SENS NORM RANGE HOLD	SNHD			
SENS NORM RANGE AUTO	SNAT			
SENS MID	SMID			
SENS HIGH1	SHI1			
SENS HIGH2	SHI2			
SENS HIGH3	SHI3			
<AVERAGE TIMES****>	AVG****	Sets the number of averaging times for measurement. ****: 1 to 1000 (1 step)	AVG?	1 to 1000
<SAMPLING PT****>	SMPL****	Sets the sampling point for measurement. ****: 11 to 20001 (1 step) 0(auto)	SMPL?	11 to 20001,0

Measuring sensitivity	Output
SENS HIGH1	1
SENS HIGH2	2
SENS HIGH3	3
SENS NORM RANG HOLD	4
SENS NORM RANG AUTO	5
SENS MID	6

Table 2-1 GP-IB Program Codes (6/36)

<table>
<tr><th>Function</th><th>Control command</th><th>Explanation</th><th>Talker command</th><th>Talker output data format</th></tr>
<tr><td>[SETUP]</td><td></td><td></td><td></td><td></td></tr>
<tr><td><CW LIGHT MEASURE></td><td>CLMES</td><td>Sets the CW light measurement mode.</td><td rowspan="2">CWPLS?</td><td rowspan="2"><table><tr><th>Measurement mode</th><th>Output</th></tr><tr><td>PULSE light measurement mode</td><td>0</td></tr><tr><td>CW light measurement mode</td><td>1</td></tr></table></td></tr>
<tr><td><PLS LIGHT MEASURE></td><td>PLMES</td><td>Sets the PULSE light measurement mode.</td></tr>
<tr><td><LPF MODE></td><td>LPF</td><td>Mode for measuring chop light by using a lowpass filter.</td><td rowspan="3">PLMOD?</td><td rowspan="3"><table><tr><th>Measurement mode</th><th>Output</th></tr><tr><td>LPF MODE</td><td>0</td></tr><tr><td>EXT TRG MODE</td><td>1</td></tr><tr><td>PEAK HOLD MODE</td><td>2 + hold time</td></tr></table></td></tr>
<tr><td><PEAK HOLD MODE></td><td>PKHLD****</td><td>Mode for measuring chop light by using the peak hold method.
****[hold time (Unit: ms)]: 1 to 9999 (1 step)</td></tr>
<tr><td><EXT TRG MODE></td><td>EXTRG</td><td>Mode for measuring chop light by an external trigger signal.</td></tr>
<tr><td><X SCALE UNIT></td><td>XUNT*</td><td>Switches the display of the X-axis scale to the wavelength or frequency.
For the wavelength : *: 0
For the frequency : *: 1</td><td>XUNT?</td><td>Wavelength : 0
Frequency : 1</td></tr>
<tr><td><TLS SYNCRO SWEEP></td><td>TLSSYNC*</td><td>Selects ON or OFF for the TLS synchronization sweep function.
ON... ... *:1 OFF... ....*:0</td><td>TLSSYNC?</td><td>ON:1
OFF:0</td></tr>
<tr><td><RESOLN CORRECT></td><td>RESCOR*</td><td>Sets the resolution correction function
OFF *:0 , ON *:1</td><td>RESCOR?</td><td>ON:1
OFF:0</td></tr>
<tr><td><MEAS WL AIR VAC></td><td>MESWL*</td><td>Switches measurement wavelength (between air wavelength and vacuum wavelength)
When AIR (air wavelength) is selected :0
When VAC (vacuum wavelength) is selected :1</td><td>MESWL?</td><td>AIR:0, VAC:1</td></tr>
</table>

Table 2-1 GP-IB Program Codes (7/36)

Function	Control command	Explanation	Talker command	Talker output data format
[MARKER]				
<MARKER>	WMKR****.***	Sets the moving marker to the specified wavelength position. (Unit: nm) ****.***: 0.000 to 2350.000	MKR?	Output of the wavelength (or frequency) and level at the moving marker position.
	FMKR***.***	Sets the moving marker to the specified frequency position. (Unit: THz) ***.***: 1.0000 to 674.5000		
<MARKER→CENTER>	CTR=M	Sets the wavelength of the moving marker to the center wavelength.	None	
<MARKER->REF LEVEL>	REF=M	Sets the level of the moving marker to the reference level.	None	
<SET MARKER1,2>	MKR1	Sets the moving marker to the fixed marker 1.	MKR1?	Output of the wavelength and level at the fixed marker 1.
	MKR2	Sets the moving marker to the fixed marker 2.	MKR2?	Output of the wavelength and level at the fixed marker 2.
<SET MKR ***>	MKR***	Sets the moving marker to the fixed maker ***. ***: 1 to 200 (1 step)	MKR?***	Output of the wavelength and level at the fixed marker ***.
<CLR MKR ***>	MCLR***	Clears the fixed marker ***. ***: 1 to 200 (1 step)	None	
<ALL MARKER CLEAR>	MKCL	Clears the moving marker, fixed markers and the marker values in the data area.	None	
<LINE MARKER1>	L1MK****.***	Sets the wavelength line marker 1. (Unit: nm) ****.***: 0.000 to 2350.000	L1MK?	As per Table 9-4 Output Data Format.
	L1FMK***.****	Sets the wavelength line marker 1. (Unit: THz) ***.****: 1.0000 to 674.5000		
<LINE MARKER2>	L2MK****.***	Sets the wavelength line marker 2. (Unit: nm) ****.***: 0.000 to 2350.000	L2MK?	As per Table 9-4 Output Data Format.
	L2FMK***.****	Sets the wavelength line marker 2. (Unit: THz) ***.****: 1.0000 to 674.5000		

Table 2-1 GP-IB Program Codes (8/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[MARKER]				
	<LINE MARKER3>		Sets the level line marker 3.	L3MK?	As per Table 9-4 Output Data Format.
	LOG scale	L3DBM****.**	****.**: −150.00 to 40.00 (dBm)		
	SUBLOG scale	L3DB****.**	****.**: −139.90 to 139.90 (dB)		
	LIN scale	L3LN*.***E±**	*.***E±**: 0 to 1.360E±02		
	<LINE MARKER4>		Sets the level line marker 4.	L4MK?	
	LOG scale	L4DBM****.**	****.**: −150.00 to 40.00 (dBm)		
	SUBLOG scale	L4DB****.**	****.**: −139.90 to 139.90 (dB)		
	LIN scale	L4LN*.***E±**	*.***E±**: 0 to 1.360E±02		
	<MKRL1-L2→SPAN>	SP=LM	Sets the L1-L2 section to the sweep range.	None	
	<SEARCH L1-L2>	SRLMK*	Sets whether or not to execute peak value detection between L1 and L2. ON....*: 1 OFF....*: 0	SRLMK?	ON: 1, OFF: 0
	<LINE MKR CLEAR>	LMKCL	Clears the line markers and line marker values.	None	
	<MARKER MULTI-MKR DISPLAY>	MLTMKR*	Switches the marker value display to the multi-marker display. OFF *: 0 ON *: 1	MLTMKR?	0: OFF, 1: ON
	<MARKER OFFSET SPACING>	MKROS*	Displays the difference for the moving marker or adjacent marker. OFFSET *: 0 SPACING *: 1	MKROS?	0: OFFSET, 1: SPACING
	<MARKER LVL DIGIT>	FIG*	Specifies the number of level display decimal digits of the marker. 1 digit *: 0, 2 digits *: 1, 3 digits *: 2	FIG?	0: 1 digit, 1: 2 digits, 2: 3 digits
	<MKR LIST PRINT>	MKRPRT	Prints out the multi-marker value.	None	
*	<MKR AUTO UPDATE>	MKRUP	Makes the waveform track the fixed marker level position. OFF *:0, ON *:1	MKRUP?	0:OFF, 1:ON
*	<MKR UNIT nm THz>	MKUNT*	Sets the display unit of the wavelength marker value. nm *:0, THz *:1	MKUNT?	0:nm, 1:THz

Table 2-1 GP-IB Program Codes (9/36)

Function	Control command	Explanation	Talker command	Talker output data format
[PEAK SEARCH]				
<PEAK SEARCH>	PKSR	Detects the MAX value of level.	PKSR?	BOTTOM: 0, PEAK: 1
<BOTTOM SEARCH>	BTSR	Detects the MIN value of level.		
<NEXT SEARCH>	NSR	Detects the next largest value (or next smallest value)	None	
<NEXT SRCH RIGHT>	NSRR	Detects the largest value (or smallest value) on the right side of the moving marker.	None	
<NEXT SRCH LEFT>	MSRL	Detects the largest value (or smallest value) on the left side of the moving marker.	None	
<AUTO SEARCH>	ATSR*	Selects ON or OFF for the automatic detection of the peak/bottom function. ON *: 1 , OFF *: 0	ATSR?	ON: 1, OFF: 0
<MODE DIFF**.**dB>	MODIF**.**	Sets the level difference for mode judgment. (Unit: dB) **.**: 0.01 to 50.00 (0.01 step)	MODIF?	0.01 to 50.00

Table 2-1 GP-IB Program Codes (10/36)

Function	Control command	Explanation	Talker command	Talker output data format
[ANALYSYS]				
<SPEC WD********>	SW*	Measures the spectrum width. ENVELOPE *: 0, THRESH *: 1, RMS *: 2, PEAK RMS *: 3, NOTCH *: 4	SW?	ENVELOPE: 0, THRESH: 1, RMS: 2, PEAK RMS: 3, NOTCH: 4
(ENVELOPE)	SWENV**.**	Measures the spectrum width in Envelope method. Threshold method **.**: 0.01 to 50.00 (0.01 step)	None	
<ENV TH1**.*dB>	ENVT1**.**	Sets a threshold (in dB) for spectrum width search in Envelope method. **.*: 0.01 to 50.00 (0.01 step)	ENVT1?	0.01 to 50.00
<ENV TH2**.*dB>	ENVT2**.**	Sets a truncation limit for spectrum width search in Envelope method. **.*: 0.01 to 50.00 (0.01 step)	ENVT2?	0.01 to 50.00
<ENV K**.**>	ENVK**.**	Sets a magnification ratio for spectrum width search in Envelope method. **.**: 1.00 to 10.00 (0.01 step)	ENVK?	1.00 to 10.00
(THRESH)	SWTHR**.**	Measures the spectrum width in Threshold method. **.**: Threshold value 0.01 to 50.00 (0.01 step)	None	
<THRESH TH**.*dB>	THRTH**.**	Sets a threshold (in dB) for spectrum width search in Threshold method. **.**: 0.01 to 50.00 (0.01 step)	THRTH?	0.01 to 50.00
<THRESH K**.**>	THRK**.**	Sets a magnification ratio for spectrum width search in Threshold method. **.**: 1.00 to 10.00 (0.01 step)	THRK?	1.00 to 10.00
<MODE FIT>	MODFT*	During spectrum width search in Threshold method (with the 1-time magnification): "1": Sets the marker to the peak of selected mode. "2": Sets the marker to the matching position of threshold level.	MODFT?	"1": Sets the marker to the mode peak. "0": Sets the marker to the matching position of threshold level.

Table 2-1 GP-IB Program Codes (11/36)

Function	Control command	Explanation	Talker command	Talker output data format
[ANALYSYS]				
<SPEC WD********>				
(RMS)	SWRMS**.**	Measures the spectrum width in RMS method. **.**: truncation limit 0.01 to 50.00 (0.01 step)	None	
<RMS TH**.*dB>	RMSTH**.*	Sets a truncation limit (in dB) for spectrum width search in RMS method. **.*: 0.01 to 50.00 (0.01 step)	RMSTH?	0.01 to 50.00
<RMS K**.**>	RMSK**.**	Sets a magnification ratio for spectrum width search in RMS method. **.**: 1.00 to 10.00 (0.01 step)	RMSK?	1.00 to 10.00
(PEAK RMS)	SWPRM**.**	Measures the spectrum width in Peak RMS method. **.**: truncation limit 0.01 to 50.00 (0.01 step)	None	
<PK RMS**.*dB>	PRMTH**.*	Sets a truncation limit (in dB) for spectrum width search in Peak RMS method. **.*: 0.01 to 50.00 (0.01 step)	PRMTH?	0.01 to 50.00
<PK RMS K**.**>	PRMK**.**	Sets a magnification ratio for spectrum width search in Peak RMS method. **.**: 1.00 to 10.00 (0.01 step)	PRMK?	1.00 to 10.00
(NOTCH)	None	Measures the notch width.	None	
<NOTCH TH**.*dB>	NCHTH**.*	Sets a threshold (in dB) for notch width measurement. **.*: 0.01 to 50.00 (0.01 step)	NCHTH?	0.01 to 50.00
* <PEAK/BOTTOM>	NCHMOD*	Sets the notch width measuring direction. PEAK *:0, BOTTOM *:1	NCHMOD?	0:PEAK, 1:BOTTOM

Table 2-1 GP-IB Program Codes (12/36)

Function	Control command	Explanation	Talker command	Talker output data format
[ANALYSYS]				
<ANALYSIS1********>		Analyzes the parameters required for side mode suppress ratio, power measurement, and LD and LED indication.		
(SMSR)			None	
<SMSR*>	SMSR*	Sets the reference to measure the side mode suppress ratio. *: 1, 2	SMSR?	1, 2
<SMSR MASK ±**.**nm>	SSMSK**.**	Sets the mask range (in nm) close to the peak during SMSR1 measurement. **.**: 0 to 99.99 (0.01 step)	SSMSK?	0 to 99.99
(POWER)	PWR	Measures the marker-to-marker power.	None	
<PWR OFST**.**dB>	POFS**.**	Sets a compensation value (in dB) for marker-to-marker measurement. **.**: −10.00 to 10.00 (0.01 step)	POFS?	−10.00 to 10.00
(FP-LD) (See Table A1.)	FPAN	Analyzes the Fabry-Peror laser diode.	None	
(DFB-LD) (See Table A1.)	DFBAN	Analyzes the DFB laser diode.	None	
(LED) (See Table A1.)	LEDAN	Analyzes the light emitting diode (LED).	None	
(PMD)	PMD	Sets the PMD analysis.	None	
<PMDTH**.**dB>	PMDTH**.**	Sets the threshold of the PMD. (unit: dB) **.**: 0.01 to 50.00 (0.01 step)	PMDTH?	See the talker data format.

Table 2-1 GP-IB Program Codes (13/36)

<table>
<tr><th>Function</th><th>Control command</th><th>Explanation</th><th>Talker command</th><th>Talker output data format</th></tr>
<tr><td>[ANALYSYS]</td><td></td><td></td><td></td><td></td></tr>
<tr><td><ANALYSIS2*********></td><td></td><td>Executes NF calculation, color analysis, and WDM analysis.</td><td></td><td></td></tr>
<tr><td>(EDFA NF)</td><td>EDNF</td><td>Calculates the noise figure (NF).</td><td>None</td><td></td></tr>
<tr><td><OFST(IN)***.**dB></td><td>OFIN***.**</td><td>Sets an offset of signal light (in dB).
***.**: −99.99 to 99.99 (0.01 step)</td><td>OFIN?</td><td>−99.99 to 99.99</td></tr>
<tr><td><OFST(OUT)
.**dB></td><td>OFOUT.**</td><td>Sets an offset of output light (in dB).
***.**: −99.99 to 99.99 (0.01 step)</td><td>OFOUT?</td><td>−99.99 to 99.99</td></tr>
<tr><td><PLUS MSK**.**nm></td><td>PLMSK**.**</td><td>Sets a mask range right to peak waveforms.
.: 0 to 10.00 (0.01 step)</td><td>PLMSK?</td><td>0 to 10.00</td></tr>
<tr><td><MINUS MSK
. nm></td><td>MIMSK**.**</td><td>Sets a mask range left to peak waveforms.
.: 0 to 10.00 (0.01 step)</td><td>MIMSK?</td><td>0 to 10.00</td></tr>
<tr><td><CVFT TYPE
*********></td><td>EDFCVF*</td><td>Sets the following curve fit types for NF calculation:
<table><tr><th></th><th>*</th></tr><tr><td>GAUSSIAN</td><td>0</td></tr><tr><td>LORENZIAN</td><td>1</td></tr><tr><td>3RD POLY</td><td>2</td></tr><tr><td>4TH POLY</td><td>3</td></tr><tr><td>5TH POLY</td><td>4</td></tr></table></td><td>EDFCVF?</td><td><table><tr><th></th><th>Output</th></tr><tr><td>GAUSSIAN</td><td>0</td></tr><tr><td>LORENZIAN</td><td>1</td></tr><tr><td>3RD POLY</td><td>2</td></tr><tr><td>4TH POLY</td><td>3</td></tr><tr><td>5TH POLY</td><td>4</td></tr></table></td></tr>
<tr><td><CVFT THR**.*dB></td><td>EDFTH**.*</td><td>Sets a threshold for curve fitting (in dB).
**.*: 0.1 to 99.9 (0.1 step)</td><td>EDFTH?</td><td>0.1 to 99.9</td></tr>
</table>

Table 2-1 GP-IB Program Codes (14/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[ANALYSYS]				
	<ANALYSIS2*********>				
	(WDM)	WDMAN	Analyzes the WDM.	None	
	<OFFSET SPACING>	WDMOS*	Selects the display items on the WDM list. OFFSET *: 0, SPACING *: 1	WDMOS?	0: OFFSET, 1: SPACING
	<REF CHNEL HIGHEST>	WDMRH	Sets the reference at the highest channel peak.	None	
	<REF CHNEL NO.***>	WDMRN***	Sets the reference at the "n-th" channel peak specified. ***: 1 to 200 (1 step)	WDMRN?	1 to 200
*	<DISPLAY ******>	WDMDISP*	Sets the display format of the WDM analysis result. ABSOLUTE *: 0 RELATIVE *: 1 ABS&REL *: 2 DRIFT *: 3	WDMDISP?	ABSOLUTE 0 RELATIVE 1 ABS&REL 2 DRIFT 3
*	<ITU-T TABLE REF TABLE>	WDMREF*	Sets the data to be referred to at the relative value displaying time. ITU-T *:0, REF *:1	WDMREF?	0:ITU-T 1:REF
*	<MAX/MIN RESET>	WDMMR	Resets the MAX/MIN data at the drift measuring time.	None	
*	<WDM RESULT → REF DATA> <PRESET→ REF DATA> <ITU-T→REF DATA>	WDMREFDAT*	Sets the reference data. WDM RESLT *: 0 PRESET *: 1 ITU-T *: 2	None	
	<CH DETECT AUTO> <CH DETECT PRESET>	WDMCHAUT*	Sets the method of channel detection. PRESET *: 0 AUTO *: 1	WDMCHAUT?	0: PRESET 1: AUTO
	<MAX NUM***>	WDMMAX***	Sets the maximum channel peak. ***: 1 to 200 (1 step)	WDMMAX?	1 to 200

Table 2-1 GP-IB Program Codes (15/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[ANALYSYS]				
	<ANALYSIS2********>				
	(WDM)				
	<THRESH**.*dB>	WDMTH**.**	Sets a threshold of channel peak (in dB). **.*: 0.1 to 50.00 (0.01 step)	WDMTH?	0.1 to 50.00
	<MODE DIFF**.**dB>	WDMDIF**.**	Sets the minimum difference between top and bottom of waveforms (in dB) for channel peak detection. **.*: 0.00 to 50.00 (0.01 step)	WDMDIF?	0.0 to 50.0
	<PRESET WL TABLE>	DUTCH***; ####.##	Sets the wavelength at channel number. *** : CHANNEL 1 to 200 (1 step) ####.## : WAVELENGTH (nm) 600.00 to 1750.00 (0.01 step)	DUTCH?***	600.00 to 1750.00
*	<PRESET WL TABLE>	DUTCHF***; ###.###	Sets the frequency at channel number. *** : CHANNEL 1 to 200 (1step) ###.### : FREQUENCY (THz) 171.5000 to 499.5000(0.001step)	DUTCHF?***	171.5000 to 499.5000
*	<SET ON/OFF>	WDMCHSW***;#	Sets the channel to ON or OFF. *** : CHANNEL 1 to 200(1 step) #: 0=OFF, 1=ON	WDMCHSW?***	OFF:0, ON:1
*	<WAVELEN/FREQ>	WDMUNT*	Selects the wavelength display or the frequency display. WAVELENGTH *:0 FREQUENCY *:1	WDMUNT?	WAVELENGTH:0 FREQUENCY:1
*	<TABLE PRINT>	WDMTCOPY	Prints out an active table.	WDMTCOPY?	ON(copy):1 OFF(except copy):0
	<NOISE POI CTR FIX>	WDMNOI*	Selects noise measuring point. FIX *:0 , CENTER *:1	WDMNOI?	FIX:0 CENTER:1

Table 2-1 GP-IB Program Codes (16/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[ANALYSYS]				
	<ANALYSIS2*********>				
	(WDM)				
	<NOISE POI **.**nm>	WDMNOIP**.**	Sets the noise measuring point. **.**:0.00 to 10.00 (0.01 step)	WDMNOIP?	0.00 to 10.00
	<NOISE BW>	WDMNOIBW*.**	Sets the noise bandwidth. (Unit:nm) *.**:0.01 to 1.00 (0.01step)	WDMNOIBW?	0.01 to 1.00
	<LEVEL PRESET>	DUTLEV**.**	Sets the preset level value. (Unit:dB) **.**:-90.00 to 20.00 (0.01step)	DUTLEV?	-90.00 to 20.00
	<SNR PRESET>	DUTSNR**.**	Sets the preset snr value. (Unit:dB) **.**:0.00 to 50.00 (0.01step)	DUTSNR?	0.00 to 50.00
*	<DISP MASK ***>	WDMDSPMSK***	Sets the threshold value at the channel display masking time. *** : 10.00 to –100.00 (0.01 step) , -999.00(OFF)	WDMDSPMSK?	10.00 to –100.00, -999.00
*	<DUAL TRACE>	WDMDUAL*	Uses the both A and B traces for the WDM analysis. OFF *:0, ON *:1	WDMDUAL?	
*	<OUTPUT SLOPE>	WDMSLOPE*	Displays the least square approximate value line of the channel peak. OFF *:0, ON *:1	WDMSLOPE?	OFF:0 ON:1

Table 2-1 GP-IB Program Codes (17/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[ANALYSYS]				
	<ANALYSIS2*********>				
*	(WDM-NF)	WNFAN	Execute the multi-channel NF analysis.	None	
*	<ASE POINT>	WNFNP**.**	Sets the ASE level measuring points. **.** : 0.00 to 10.00 (0.01 step)	WNFNP?	0.00 to 10.00
*	<OFFSET(IN)>	WNFOFI***.**	Set signal light offset values. ***.** : -99.99 to 99.99 (0.01 step)	WNFOFI?	-99.99 to 99.99
*	<OFFSET(OUT)>	WNFOFO***.**	Set output light offset values. ***.** : -99.99 to 99.99 (0.01 step)	WNFOFO?	-99.99 to 99.99
*	(FIL-PK)(See Table A1.)	FILPKAN	Executes the optical filter (PEAK) analysis.	None	
*	(FIL-BTM)(See Table A1.)	FILBTMAN	Executes the optical filter (BOTTOM) analysis.	None	
	<AUTO ANALYSIS>	ATANA*	Automatically executes the selected function after sweep. ON *: 1 OFF *: 0	ATANA?	ON: 1, OFF: 0

Table 2-1 GP-IB Program Codes (18/36)

Table A1. FP-LD, DFB-LD, LED, FIL-PK, and FIL-BTM ANALYSIS Parameter Setup Commands (Parameter Setup Window)

	Function	Control command	Explanation	Talker command
	<PARAMETER (FP-LD)>	FPLD○; □; △;****	Sets the parameters in the FP-LD ANALYSIS window. ○ - 0: SPEC WIDTH, 1: MEAN WL, 2: TOTAL POWER, 3: MODE NO. □ - 0: ENV, 1: THRESH, 2: RMS, 3: PK RMS, 4: POWER △ - 0: TH1, 1: TH2, 2: K, 3: MODE FIT, 4: MODE DIFF, 5: OFST LEVEL **** : Set value	FPLD ○?
	<PARAMETER (DFB-LD)>	DFBLD○; □; △;****	Sets the parameters in the DFB-LD ANALYSIS window. ○ - 0: −XdB WIDTH, 1: SMSR □ - 0: ENV, 1: THRESH, 2: RMS, 3: PK RMS, 4: SMSR1, 5: SMSR2 △ - 0: TH, 1: TH2, 2: K, 3: MODE FIT, 4: MODE DIFF, 5: SMSR MASK **** : Set value	DFBLD ○?
	<PARAMETER (LED)>	LED○; □; △;****	Sets the parameters in the LED ANALYSIS window. ○ - 0: SPEC WIDTH, 1: MEAN WL, 2: TOTAL POWER □ - 0: ENV, 1: THRESH, 2: RMS, 3: PK RMS, 4: POWER △ - 0: TH1, 1: TH2, 2: K, 3: MODE FIT, 4: MODE DIFF, 5: OFST LEVEL **** : Set value	LED ○?
*	<PARAMETER(FIL-PK)>	FILPK○;□;△;****	Sets parameters in the FIL-PK ANALYSIS window. ○ - 0: PEAK LVL, 1:PEAK WL, 2:MEAN WL, 3:SPEC WD, 4:CROSS TALK, 5:RIPPLE WD □ - 0:THRESH, 1:RMS, 2:PEAK LV, 3:ITU-T △ - 0:SW, 1:TH, 2:K, 3:MODE FIT, 4:MODE DIFF, 5:CH SPACE,6:SEARCH AREA **** : Set value	FILPK○?
*	<PARAMETER(FIL-BTM)>	FILBTM○;□; △;****	Sets parameters in the FIL-BTM ANALYSIS window. ○ - 0: BOTTOM LVL, 1:BOTTOM WL, 2:MEAN WL, 3:NOTCH WD, 4:CROSS TALK □ - 0:PEAK, 1:BOTTOM, 2:BOTTOM LV, 3:ITU-T △ - 0:SW, 1:TH, 2:MODE DIFF, 3:CH SPACE, 4:SEARCH AREA **** : Set value	FILBTM○?

Table 2-1 GP-IB Program Codes (19/36)

<table>
<tr><th>Function</th><th>Control command</th><th>Explanation</th><th>Talker command</th><th>Talker output data format</th></tr>
<tr><td>[TRACE]</td><td></td><td></td><td></td><td></td></tr>
<tr><td><WRITE A></td><td>WRTA</td><td>Sets the trace A write mode.</td><td rowspan="4">TRA?</td><td rowspan="4"><table><tr><th></th><th>Output</th></tr><tr><td>WRITE</td><td>0</td></tr><tr><td>FIX</td><td>1</td></tr><tr><td>MAX HLD</td><td>2</td></tr><tr><td>ROL AVG</td><td>3 + number of AVG times</td></tr></table></td></tr>
<tr><td><FIX A></td><td>FIXA</td><td>Sets the trace A fixed data mode.</td></tr>
<tr><td><MAX HOLD A></td><td>MAXA</td><td>Sets the trace A MAX value detection mode.</td></tr>
<tr><td><ROLL AVG A***></td><td>RAVA***</td><td>Trace A sequential addition mode.
*** (number of AVG times): 2 to 100 (1 step)</td></tr>
<tr><td><DISPLAY A></td><td>DSPA</td><td rowspan="2">Selects display or non-display for trace A.</td><td>DSPA?</td><td><table><tr><th></th><th>Output</th></tr><tr><td>BLANK</td><td>0</td></tr><tr><td>DISP</td><td>1</td></tr></table></td></tr>
<tr><td><BLANK A></td><td>BLKA</td><td></td><td></td></tr>
<tr><td><ACTIVE TRACE*></td><td>ACTV*</td><td>Active trace selection<table><tr><th></th><th>*</th></tr><tr><td>Trace A</td><td>0</td></tr><tr><td>Trace B</td><td>1</td></tr><tr><td>Trace C</td><td>2</td></tr></table></td><td>ACTV?</td><td><table><tr><th></th><th>Output</th></tr><tr><td>Trace A</td><td>0</td></tr><tr><td>Trace B</td><td>1</td></tr><tr><td>Trace C</td><td>2</td></tr></table></td></tr>
<tr><td><WRITE B></td><td>WRTB</td><td>Sets the trace B write mode.</td><td rowspan="4">TRB?</td><td rowspan="4"><table><tr><th></th><th>Output</th></tr><tr><td>WRITE</td><td>0</td></tr><tr><td>FIX</td><td>1</td></tr><tr><td>MIN HLD</td><td>2</td></tr><tr><td>ROL AVG</td><td>3 + number of AVG times</td></tr></table></td></tr>
<tr><td><FIX B></td><td>FIXB</td><td>Sets the trace B fixed data mode.</td></tr>
<tr><td><MIN HOLD B></td><td>MINB</td><td>Sets the trace B MIN value detection mode.</td></tr>
<tr><td><ROLL AVG B***></td><td>RAVB***</td><td>Sets the trace B sequential addition mode.
*** (number of AVG times): 2 to 100 (1 step)</td></tr>
</table>

Table 2-1 GP-IB Program Codes (20/36)

Function	Control command	Explanation	Talker command	Talker output data format
[TRACE]				
<DISPLAY B>	DSPB	Selection display or non-display for trace B.	DSPB?	
<BLANK B>	BLKB			

	Output
BLANK	0
DISP	1

Function	Control command	Explanation	Talker command	Talker output data format
<WRITE C>	WRTC	Sets the trace C write mode.	TRC?	
<FIX C>	FIXC	Sets the trace C fixed data mode.		
<CALCULATE C>				
<A-B→C>	A-BC	Copies the result obtained by subtracing trace B from trace A to the trace C. (LOG value calculation)		
<B-A→C>	B-AC	Copies the result obtained by subtracing trace A from trace B to the trace C. (LOG value calculation)		
<A-B(LIN)→C>	A-BCL	Copies the result obtained by subtracing trace B from trace A and to the trace C. (Linear value calculation)		
<B-A(LIN)→C>	B-ACL	Copies the result obtained by subtracing trace A from trace B to the trace C. (Linear value calculation)		
<A+B(LIN)→C>	A+BCL	Copies sum of trace A and trace B to trace C. (Linear value calculation)		

	Output
WRITE	0
FIX	1
A-B	2
B-A	3
A-B (LIN)	4
B-A (LIN)	5
A+B (LIN)	6
NORMALIZE	7
CURVE FIT	10 + limit value
CURVE FIT PK	110 + limit value

Table 2-1 GP-IB Program Codes (21/36)

Function	Control command	Explanation	Talker command	Talker output data format
[TRACE]				
<EFECT C>				
<NORMALIZE C>	NORMC	Displays the data of trace C in normalized form.	TRC?	See previous page.
<CURVE FIT C**dB>	CVFTC**	Displays all the data of trace C after curve fit processing. (Unit: dB) **: 0 to 99 (1 step)		
<CURVE FIT PK C**dB>	CVPKC**	Displays only the data of the mode peak point on trace C after curve fit processing. (Unit: dB) **: 0 to 99 (1 step)		
<DISPLAY C>	DSPC	Selects dislay or non-display for trace C.	DSPC?	<table><tr><td></td><td>Output</td></tr><tr><td>BLANK</td><td>0</td></tr><tr><td>DISP</td><td>1</td></tr></table>
<BLANK C>	BLKC			
<TRACE A→B>	B=A	Copies the trace A to the trace B.	None	
<TRACE A→C>	C=A	Copies the trace A to the trace C.	None	
<TRACE B→A>	A=B	Copies the trace B to the trace A.	None	
<TRACE B→C>	C=B	Copies the trace B to the trace C.	None	
<TRACE C→A>	A=C	Copies the trace C to the trace A.	None	
<TRACE C→B>	B=C	Copies the trace C to the trace B.	None	

Table 2-1 GP-IB Program Codes (22/36)

Function	Control command	Explanation	Talker command	Talker output data format
[DISPLAY]				
<NORMAL DISPLAY>	NORMD	Sets the scren to the ordinary display mode.	DISP?	<NORMAL>: 0 <SPLIT>: 1 <3D>: 2
<SPLIT DISPLAY>	SPLIT	Sets the screen to the 2-split display mode.		
<TRACE A UP LOW>	ULTRA*	Sets the upper and lower sides of 2-split display for trace A. UP....*: 1 LOW....*: 0	ULTRA?	UP: 1, LOW: 0
<TRACE B UP LOW>	ULTRB*	Sets the upper and lower sides of 2-split display for trace B. UP....*: 1 LOW....*: 0	ULTRB?	
<TRACE C UP LOW>	ULTRC*	Sets the upper and lower sides of 2-split display for trace C. UP....*: 1 LOW....*: 0	ULTRC?	
<UPPER HOLD>	UHLD*	Fixes the scale after changing the upper-side trace of 2-split display to FIX. ON....*: 1 OFF....*: 0	UHLD?	ON: 1, OFF: 0
<LOWER HOLD>	LHLD*	Fixes the scale after changing the lower-side trace of 2-split display to FIX. ON....*: 1 OFF....*: 0	LHLD?	

Table 2-1 GP-IB Program Codes (23/36)

Function	Control command	Explanation	Talker command	Talker output data format
[DISPLAY]				
<3D DISPLAY>	3D	Sets the screen to the 3-dimensional display mode.	DISP?	
<ANGLE***deg>	ANGL**	Sets the angle of 3-dimensional display. (Unit: deg) ***: −50 to 50 (10 steps)	ANGL?	−50 to 50
<RECALL>	3DRCL	Redisplays the waveform group cleared in the 3-dimensional display mode.	None	
<Z-SCALE**>	ZSCL**	Sets the number of waveforms in the 3-dimensional display mode. **: 3 to 16 (1 step)	ZSCL?	3 to 16
<MEMORY 1st 2nd>	MEM*	Sets the memory for 3-dimensional display. 1st....*: 0 2nd....*: 1	MEM?	1st: 0, 2nd: 1
<LABEL>	LBL'***...***'	Sets the label input mode. ***...***: Character string (50 max.)	LBL?	Character string on display
<ALL CLEAR>	LBLCL	Clears all the chracter strings in the label input area.	None	
<NOISE MSK****dBm>	NMSK****	Displays the waveforms below the set value in masked form. (Unit: dBm) ****: 0 to −100 (1step) OFF: −999	NMSK?	0 to −100 OFF: −999
<MASK LINE VERT HRZN>	MSKL*	Srts the method of MASK. VERT *:0 HRZN *:1	MSKL?	VERT :0 HRZN :1
<GRAPH CLEAR>	CLR	Clears then trace A, B and C.	None	

Table 2-1 GP-IB Program Codes (24/36)

Function	Control command	Explanation	Talker command	Talker output data format
[MEMORY]				
<SAVE>				
<SAVE A→MEM>	SAVEA**	Saves the trace A into memory. ** (memory address): 0 to 31 (1 step)	None	
<SAVE B→MEM>	SAVEB**	Saves the trace B into memory. ** (memory address): 0 to 31 (1 step)	None	
<SAVE C→MEM>	SAVEC**	Saves the trace C into memory. ** (memory address): 0 to 31 (1 step)	None	
<RECALL>				
<RECALL MEM→A>	RCLA**	Recalls the contents of memory to the trace A. ** (memory address): 0 to 31 (1 step)	None	
<RECALL MEM→B>	RCLB**	Recalls the contents of memory to the trace B. ** (memory address): 0 to 31 (1 step)	None	
<RECALL MEM→C>	RCLC**	Recalls the contents of memory to the trace C. ** (memory address): 0 to 31 (1 step)	None	

Table 2-1 GP-IB Program Codes (25/36)

Function	Control command	Explanation	Talker command	Talker output data format
[FLOPPY]				
<WRITE>				
<TRACE RD/WRT>				
<ABC→FD>	WR* '@@@@@@@@@'	Records one of trace A, B and C to FD. *: A(trace A), B(trace B) or C(trace C) @-@: File name When the underlined part is omitted, the default file name is set.	None	
<MEMORY→FD>	WRMEM** '@@@@@@@@@'	Records the contents of memory into FD. **(memory address): 0 to 31 (1 step) @-@: File name When the underlined part is omitted, the default file name is set.	None	
<3D→FD 1st 2nd>	WR3D* '@@@@@@@@@'	Records the waveform group in the 3-dimensional display mode into FD. *: F(1st) or S(2nd) @-@: File name When the underlined part is omitted, the default file name is set.	None	
<BIN TXT>	TRFMT*	Selects a record format. BINARY...*: 0 TEXT...*: 2	TRFMT?	BINARY:0, TXT: 2
<PROGRAM RD/WRT>	WRPRG** '@@@@@@@@@'	Records a program to FD. **: 1 to 20 (1 step) @-@: File name When the underlined part is omitted, the default file name is set.	None	

Table 2-1 GP-IB Program Codes (26/36)

Function	Control command	Explanation	Talker command	Talker output data format
[FLOPPY]				
<WRITE>				
<DATA RD/WRT>	WRDT '@@@@@@@@'	Records data into FD. @-@: File name When the underlined part is omitted, the default file name is set.	None	
<DATA & TIME>	D&TDT*	Records the date and time into FD. ON...*: 1 OFF...*: 0	D&TDT?	ON: 1, OFF: 0
<LABEL>	LBLDT*	Records a label into FD. ON...*: 1 OFF...*: 0	LBLDT?	ON: 1, OFF: 0
<DATA AREA>	DTARA*	Records data into FD. ON...*: 1 OFF...*: 0	DTARA?	ON: 1, OFF: 0
<CONDITION>	CNDDT*	Records setting conditions into FD. ON...*: 1 OFF...*: 0	CNDDT?	ON: 1, OFF: 0
<ADD WRITE OVERWRITE>	DTAD*	Adds or overwrites a data file. ADD WRITE...*: 0, OVERWITE...*: 1	DTAD?	0: ADD WRITE, 1: OVERWRITE
<LONG TERM RD/WRT>	WRTLT '@@@@@@@'	Records the long term measurement result in the FD. @-@: File name When the underlined part is omitted, the default file name is set.		
<GRPH RD/WRT>	WRGR '@@@@@@@@@'	Saves a graphic file on an FD. @-@: File name When the underlined part is omitted, the default file name is set.	None	
<B&W> <PRESET COLOR> <SCREEN COLOR>	GRCOL*	Selects a graphic file color. B&W...*: 0, PRESET COLOR...*: 1, SCREEN COLOR...*: 2	GRCOL?	0: B&W, 1: PRESET COLOR 2: SCREEN COLOR
<BMP TIFF>	GRFMT*	Selects a graphic file format. BMT...*: 0, TIFF...*: 1	GRFMT?	0: BMP, 1: TIFF
<SETTING RD/WRT>	WRSET '@@@@@@@@@'	Records system information into FD. @-@: File name The default file name is used if under lined parameter is omitted.	None	

Table 2-1 GP-IB Program Codes (27/36)

Function	Control command	Explanation	Talker command	Talker output data format
[FLOPPY]				
<TRACE RD/WRT>				
<FD→ABC>	RD* '@@@@@@@@'	Reads the data of FD into the set trace. *: A(trace A), B(trace B) or C(trace C) @-@: File name	None	
<FD→MEMORY>	RDMEM** '@@@@@@@@'	Reads the data of FD into memory. **(memory address): 0 to 31 (1 step) @-@: File name	None	
<FD→3D 1st 2nd>	RD3D* '@@@@@@@@'	Reads the waveform group in the 3-dimensional display from FD. *: F(1st) or S(2nd) @-@: File name	None	
<PROGRAM RD/WRT>	RDPRG** '@@@@@@@@'	Reads a program from FD. **: 1 to 20 (1 step) @-@: File name	None	
<DATA RD/WRT>	RDDT '@@@@@@@@'	Reads data from FD. @-@: File name	None	
<SETTING RD/WRT>	RDSET '@@@@@@@@'	Reads system information from FD. @-@: File name ***: Extension	None	
<LONG TERM RD/WRT>	RDLT '@@@@@@@@'	Reads long term measurement data from FD. @-@: File name	None	
<DIRECTORY>				
DELETE	DEL '@@@@@@@@ ***'	Deletes the file stored in FD. @-@: File name	None	
<DISK INITIALIZE>	DSKIN*.**	Initializes FD. (Unit: Mbyte) *.**: 1.2 or 1.44	None	

Table 2-1 GP-IB Program Codes (28/36)

Function	Control command	Explanation	Talker command	Talker output data format
[PROGRAM]				
<PROGRAM EXECUTE>	EXEC**	Executes a program. ** (program file No.): 1 to 20	EXEC?	Run status: 1 Stop status: 0
<PROGRAM EXIT>	PREXT	Causes a program to pause.	None	
<DELETE>	PRDEL**	Deletes a program. ** (program file No.): 1 to 20	None	
[SYSTEM]				
<USER KEY DEFINE>				
{KEY DEF DONE}	KYDNE	Terminates the user key registration mode.	None	
<SET CLOCK>	DATE YR. MO. DY	Set the built-in clock. YR(YEAR): 0 to 99, MO(MONTH): 1 to 12, DY(DAY): 1 to 31,	DATE?	Output of the current YR, MO and DY.
	TIME HH:MM	HH(HOUR): 0 to 23, MM(MINUTE) : 0 to 59	TIME?	Output of the current HH:MM.
<SET COLOR>				
<DEFAULT COLOR*>	DEFCL*	Set the display color. * : 1 to 5 patterns	DEFCL?	1 to 5
<WL CAL>				
<BUILT-IN SOURCE>	WCALS	Calibrates a wavelength by the internal light source.	None	
<EXTERNAL SOURCE>	WCAL****.***	Waveform absolute value calibration by the external light source. (Unit: nm) ****.***: 600.000 to 1750.000 (0.001 step)	WCAL?	600.000 to 1750.000
<WL SHIFT>	WLSFT**.***	Sets the amount of waveform shift. (Unit: dB) ***.***: –5.000 to 5.000 (0.001 step)	WLSFT?	–5.000 to 5.000
<LEVEL SHIFT>	LVSFT***.**	Sets the amount of level shift. (Unit: dB) ***.**: –60.00 to 60.00 (0.01 step)	LVSFT?	–60.00 to 60.00
<WL OFST TABLE>	WCALT****; #.###	Sets the wavelength calibration table. **** : Wavelengths 600 to 1750 (nm) #. ###: Offset value (nm) –0.200 to 0.200 (0.001 step)	WCALT?***	–0.200 to 0.200

Table 2-1 GP-IB Program Codes (29/36)

Function	Control command	Explanation	Talker command	Talker output data format
[SYSTEM]				
<LEV OFST TABLE>	LCALT****;#.###	Sets the level calibration table. **** : Wavelengths 600 to 1750 (nm) #. ###: Offset value (nm) -1.000 to 1.000 (0.001 step)	LCALT?***	-1.000 to 1.000
<OPTICAL ALIGNMENT>	OPALIGN	Adjusting optical axis of monochromator optical system employed on this unit.	None	
<AUTO OFFSET>	ATOFS*	Selects ON or OFF for the AMP auto offset function. ON ... *: 1 OFF ... *: 0	ATOFS?	ON:1, OFF:0
<BUZZER>				
<CLICK>	BZCLK*	Selects use or non-use of a click. ON ... *:1 OFF ... *:0	BZCLK?	ON:1, OFF:0
<WARNING>	BZWRN*	Selects use or non-use of an alarm. ON ... *:1 OFF ... *:0	BZWRN?	ON:1, OFF:0
<TLS ADRS>	TLSADR**	Sets the address of the wavelength variable light source. **: 0 to 30 (1 step)	TLSADR?	0 to 30
<GP－IB2 ADR>	GP2ADR**	Sets the GP－IB2 address . ** : 0 to 30 (1 step)	GP2ADR?	0 to 30
<UNCAL WARNING>	UCWRN*	Selects ON or OFF for UNCAL mark and warning display ON ... *:1 OFF ... *:0	UCWRN?	ON:1, OFF:0
* <ACTUAL RES DISP>	ARESDSP*	Changes over the resolution ability value displays. OFF *:0, ON *:1	ARESDSP?	ON:1, OFF:0
* <LOG LIMIT ***dB>	LOGLMT***	Sets the LOG data upper/lower limit value. *** : 100 or 210	LOGLMT?	100 or 210

Table 2-1 GP-IB Program Codes (30/36)

Function	Control command	Explanation	Talker command	Talker output data format
[ADVANCE]				
<LONG TERM SWEEP>				
<LONG TERM STA STP>	LTSWP	Starts the long term measurement function.	None	
<LONG TERM INTVL ****.*min >	LTINTVL****.*	Sets the measurement interval. (Unit: min) ****.*: 0.1 to 9999.9 (0.1 step)	LTINTVL?	0.1 to 9999.9
<LONG TERM RPT TIMES>	LTTIME****	Sets the repeated measurement interval. ****: 1 to 1000 (1 step)	LTTIME?	1 to 1000
<MULTI CH DISP.WEVELEN>	LTWL	Sets the wavelength display.	None	
<MULTI CH DISP.LEVEL>	LTL	Sets the level display.	None	
<MULTI CH DISP.SNR>	LTSNR	Sets the SNR display.	None	
<SINGLE CH DISPLAY>	LTCH***	Sets a channel during single channel display. 1 to 200 (1 step)	LTCH?	1 to 200
<ABSOLUTE>	LTABS	Display an absolute value.	None	
<RELATIVE>	LTREL	Displays a relative value.	None	
<REF DATA SET>	LTREFSET	Specifies the data of the cursor position for the reference data.	None	
<REF DATA INITIAL>	LTREFINI	Sets the preset value as the reference data.	None	
<WL LIMIT **.**nm>	LTWLLIM**.**	Sets the threshold of the wavelength drift. (Unit: nm) **.**: 0.00 to 99.99 (0.01 step)	LTWLLIM?	0.00 to 99.99
<LOW LIMIT ***.**dBm>	LTLLOW***.**	Sets the lower limit of the level. (Unit: dBm) ***.**: -90.00 to -30.00 (0.01 step)	LTLLOW?	-90.00 to -30.00
<UP LIMIT ***.**dBm>	LTLHI***.**	Sets the upper limit of the level. (Unit: dBm) ***.**: -30.00 to 20.00 (0.01 step)	LTLHI?	-30.00 to 20.00
<SNR LIMIT **.**dBm >	LTSNRLIM**.**	Sets the lower limit of the SNR. (Unit: dB) **.**: 0.00 to 50.00 (0.01 step)	LTSNRLIM?	0.00 to 50.00

Table 2-1 GP-IB Program Codes (31/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	[ADVANCE]				
	<LONG TERM SWEEP>				
*	<Y SCALE AUTO>	LTATSCL*	Sets the scale of the graph vertical axis. Manual scale *:0 Auto scale *:1	LTATSCL?	Manual scale : 0 Auto scale : 1
*	<WL CTR ****.**nm>	LTWLCTR****.**	Sets the Y-axis center wavelength on the wavelength display graph. ****.** : 600.00 to 1750.00 (0.01 step)	LTWLCTR?	600.00 to 1750.00
*	<WL SPAN ****.*nm>	LTWLSPAN****.*	Sets the Y-axis span on the wavelength display graph. ****.* : 0.0 to 1200.0 (0.1 step)	LTWLSPAN?	0.0 to 1200.0
*	<LVL CTR ***.**dBm>	LTLVLCTR***.**	Sets the Y-axis center level on the level display graph. ***.** :-90.00 to 20.00 (0.01 step)	LTLVLCTR?	-90.00 to 20.00
*	<LVL SCALE **.*dB/D>	LTLVLSCL**.*	Sets the Y-axis scale on the level display graph. **.* : 0.1 to 10.0 (0.1 step)	LTLVLSCL?	0.1 to 10.0
*	<SNR CTR ***.**dB>	LTSNRCTR***.**	Sets the Y-axis center level on the SNR display graph. ***.** : -90.00 to 20.00 (0.01 step)	LTSNRCTR?	-90.00 to 20.00
*	<SNR SCALE **.*dB/D>	LTSNRSCL**.*	Sets the Y-axis scale on the SNR display graph. **.* : 0.1 to 10.0 (0.1 step)	LTSNRSCL?	0.1 to 10.0
*	<AUTO SET>	LTATSET	Sets the same value as that at the automatic setting time on the graph scale.	None	
	CURSOR MOVE (CHANNEL)	LTCHCUR***	Sets cursor of a channel in the long term measurement. 1 to 200 (1 step)	LTCHCUR?	1 to 200
	CURSOR MOVE (NUMBER OF MEASUREMENT TIMES)	LTTMCUR****	Sets cursor of the number of long term measurement times. 1 to 1000 (1 step)	LTTMCUR?	1 to 1000

Table 2-1 GP-IB Program Codes (32/36)

<table>
<tr><th>Function</th><th>Control command</th><th>Explanation</th><th>Talker command</th><th>Talker output data format</th></tr>
<tr><td>[ADVANCE]</td><td></td><td></td><td></td><td></td></tr>
<tr><td><POWER METER></td><td></td><td></td><td></td><td></td></tr>
<tr><td><REPEAT></td><td>PMPRT</td><td>Sets repeat measurement.</td><td rowspan="3">PMST?</td><td rowspan="3"><table><tr><th></th><th>Output</th></tr><tr><td>STOP</td><td>0</td></tr><tr><td>SINGLE</td><td>1</td></tr><tr><td>REPEAT</td><td>2</td></tr></table></td></tr>
<tr><td><SINGLE></td><td>PMSGL</td><td>Sets single measurement.</td></tr>
<tr><td><STOP></td><td>PMSTP</td><td>Stops the power meter function.</td></tr>
<tr><td><AREA********></td><td>AREA*</td><td>Sets the measuring range.<table><tr><th></th><th>*</th></tr><tr><td>FULL</td><td>0</td></tr><tr><td>600 to 1000 nm</td><td>2</td></tr><tr><td>1000 to 1750 nm</td><td>3</td></tr></table></td><td>AREA?</td><td><table><tr><th></th><th>Output</th></tr><tr><td>FULL</td><td>0</td></tr><tr><td>600 to 1000 nm</td><td>2</td></tr><tr><td>1000 to 1750 nm</td><td>3</td></tr></table></td></tr>
<tr><td><RELATIVE></td><td>REL*</td><td>Selects absolute value or relative value for display value.
The relative value is 0 dB at ON.
ON (relative value)...*: 1
OFF (absolute value)...*: 0</td><td>REL?</td><td>ON (relative value): 1
OFF (absolute value): 0</td></tr>
<tr><td><MAX MIN RESET></td><td>PMRST</td><td>Sets the maximum value and minimum value.</td><td>None</td><td></td></tr>
<tr><td><dBm W></td><td>PMUNT*</td><td>Sets the display unit.
dBm (LOG value)...*: 0
W (linear value)...*: 1</td><td>PMUNT?</td><td>dBm: 0, W: 1</td></tr>
</table>

Table 2-1 GP-IB Program Codes (33/36)

② Others

<table>
<tr><th>Function</th><th>Control command</th><th>Explanation</th><th>Talker command</th><th>Talker output data format</th></tr>
<tr><td>[COPY]</td><td>COPY*</td><td>Outputs to the printer/plotter.
ON ... * : 1 OFF ... * : 0</td><td>COPY?</td><td>ON (copy) : 1,
OFF (except copy) : 0</td></tr>
<tr><td>[FEED]</td><td>PRFED**</td><td>Printer paper feed
** : 1 to 10 (Amount of feed, Unit : × 5 mm)</td><td>None</td><td></td></tr>
<tr><td>[HELP]</td><td>HELP*</td><td>ON or OFF for the explanatory statement display.
Display ... * : 1 Clear ... * : 0</td><td>HELP?</td><td>Display : 1
Non-display : 0</td></tr>
<tr><td>[COARSE]</td><td>CRS*</td><td>[COARSE] key of the rotary knob.
ON ... * : 1 OFF ... * : 0</td><td>CRS?</td><td>ON : 1, OFF : 0</td></tr>
<tr><td rowspan="2">Delimiter specification
(Talker data)</td><td>SD*</td><td>Specifies the string delimiter.
<table><tr><td></td><td>*</td></tr><tr><td>,</td><td>0</td></tr><tr><td>CRLF</td><td>1</td></tr></table></td><td>SD?</td><td><table><tr><td></td><td>Output</td></tr><tr><td>,</td><td>0</td></tr><tr><td>CRLF</td><td>1</td></tr></table></td></tr>
<tr><td>BD*</td><td>Specifies the block delimiter.
<table><tr><td></td><td>*</td></tr><tr><td>CRLF+EOI</td><td>0</td></tr><tr><td>LF+EOI</td><td>1</td></tr></table></td><td>BD?</td><td><table><tr><td></td><td>Output</td></tr><tr><td>CRLF+EOI</td><td>0</td></tr><tr><td>LF+EOI</td><td>1</td></tr></table></td></tr>
<tr><td>SRQ ON/OFF</td><td>SRQ*</td><td>Permission or inhibition of service request.
ON (permission ... * : 1
OFF (inhibition) ... * : 0
Default = "OFF"</td><td>SRQ?</td><td>ON : 1, OFF : 0</td></tr>
<tr><td>SRQ mask function</td><td>SRMSK***</td><td>Sets "1" in the bit to be masked.
*** : 0 to 255</td><td>SRMSK?</td><td>0 to 255</td></tr>
</table>

Table 2-1 GP-IB Program Codes (34/36)

Function	Control command	Explanation	Talker command	Talker output data format
Nonvolatile data initialization	INIT	Initializes data except program/memory.	None	
Hardware initialize	*RST	Initializes the hardware.	None	
identification	None	Outputs the equipment information.	*IDN?	See the output data format.
Talker data header information ON/OFF	HD*	Appends a header to the talker data for the output request command. ON ... * :1 OFF ... * : 0 Default = "OFF"	HD?	ON : 1, OFF : 0
Waveform data output request command	LDATA R****-R****	Trace A level data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		As per Table 9-4 Output data format.
	LDATB R****-R****	Trace B level data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		
	LDATC R****-R****	Trace C level data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		
	LMEM$$ R****-R****	Memory $$ level data $$: 0 to 31 **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		
	WDATA R****-R****	Trace A wavelength data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		

Table 2-1 GP-IB Program Codes (35/36)

Function	Control command	Explanation	Talker command	Talker output data format
Waveform data output request command	WDATB R****-R****	Trace B wavelength data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		As per Table 9-4 Output data format.
	WDATC R****-R****	Trace C wavelength data **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		
	WMEM$$ R****-R****	Memory $$ wavelength data $$: 0 to 31 **** : 1 to 20001 R1-R20001 when the underlined part is omitted.		
	DTNUM A			11 to 20001
	DTNUM B			11 to 20001
	DTNUM C			11 to 20001
	DTNUM **			11 to 20001
Log data digit count setup command	LDTDIG*	Sets the number of decimal digits during level data (log) output via GPIB port. "2" for two decimal digits immediately after power-on "3" for three decimal digits	LDTDIG?	"2" for two decimal digits "3" for three decimal digits
Marker value output request command	MKR?	Requests the moving ▽ marker value.		
	MKR1?	Requests the fixed ▽ marker 1 value.		
	MKR2?	Request the fixed ▽ marker 2 value.		
	MKR?***	Request the fixed ▽ marker *** value. ***: 1 to 200 (1 step)		
	L1MK?	Requests the line marker 1 value (wavelength).		
	L2MK?	Requests the line marker 2 value (wavelength).		
	L3MK?	Requests the line marker 3 value (level).		
	L4MK?	Requests the line marker 4 value (level).		
Analysis result output request command	ANA?	Requests the analysis result.		

Table 2-1 GP-IB Program Codes (36/36)

	Function	Control command	Explanation	Talker command	Talker output data format
	FD directory information output request command	DIR?	Outputs the <DIRECTORY> execution result.		As per Table 9-4 Output data format.
	FD-accessed file name output request command	FNAME?	Requests the file name previously read or written.		
	Warning error No. output request command	WARN?	Requests the warning error number that lastly occurred.		
*	Resolution ability value output request command	ARES?	Requests outputting the resolution ability value in the present center wavelength setting.		
*	Alarm state output request command in the long-term measurement.	LTALM?	Request for alarm numbers in the long-term measurement.		
*	Alarm position data output request in long-term measurement.	LTALMDT?	Request for alarm position data in the long-term measurement.		

Table 2-2 Output Data Formats (1/17)

Data output item	Output request command	Talker output data format
Data on LOG scale (dBm, dB/nm, dB/km) Data in trace A Data in trace B Data in trace C Data in memory (LOG scale)	LDATA R*****-R***** LDATB R*****-R***** LDATC R*****-R***** LMEM$$ R*****-R***** ***** : 1 to 20001 When the underlined part is omitted: R1 to R20001 $$: 0 to 31 (memory address)	* (SD) ... String delimiter (BD) ... Block delimiter Space / Data continues according to the number of data. (Header) △*****(SD)±***.**(SD)...±***.**(BD) Number of data (1 to 20001) Data (210.00 to –210.00) (Header)..... Absolute value : "DBM" Relative value : "DB△"
Data on LIN scale (*W, *W/nm, LIN or % subscale) Data in trace A Data in trace B Data in trace C Data in memory (LIN scale)	LDATA R*****-R***** LDATB R*****-R***** LDATC R*****-R***** LMEM$$ R*****-R***** ***** : 1 to 20001 When the underlined part is omitted: R1 to R20001 $$: 0 to 31 (memory address)	* (SD) ... String delimiter (BD) ... Block delimiter Space / Data continues according to the number of data. (Header) △*****(SD)*.***E±**(SD)...±*.***E±**(BD) Number of data (1 to 20001) Data (1.000E + 21 to 1.000E – 21) (Header)..... Absolute value : "LNW" Relative value : "LN△"

*Note: The talker output data format of this table has an underlined option (***.**).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (2/17)

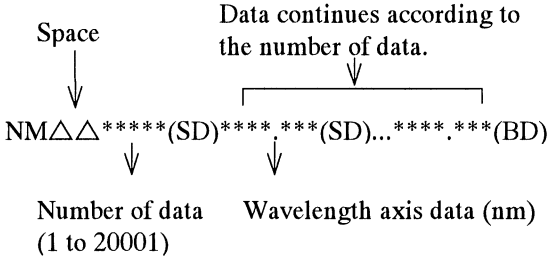
Data output item	Output request command	Talker output data format
Data in trace A (wavelength axis) Data in trace B (wavelength axis) Data in trace C (wavelength axis) Data in memory (wavelength axis)	WDATA R*****-R***** WDATB R*****-R***** WDATC R*****-R***** WMEM$$ R*****-R***** ***** : 1 to 20001 When the underlined part is omitted: R1 to R20001 $$: 0 to 31 (memory address)	* (SD) ... String delimiter (BD) ... Block delimiter 

Table 2-2 Output Data Formats (3/17)

Data output item	Output request command	Talker output data format
Moving △ marker value Fixed marker 1 value Fixed marker 2 value	MKR? MKR1? MKR2? MKR?*** ***:1 to 200	**Wavelength display for LOG scale** WMKR△ △****.***(SD)±<u>***.**</u>(BD) WMKR1△△****.***(SD)±<u>***.**</u>(BD) WMKR2△△****.***(SD)±<u>***.**</u>(BD) Wave-length (nm) Level (dBm or dB) **Frequency display for LOG scale** FMKR△ △***.****(SD)±<u>***.**</u>(BD) FMKR1△ △***.****(SD)±<u>***.**</u>(BD) FMKR2△ △***.****(SD)±<u>***.**</u>(BD) Frequency (THz) Level (dBm or dB) **Wavelength display for LIN scale** WMKR△ △****.***(SD)*.***E±**(BD) WMKR1△△****.***(SD)*.***E±**(BD) WMKR2△△****.***(SD)*.***E±**(BD) Wave-length (nm) Level (dBm or dB) **Frequency display for LIN scale** FMKR△ △***.****(SD)*.***E±**(BD) FMKR1△ △***.****(SD)*.***E±**(BD) FMKR2△ △***.****(SD)*.***E±**(BD) Frequency (THz) Level (W or no unit)
Line marker 1 value (wavelength) Line marker 2 value (wavelength)	L1MK? L2MK?	**When displayed in wevelength** LMKR1△ △****.***(BD) LMKR2△ △****.***(BD) Wavelength (nm) **When displayed in wevelength** LFMK1△ △***.****(BD) LFMK2△ △***.****(BD) Frequency (THz)
Line marker 3 value (level) Line marker 4 value (level)	L3MK? L4MK?	**For LOG scale** LMKR3△ ±<u>***.**</u>(BD) LMKR4△ ±<u>***.**</u>(BD) Level (dBm or dB) **For LIN scale** LFMK3△ △*.***E±**(BD) LFMK4△ △*.***E±**(BD) Level (W or no unit)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (4/17)

Data output item	Output request command	Talker output data format
Analysis result	ANA?	(SPECTRAL WIDTH) When marker is expressed in wevelength : (Header) △****.***(SD)****.***(SD)***(BD) Mean wavelength (nm) / Spectral width (nm) / Number of modes When marker is expressed in frequency : (Header) △***.****(SD)***.****(SD)***(BD) Mean wavelength (THz) / Spectral width (THz) / Number of modes (Header)... ENV → "SEEN" THRESH → "SWTH" RMS → "SWRM" PK RMS → "SWPR"

Table 2-2 Output Data Formats (5/17)

Data output item	Output request command	Talker output data format
Analysis result	ANA?	(SMSR) When marker is expressed in wevelength : SMSR△****.***(SD)±<u>***.**</u>(SD)****.***(SD)±<u>***.**</u>(SD) Peak wavelength (nm) / Peak level (dBm) / 2nd peak wavelength (nm) / 2nd peak level (dBm) ****.***(SD)±<u>***.**</u>(BD) Wavelength difference (nm) / Level difference (SMSR) (dB) When marker is expressed in frequency : SMSR△***.****(SD)±<u>***.**</u>(SD)***.****(SD)±<u>***.**</u>(SD) Peak wavelength (THz) / Peak level (dBm) / 2nd peak wavelength (THz) / 2nd peak level (dBm) ***.****(SD)±<u>***.**</u>(BD) Wavelength difference (THz) / Level difference (SMSR) (dB)
		(POWER LOG scale) PDBM△±<u>***.**</u>(BD) Power (dBm) (POWER LIN scale) PLNW△*.***E±**(BD) Power (W)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (6/17)

Data output item	Output request command	Talker output data format
Analysis result	ANA?	(EDFA NF) EDNF△<u>***.**</u>(SD)****.*** (SD)±***.**(SD)<u>***.**</u>(BD) Gain (dB) Measuring resolution (nm) ASE power (dBm) Dominant wavelength (nm) NF (dB)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (7/17)

	Data output item	Output request command	Talker output data format
*	Analysis results	ANA?	(WDM) When <DISPLAY ABSOLUTE> soft key is selected. When marker is set to display the wavelength : WDM***(SD)***.***(SD)***,**(SD)***.**(SD).....(BD) Mode count / Peak wavelength (nm) / Peak level (dBm) / SNR (dB) / Iteration of Items 2 to 4 When marker is set to display the frequency : WDM***(SD)***.***(SD)***,**(SD)***.**(SD).....(BD) Mode count / Peak frequency (THz) / Peak level (dBm) / SNR (dB) / Iteration of Items 2 to 4 When <DISPLAY RELATIVE> soft key is selected. When marker is set to display the wavelength : WDM***(SD)***.***(SD)***,**(SD)***.**(SD).....(BD) Mode count / Peak wavelength (nm) / Peak level (dBm) / SNR (dB) / Iteration of Items 2 to 4 When marker is set to display the frequency : WDM***(SD)***.***(SD)***,**(SD)***.**(SD).....(BD) Mode count / Peak frequency (THz) / Peak level (dBm) / SNR (dB) / Iteration of Items 2 to 4

Table 2-2 Output Data Formats (8/17)

Data output item	Output request command	Talker output data format
*	ANA?	When <DISPLAY ABS&REL> soft key is selected: When marker is set to display the wavelength : WDM***(SD)****.***(SD)****.***(SD)***.**(SD)***.**(SD)***.**(SD)***.**(SD)....(BD) Mode count / Absolute wavelength (nm) / Relative wavelength (nm) / Absolute level (dBm) / Relative level (dB) / Absolute SNR (dB) / Relative SNR (dB) / Iteration of Items 2 to 7 When marker is set to display the frequency : WDM***(SD)***.****(SD)***.****(SD)***.**(SD)***.**(SD)***.**(SD)***.**(SD)....(BD) Mode count / Absolute frequency (THz) / Relative frequency (THz) / Absolute level (dBm) / Relative level (dB) / Absolute SNR (dB) / Relative SNR (dB) / Iteration of Items 2 to 7 When <DISPLAY DRIFT> soft key is selected: When marker is set to display the wavelength : WDM***(SD)****.***(SD)****.***(SD)****.***(SD)****.***(SD) Mode count / Relative wavelength (nm) / Maximum wavelength (nm) / Minimum wavelength (nm) / MAX-MIN wavelength (nm) ***.**(SD)***.**(SD)***.**(SD)***.**(SD)....(BD) Relative level (dB) / Maximum level (dB) / Minimum level (dB) / MAX-MIN level (dB) / Iteration of Items 2 to 9 When marker is set to display the frequency : WDM***(SD)****.***(SD)****.***(SD)****.***(SD)****.***(SD) Mode count / Relative frequency (THz) / Maximum frequency (THz) / Minimum frequency (THz) / MAX-MIN frequency (THz) ***.**(SD)***.**(SD)***.**(SD)***.**(SD)....(BD) Relative level (dB) / Maximum level (dB) / Minimum level (dB) / MAX-MIN level (dB) / Iteration of Items 2 to 9

Table 2-2 Output Data Formats (9/17)

Data output item	Output request command	Talker output data format
*	ANA?	(FIL-PK) When marker is set to display the wavelength : FILPK△****.***(SD)±***.**(SD)****.***(SD)****.***(SD) Peak wavelength (nm) / Peak level (dBm) / Center wavelength (nm) / Spectral width (nm) ±***.**(SD)±***.**(SD) ±***.**(BD) Cross talk(left) (dB) / Cross talk(right) (dB) / Ripple width (dB) When marker is set to display the frequency : FILPK△****.***(SD)±***.**(SD)****.***(SD)****.***(SD) Peak frequency (THz) / Peak level (dBm) / Center frequency (THz) / Spectral width (THz) ±***.**(SD)±***.**(SD) ±***.**(BD) Cross talk(left) (dB) / Cross talk(right) (dB) / Ripple width (dB)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (10/17)

Data output item	Output request command	Talker output data format
*	ANA?	(FIL-BTM) When marker is set to display the wavelength : FILBM△****.***(SD)±***.**(SD)****.***(SD)****.***(SD) Bottom wavelength (nm) / Bottom level (dBm) / Center wavelength (nm) / Notch width (nm) ±***.**(SD)±***.** (BD) Cross talk(left) (dB) / Cross talk(right) (dB) When marker is set to display the frequency : FILBM△****.***(SD)±***.**(SD)****.***(SD)****.***(SD) Bottom frequency (THz) / Bottom level (dBm) / Center frequency (THz) / Notch width (THz) ±***.**(SD)±***.**(BD) Cross talk(left) (dB) / Cross talk(right) (dB)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (11/17)

Data output item	Output request command	Talker output data format
*		(WDM-NF) WDMNF△***(SD)****.***(SD)±***.**(SD)±***.**(SD)±***.**(SD) Mode count / Channel wavelength (nm) / Input level (dBm) / Output level (dBm) / ASE power (dBm) ****.***(SD)±***.**(SD)±***.**(SD)..... (BD) Measured resolution (nm) / Gain (dB) / NF (dB) / Iteration of Items 2 to 9
		(NOTCH) When marker is set to display the wavelength : SWNC****.***(SD)****.***(BD) Center wavelength (nm) / Notch width (nm) When marker is set to display the frequency : SWNC****.***(SD)****.***(BD) Center frequency (THz) / Notch width (THz)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (12/17)

Data output item	Output request command	Talker output data format
Analysis result	ANA?	(FP-LD ANAYLYSIS) When marker is expressed in wevelength : FPLD△****.***(SD)****.***(SD)±<u>***.**</u>(SD)****.***(SD) ±<u>***.**</u>(SD)****(BD) Spectral width (nm) / Peak wavelength (nm) / Peak level (dBm) / Mean wavelength (nm) / Total power (dBm) / Number of modes When marker is expressed in frequency FPLD△***.****(SD)***.****(SD)±<u>***.**</u>(SD)***.****(SD) ±<u>***.**</u>(SD)****(BD) Spectral width (THz) / Peak wavelength (THz) / Peak level (dBm) / Mean wavelength (THz) / Total power (dBm) / Number of modes
		(DFB-LD ANALYSIS) When marker is expressed in wevelength : DFB△△****.***(SD)****.***(SD)±<u>***.**</u>(SD)****.***(SD) ±<u>***.**</u> (BD) Spectral width (nm) / Peak wavelength (nm) / Peak level (dBm) / Mode offset (nm) / SMSR (dB) When marker is expressed in frequency : DFB△△***.****(SD)***.****(SD)±<u>***.**</u>(SD)***.****(SD) ±<u>***.**</u> (BD) Spectral width (THz) / Peak wavelength (THz) / Peak level (dBm) / Mode offset (THz) / SMSR (dB)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (13/17)

Data output item	Output request command	Talker output data format
Analysis result	ANA?	(LED ANALYSIS) When marker is expressed in wevelength : LED△△****.***(SD)****.***(SD)±<u>***.**</u>(SD)****.***(SD) ±<u>***.**</u> (BD) Spectral width (nm) / Peak wavelength (nm) / Peak level (dBm) / Mean wavelength (nm) / Total power (dBm) When marker is expressed in frequency : LED△△***.****(SD)* **.****(SD)±<u>***.**</u>(SD)** *.****(SD) ±<u>***.**</u> (BD) Spectral width (THz) / Peak wavelength (THz) / Peak level (dBm) / Mean wavelength (THz) / Total power (dBm)
		(PMD ANALYSIS) PMD△***.****(SD)****.****(SD)*****.***(BD) Left-hand mode peak (THz) / Right-hand mode peak (THz) / PMD(PS)
Measurement condition of LONG TERM measurement result	LTST?	LTST△***(SD)****(SD)****(BD) Number of channels / Number of repetitions / Repeated time interval
LONG TERM measurement result	LTDAT?**** ****: Data number (1 to 1000)	LTDAT△***(SD)****.***(SD)±<u>***.**</u>(SD)***.**(SD)-----(BD) Number of channels / Peak wavelength (nm) / Peak level (dBm) / SNR (dBm) / Repeat items 2 to 4.
* Alarm state in LONG TERM measurement	LTALM?	* : The number of Alarm states. (The sum of two values written below) 0: Non alarm, 1:Wavelength drift is over the threshold, 2:Level is over the upper limit, 4: Level is under the lower limit, 8:SNR is under the lower limit

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (14/17)

Data output item	Output request command	Talker output data format
* Alarm position data in LONG TERM measurement	LTALMDT?	LTALMDT**(SD)***(SD)**(SD) -----(BD) Number of alarm channels CH. Alarm number Repeat items 2 to 3.
Analysis parameters	FPLD*?	(FP-LD) FPLD##*(SD)*(SD)****(SD)****(SD)****(SD)*(SD)****(SD)****(BD) 1st option: Parameter to be set 0:SPEC WIDTH 1:MEAN WL 2:TOTAL POWER 3:MODE NO. 2nd option: Algorithm 0:ENV 1:THRESH 2:RMS 3:PEAK RMS 4:POWER 3rd option: TH (dB) 4th option: TH2 (dB) 5th option: K 6th option: MODE FIT, 0=OFF, 1=ON 7th option: MODE DIFF (dB) 8th option: OFFSET LEVEL (dB)
Analysis parameters	DFBLD*?	(DFB-LD) DFBLD#*(SD)*(SD)****(SD)****(SD)****(SD)*(SD)****(SD)****(BD) 1st option: Parameter to be set 0:–XdB WIDTH 1:SMSR 2nd option: Algorithm 0:ENV 1:THRESH 2:RMS 3:PEAK RMS 4:SMSR1 5: SMSR2 3rd option: TH (dB) 4th option: TH2 (dB) 5th option: K 6th option: MODE FIT, 0=OFF, 1=ON 7th option: MODE DIFF (dB) 8th option: SMSR MASK (nm)

*Note: The talker output data format of this table has an underlined option (***, **).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (15/17)

Data output item	Output request command	Talker output data format
Analysis parameters	LED*?	(LED) LED###*(SD)*(SD)****(SD)****(SD)****(SD)*(SD)****(SD)****(BD) 1st option: Parameter to be set 0:SPEC WIDTH 1:MEAN WL 2:TOTAL POWER 2nd option: Algorithm 0:ENV 1:THRESH 2:RMS 3:PEAK RMS 4:POWER 3rd option: TH (dB) 4th option: TH2 (dB) 5th option: K 6th option: MODE FIT, 0=OFF, 1=ON 7th option: MODE DIFF (dB) 8th option: SMSR MASK (nm)
Analysis parameters	FILPK*?	(FIL-PK) FILPK△*(SD)*(SD)*(SD)****(SD)****(SD)*(SD)****(SD)****(SD)****(BD) 1st option: Parameter to be set 0:PEAK LVL 1:PEAK WL 2:MEAN WL 3:SPEC WD 4:CROSS TALK 5:RIPPLE WIDTH 2nd option: Algorithm 0:THRESH 1:RMS 2:PEAK LVL 3:ITU-T 3rd option: SW, 0=OFF, 1=ON 4th option: TH (dB) 5th option: K 6th option: MODE FIT, 0=OFF, 1=ON 7th option: MODE DIFF (dB) 8th option: CH SPACE(nm) 9th option: SEARCH AREA(nm)

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (16/17)

Data output item	Output request command	Talker output data format
* Analysis parameters	FILBM*?	(FIL-BTM) FILBM△*(SD)*(SD)*(SD)****(SD)****(SD)*(SD)****(SD)****(SD)****(BD) 1st option: Parameter to be set 0:BOTTOM LVL 1:BOTTOM WL 2:MEAN WL 3:NOTCH WIDTH 4:CROSS TALK 2nd option: Algorithm 0:PEAK 1:BOTTOM 2:BOTTOM LVL 3:ITU-T 3rd option: SW, 0=OFF, 1=ON 4th option: TH (dB) 5th option: MODE DIFF (dB) 6th option: CH SPACE(nm) 7th option: SEARCH AREA(nm)
Power meter function measurement data	PMTR? MAXP? MINP?	Absolute value LOG scale PMDBM△±<u>***.**</u>(BD) Power (dBm) Absolute value LIN scale PMLNW△*.***E±**(BD) Power (W)
		Relative value LOG scale PMDB△△±<u>***.**</u>(BD) Power (dBm) Relative value LIN scale PMLN△△*.***E±**(BD) Power (Unit not specified)
		• In OVER, numeral section is replaced by "OVR". • In UNDER, numeral section is replaced by "UND".

*Note: The talker output data format of this table has an underlined option (<u>***.**</u>).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.

Table 2-2 Output Data Formats (17/17)

Data output item	Output request command	Talker output data format
Identification	*IDN?	ANDO(SD)AQ6317B(SD)********(SD)##.##(BD) Serial number (8 digits) Software version (16 characters)
FD directory	DIR?	DIR△***(SD)**********(SD)**** (SD)********.***△**-**-**△**:**(SD) Number of files Volume name Residual capacity (K Byte) ********.***△**-**-**△**:**(SD) ********.***△**-**-**△**:**(SD) File name Year-month-day Hour:minute
File name lastly read or written in FD	FNAME?	FN△********.***(BD) File name
Warning error number	WARN?	WARN△***(BD) Number

*Note: The talker output data format of this table has an underlined option (***.**).*
If three decimal digits (LDTDIG 3) are specified for this option, the data of up to three decimal digits is output.