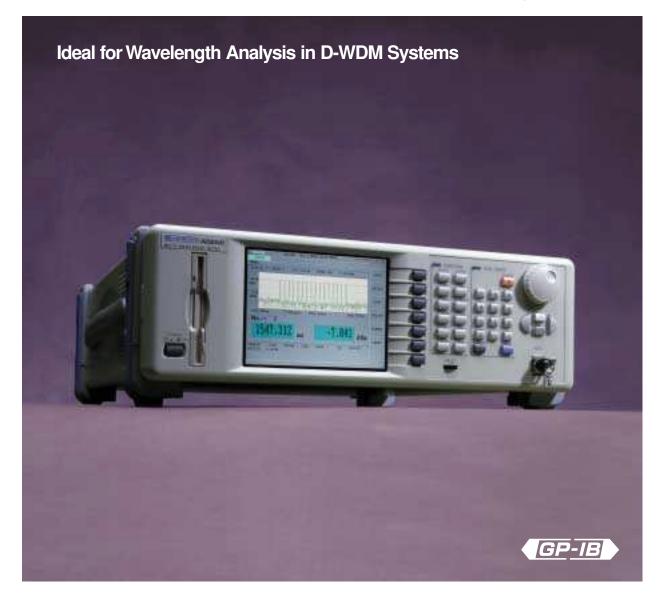


Multi-Wavelength Meter AQ6140



Ideal for Wavelength Analysis in D-WDM

LOOPER.

Systems



Practical application in recent years of Wavelength Division Multiplexing (WDM) transmission technology for high-volume optical communication has led to the current situation in which we're on the verge of producing 50 GHz-wavelength systems.

Accordingly, demand for a higher-specification wavelength parameter tester is increasing. Such a tester can go a long way toward improving evaluation of transmission systems and optical devices.

The AQ6140 Multi-Wavelength Meter, providing excellent wavelength accuracy and resolvable separation in measurement, surpasses this demand, making it ideal for all applications from D-WDM system development to manufacturing.

Features

• Highly accurate wavelength measurement

Realizes high accuracy measurement of ± 0.003 nm. (at 1310 nm, 1550 nm)

High resolvable separation

Minimum resolvable separation: 10 GHz or less (1550

• Capable of measurement for up to 256 channels Wavelength and power measurement for up to 256

channels

Simple operation

Three-step (maximum) operation saves you from complicated operation.

Enlarge display of peak list

Can display enlarged data of one channel in the area normally displaying data of 5 channels.

Drift measurement

Refers to measuring the time-passage changes wavelength and power. (up to 256 channels)

Grid monitoring function

Useful function for checking wavelength shift of each grid • Complete functions for monitoring WDM light source

Complete functions for stability analysis of light source such as 3D display of variable rate, time displacement display, variable rate trap function, etc.

• Complete memory functions

Can record measurement data and measurement conditions in floppy disk and internal memory.

Large-size (6.5-inch) color display

Can check waveform data and peak wavelength at a time by displaying waveforms and measurement data simultaneously.

Shows spectrums of each

periodic component number after FFT.

Frequency

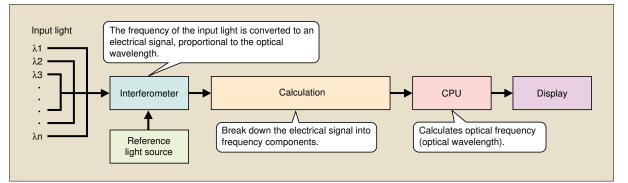
FFT: Fast Fourier Transform

Spectrum

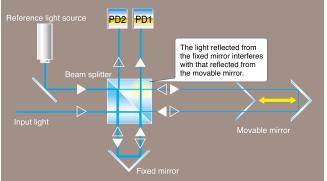
FFT

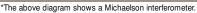
Principle of Measurement

Basic Configuration



Interferometer





Conversion to Optical Frequency (wavelength)

Flot-in = $\frac{\text{Fint-in}}{\text{Fint-ref}}$ x optical Flot-ref

$$\lambda opt-in = \frac{c}{Flot-in}$$

- Flot-in:Fint-in:
- Fint-ref:
- Optical Flot-ref:
- λopt-in:
- C:
- optical frequency of input light

Interference stripe waveform

Interference stripe waveform (Distortion waveform)

Level

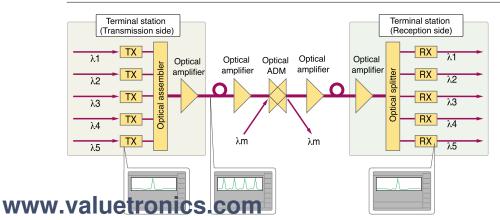
shows distortion waveform with period

frequency of input light interference wave

Time

frequency of reference light interference wave

- f: frequency of reference light
- optical wavelength of input light
- speed of light
- WDM Transmission Concept



Applications

Characteristic evaluation of light source for WDM

Measures both wavelength and power up to 256 channels, and displays waveform and measurement result at a time. Capable of checking if it's matched to advice of ITU-T and severe monitoring of grid. Also capable of displaying the list of peak wavelength and power.



| Peudi # | the second provide the second | rt-E548.58m Peridino | | 1963, 58146 1963, 58146 \$254(486) | dEn Byt (mb) | BEERLA |
|---------|-------------------------------|-------------------------|--------------------|--|-----------------|--------------------|
| 1.1 | 1947.014 | and the second second | 0.000 | COLUMN T | TRATE TAX | UNLY |
| 5 | 15460,110 | -6.972 | 11.0001 | 6.000 | 2240.210 | Contraction of the |
| 1 | 25.44. 736 | 17.248 | 11.440 | 0.0** | 1949.7.16 | 302 |
| | 25547-5789 | -6.748 | 11.0001 | 6.1000 | L'UNIC, SHARE | 810054 |
| 「大学の日日 | 1551.010 | -0.200 | -11.000 | 6.1184 | 1981.810 | |
| 14 | 19501.111 | 1.225 | HUBBRA D | 4.888 | 1258.111 | 39177 |
| - Re- | ADDA. NOT | -0.000 | 11.000 | 6.000 | 8283.827 | HITCH |
| | 22028.0226 | -E. 899. | 0.000 | 0.038 | | |
| 316 | 1154.551 | -9.294 | 11.0001 | ACCREME. | 1556,254 | |
| iii - | armen, seks | -6, 560 | 0.000 | 0,1970 | 1000.000 | BEL DA |
| 世上は | \$275a, \$753. | -6.000 | 1.000 | 67,780.00 | 4854.258 | 02242 |
| 100 | PERSONAL PROPERTY. | 10.110 | THE REAL PROPERTY. | 8.1990 | 1220.000 | |
| 1 | ADDA. MAN | 41.521 | CHARMEN T | 4112434 | 1010.040 | THEFT |
| 1.63.64 | A PERSONAL PROPERTY AND | and the second | 10010001 | and the second second | - THE COMPANY | 10000 |
| NUTERIN | | EVELIN 1 1748 | 2120 | 10 CT | WACIEUR | |
| RFSET. | 16.00148C | | | | | BITT |

Long-term function

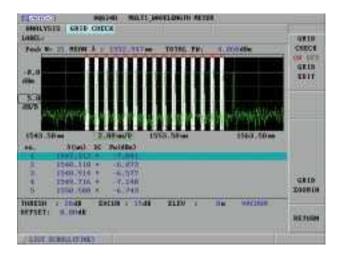
Displays changes of peak wavelength and power of one channel.

Below waveforms, displays not only current measurement result but also maximum rate, minimum rate or balance of maximum rate and minimum rate.

Grid monitoring function

Analyzes peak wavelength of set grid. Searches peak wavelength, or analyzes wavelength gap and changes of power within the grid.



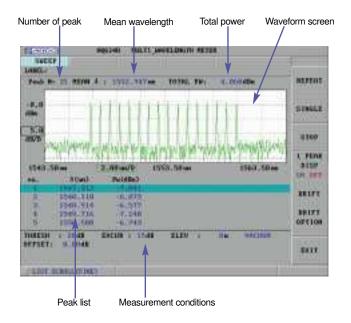


Screen examples

Standard screen

The waveform and the peaks are display simultaneously on this standard screen.

It is used to monitor WDM system temperature characteristics and evaluate laser oscillators.



3D display screen

Displays 3D waveforms and peak lists at a time. It helps to check the change of measurement result by time.

| Pauli II Pauli II -B.II III S.II III/D | | 1 3907-997 -0 | | 1.00000 | SD-THOLE STOPLAY |
|---|---|---|-----------------|------------|---------------------|
| | | | 11// | | |
| 1543.5 | | ma/8 3103.5 | 1 | 156-3,50 m | |
| 1548.5 Hanna an | Acad Acad 2540_110 (140, 514 (1560, 514 (1560, 514 (1560, 516) (1560, 516) | 1007 1003,50 Doldbo 0.077 -7.248 -6.245 | fa faste se fas | 1563, 50 m | |

List screen

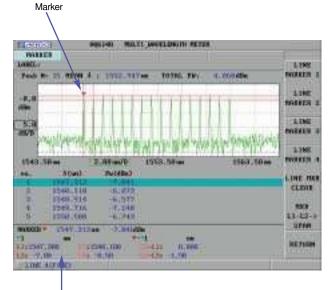
This mode displays a list of the peak wavelengths, up to 14 at a time.

| Tere of | | al marrie se | GELDWITH RETUR | |
|-----------|------------------------|---------------------------|--------------------|-----------|
| 975FL | ak | 11 | | HIRPOL |
| Peul B | H S MANN A S . | 1997.787.00 | TOTHE THE VELICIAL | DESERV |
| | | Paridition) | fiel Alter. 100 cm | 1903.8 |
| | DIST. OLD | INCOME. | | UNLY |
| 1 | 22400.1110 | -0.071 | | |
| 35 | 10467,914 | -8.3378 - | | 30 |
| 1 | 2549.736 | -TADAB | | BURNAY |
| | 35591-5793 | -61768 | | |
| -96 | 1504-010 | -0.200 | | 88177 |
| 10 | PART-TIX | (F.22E | | |
| | 1253.112 | -6.788 | | S HILLSON |
| | TRADE, TRA | -6.889 | | |
| 311 | 1954 554 | -7.294 | | 101647 |
| 井. | 22022.0285 | -6.352 | | RELTA |
| 10. | 1226, 153 1726, 160 | 10,000 | | |
| 100 | 1207.767 | -42,752 | | |
| marks we | A HEAD COM | - All and a second second | | 2005 |
| THE STORE | 1.1043 231 | 10 1 1240 | TLDU I HM MACHINE | 1.2 |
| HEFSET: | SCOULSE . | | | 2.5.50 |
| | | | | -BAXE |

Measurement conditions

Marker screen

The marker function simplifies tasks such as analysis of wavelength and power level difference.



Marker information

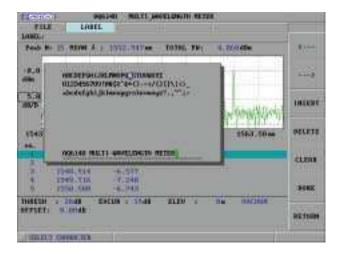
Label input screen

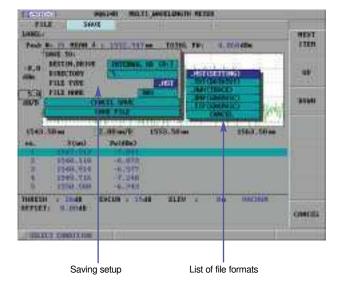
Label can be input up to 36 characters, so that file management can be easy.

File screen

Measured waveform data can be saved in a variety of file formats.

The file recall function makes it possible to make new measurement with the same measurement conditions as saved data, which is ideal for WDM system maintenance.





1 6.5-inch color LCD

Displays measured waveforms, measurement conditions, measurement results, etc.

2 Soft key

For selecting and proceeding functions corresponding to Function keys

③ Function key (Switch for selecting main function) Selects from 12 functions

(4) Data entry key

For inputting data through ten-key, rotary encoder, cursor key, etc.

(5) **Optical input connector** Connector for connecting measured optical fiber cable

6 **Brightness adjustment** Adjust the brightness of LCD

(7) 3.5-inch floppy disk drive

8 Power switch

Operation panel

Multi-Wavelength Meter AQ6140

Specifications

| Applicable fiber | | | SM | | |
|---|----------------------------|------------------------|---|--|--|
| Wavelength range | | | 1270 to 1650 nm (182 to 236 THz) | | |
| Wavelength accuracy ¹⁾ | | | ±2 ppm (1550 nm, 1310 nm: ±0.003 nm) | | |
| Minimum resolvable separation ²⁾ | | paration ²⁾ | 10 GHz or less (1550 nm: 80 pm, equal power line input) | | |
| Power accuracy | | | ±0.5 dB (1310/1550±30 nm, typ.) | | |
| Level linearity | | | 1270 to 1600 nm: ±0.3 dB (input: -30 dBm or more) | | |
| Polarization depending loss ²⁾ | | loss 2) | 1270 to 1600 nm: ±0.5 dB | | |
| | | | 1600 to 1650 nm: 1.0 dB | | |
| Maximum number of line input | | ne input | 256 | | |
| Minimum input level | | | 1270 to 1600 nm: -40 dBm (1 line input) | | |
| | | | 1600 to 1650 nm: -30 dBm (1 line input) | | |
| Maximum i | Maximum input level | | +10 dBm (total of all lines) | | |
| Safe max. i | Safe max. input level | | +18 dBm (total of all lines) | | |
| Return loss | | | 35 dB (PC) | | |
| SN ratio | | | 35 dB (typ.) (noise band width: 0.1 nm, input: -25 dBm or more, spacing \geq 100 GHz) | | |
| Measurement time 3) | | | ≦ 1.5 sec | | |
| Display | | | 6.5-inch color LCD (640 x 480 dots) | | |
| Memory | Memory Internal | | Can memorize 10 measurement results and conditions | | |
| | Floppy disk (3.5-inch 2HD) | | Can memorize measurement results and conditions | | |
| | Internal hard disk drive | | 9MB: can memorize measurement results and conditions | | |
| Interfaces | | GP-IB | GP-IB (IEEE. 488.2) | | |
| RS-232C Printer port | | RS-232C | 9-pin D-sub | | |
| | | Printer port | 25-pin D-sub (centronics) | | |
| | | VGA monitor | 15-pin D-sub | | |
| Optical connector 4) | | | AQ9441 (FC) Universal Adapter | | |
| Power requirements | | | AC 100 to 120/200 to 240 V, 50/60 Hz (47 to 63 Hz), 100 VA | | |
| Environmer | ntal condition | ns | Operation temperature: 5 to 40 °C, storage temperature: -20 to +60 °C, | | |
| | | | humidity: 80 % RH or less (at 40 °C, no condensation) | | |
| Dimensions | Dimensions and mass | | Approx. 425 (W) x 132.5 (H) x 450 (D) mm, approx. 14 kg | | |
| Accessories | | | Power cord: 1, Instruction manual: 1 | | |
| | | | | | |

Notes:

1) After 30 minutes warming up, line spacing: 30 GHz or more, multiple-line input

2) Characteristics data may be varied depending on equipment.

3) In REPEAT measurement4) FC: standard. Also compatible with SC, ST, DIN and DIA.

Specifications are subject to change without notice.

Ando Electric Co., Ltd.

3-484, Tsukagoshi, Saiwai-ku, Kawasaki, Kanagawa, 212-8519 Japan Phone: +81 (0)44 549 7300 Fax: +81 (0)44 549 7450

Ando Corporation

2021 N. Capitol Avenue, San Jose, CA 95132, U.S.A. Phone: +1 408 941 0100 Fax: +1 408 941 0103 EAST OFFICE: 7617 Standish Place, Rockville, MD 20855, U.S.A. Phone: +1 301 294 3365 Fax: +1 301 294 3359

Ando Europe B.V.

"Vijverdam", Dalsteindreef 57, 1112XC Diemen, The Netherlands Phone: +31(0)20 698 1441 Fax: +31(0)20 699 8938 NIÉDERLASSUNG DEUTSCHLAND: Nymphenburger Straße 119 B, D-80636 München, Germany Phone: +49(0)89 143 8150 Fax: +49(0)89 143 81555 Ando Electric Singapore Pte. Ltd. 19 Kim Keat Road #05-03, Jumbo Industrial Building, Singapore 328804 Phone: +65 251 1391 Fax: +65 251 1987 WWW. Kallig to Big Singapore Mww.ando.com