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Optical test and Measurement System AQ8201 Series



High-speed, high accuracy measurement of WDM optical device specifications

General

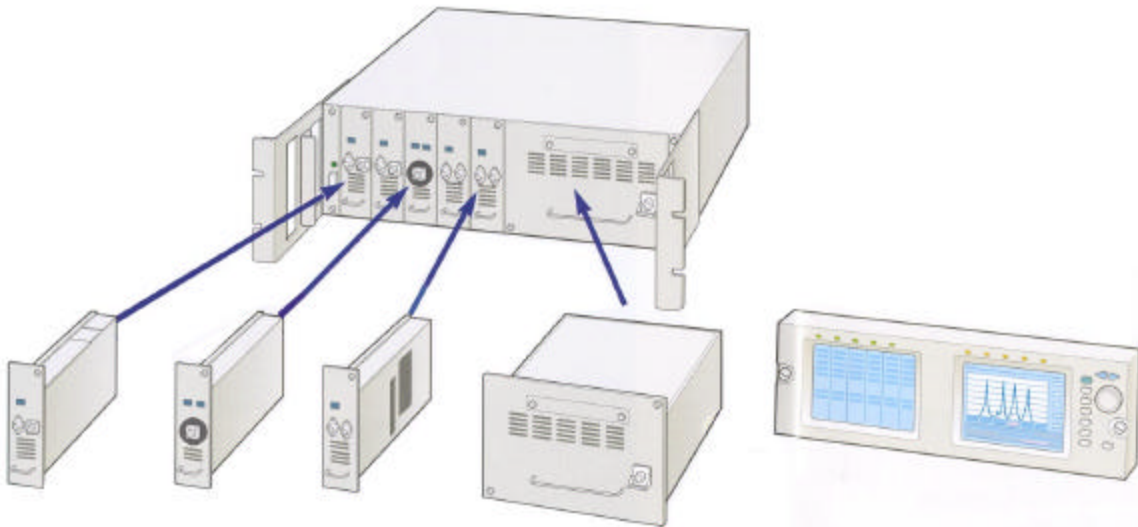
The configuration of measurement systems for evaluation is a major issue in the volume production of optical devices for WDM. The optical Test and Measurement System AQ8201 Series has a wide lineup of modules to meet diverse needs quickly. The 19-inch rack design makes space-efficient, flexible system configuration possible. And it's also effective for specification evaluation of WDM-related parts such as MUX/DEMUX, AWG and EDFA.

Features

- General optical measurement equipment consists of the mainframe and display, and plug-in modules.
- Applies mainframe for 19-inch rack.
- Highly-visible 6.5-inch TFT color LCD
- Wide variety of module lineup
- 1 frame can mount up to 10 modules and save space.
- Support for LabVIEW driver.

Easy to build up system for your application

Rack Mount Mainframe
AQ8201A



WDM DFB-LD
Module
AQ8201-11,11A,11B

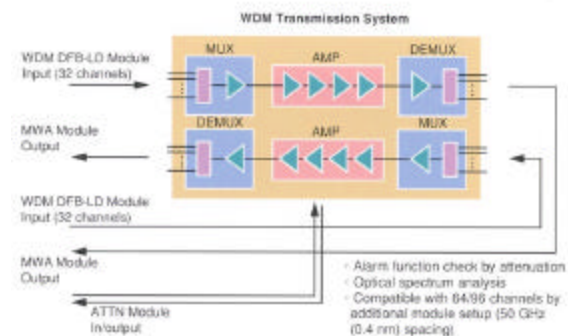
OPM
Module
AQ8210-21

ATTN Module
AQ8201-31,32,33

MWA
Module
AQ8210-61

Display
Controller
AQ8210-02

System configuration image



Optical Test and Measurement System Components

**Display Controller module
AQ8201-03**



**WDM DFB_LD Module
AQ8201-11, 11A, 11B**



**ECL Module
AQ8201-13**



**OPM Module
AQ8201-21**



Product name	Model	Slot width
Rack mount Mainframe	AQ8201A	—
Display controller	AQ8210-02	—
Display Controller Module	AQ8201-03	2 slots
WDM DFB-LD Module (Light source)	AQ8201-11,11A,11B	1 slot
ASE Module (Light source)	AQ8201-12,12A	2 slots
ECL Module (Light source)	AQ8201-13	1 slot
OPM module (Optical power meter)	AQ8201-21	1 slot
ATTN Module (Optical attenuator)	AQ8201-31,32,33	1 slot
MWA Module (Optical spectrum analyzer)	AQ8201-61	5 slot
RLM module (Return loss measurement)	AQ8201-71	1 slot



**ATTN Module
AQ8201-31, 32, 33**



**ASE Module
AQ8201-12, 12A**

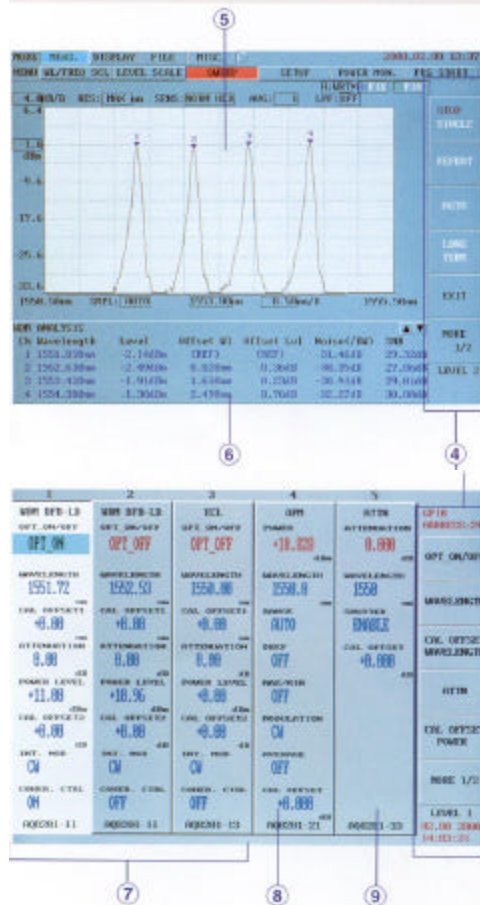
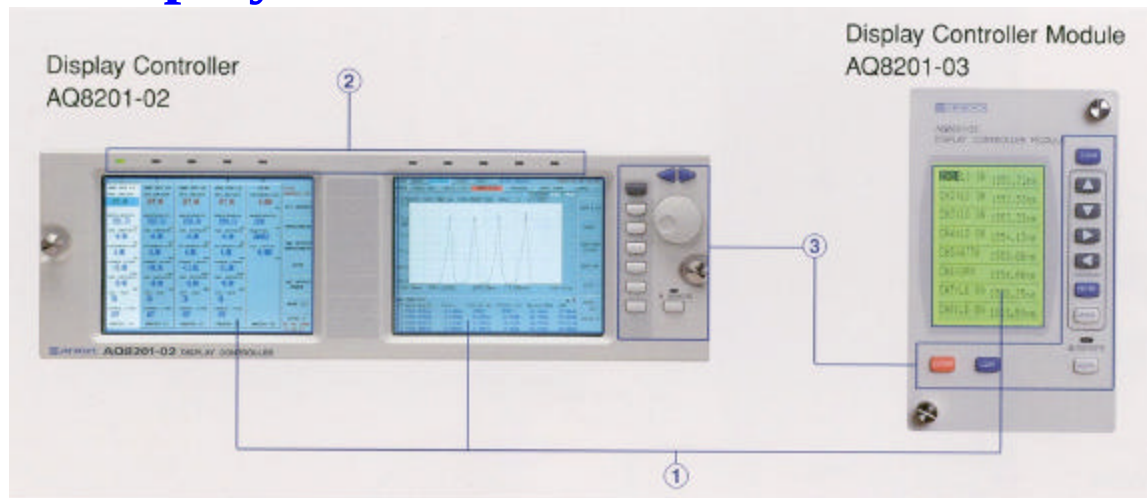


**MWA Module
AQ8201-61**



**RLM Module
AQ8201-71**

Display controller



Display Controller

Operating panel for Rack Mount Main Frame

① AQ8201-02 displays information for 1 frame (10 slots) simultaneously.

② Operating slots and modules can be identified by LEDs.

③ Rotary knob (AQ8201-02) and operation switches designed for simple adjustment and operation of mounted modules.

Display screen

Displays set-up and measurement results for modules slot by slot.

④ The function key menu for selected module.

- MWA module

⑤ Optical spectrum display

⑥ The overall results for analysis data (peak wavelength, wavelength spacing, peak level, SNR, etc.).

- DFB-LD, ECL module

⑦ Optical output on/off, wavelength and attenuation settings.

- OPM module

⑧ Optical power, wavelength, and range settings.



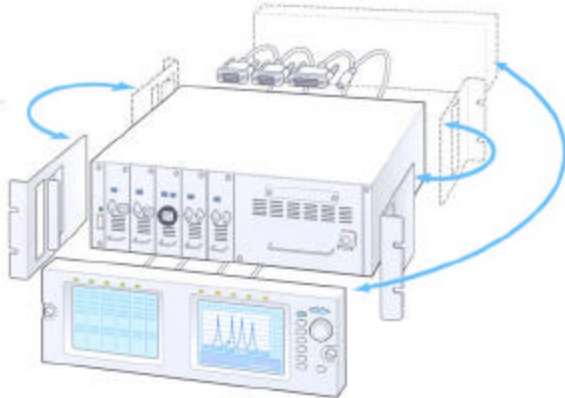
- ATTN module

⑨ Attenuation and wave length shutter on/off settings

- Display Controller module

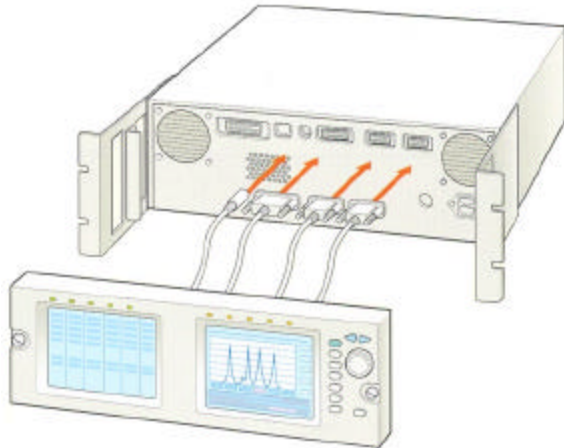
⑩ AQ8201-03 displays detailed contents of selected 1 module only.

Easy to mount



(Display controller front mounted.)

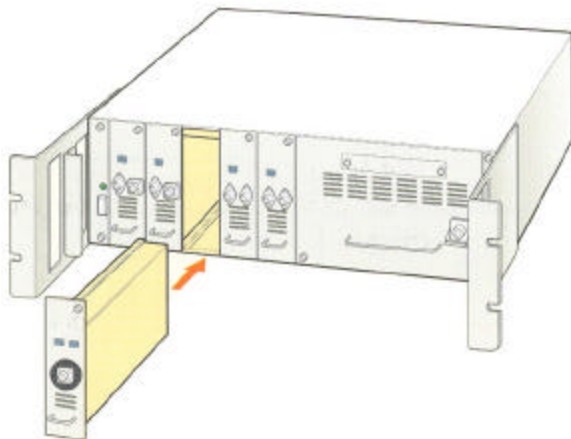
- Display controller can be attached to either front or back. (Requires extension cord when attached to front.)



(Display controller attached to back.)

- Display controller is used for monitoring and set-up of modules in the main frame.

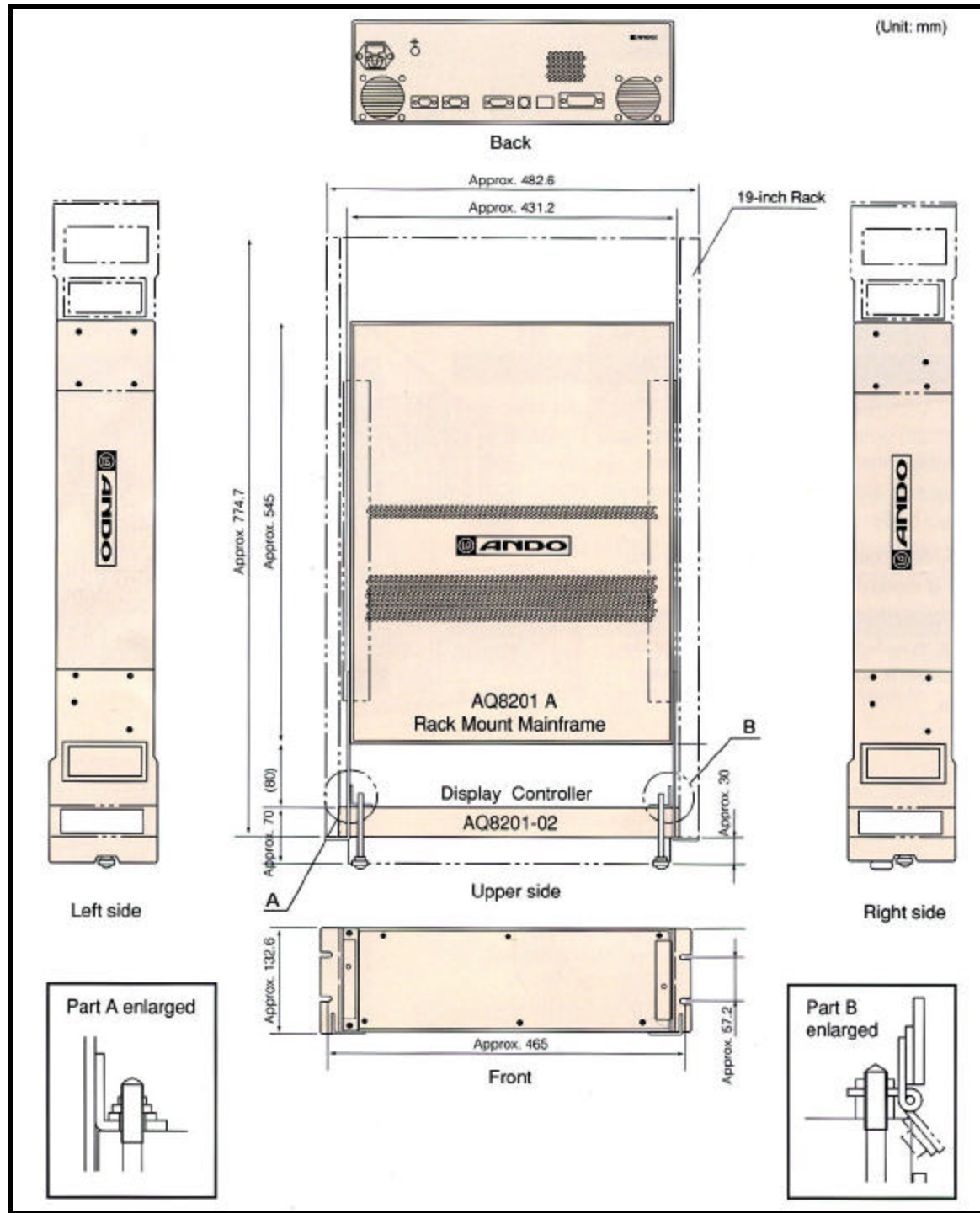
- When an MWA module (optical spectrum analyzer) is mounted on the main frame, one display screen is used exclusively for the MWA module.



- As illustrated at left, the structure is so simple that you can easily mount/dismount modules.

Fit to the 19-inch rack

Appearance of AQ8201A Rack Mount Mainframe

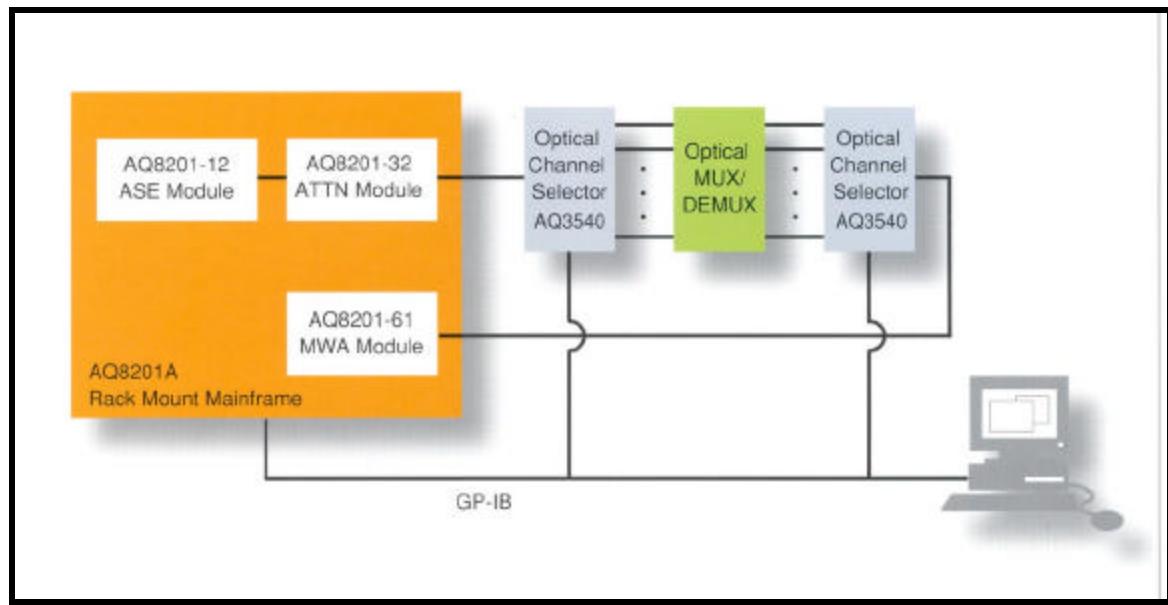


Applications

MUX/DEMUX test configuration

MUX/DEMUX: AWG, FBG, Filter, etc.

Evaluation items: insertion loss, center wavelength,
Flatness, NdB band width, etc.



Specifications

System configurations

AQ8201 series, Optical Test and Measurement System, consist of mainframe, display and various modules.

- AQ8201A Rack Mount Mainframe
- AQ8201-02 Display Controller

Note Extension cable (2 for VGA, 1 for keyboard, and 1 for power supply/signal) for attaching display controller in the front is option.

• Modules

- AQ8201-03 Display Controller Module
- AQ8201-11 WDM DFB-LD Module (Light source)
- AQ8201-11A WDM DFB-LD Module (Light source for PM fiber)
- AQ8201-11B WDM DFB-LD Module (Light source for L-band)
- AQ8201-12 ASE Module (Light source)
- AQ8201-12A ASE Module (High power type light source)
- AQ8201-13 ECL module (Light source)
- AQ8201-21 OPM Module (Optical power meter)
- AQ8201-31 ATTN Module (Optical attenuator)
- AQ8201-32 ATTN Module (High resolution type optical attenuator)
- AQ8201-33 ATTN Module (High resolution type optical attenuator)
- AQ8201-61 MWA Module (optical spectrum analyzer)
- AQ8201-71 RLM Module (Return loss measurement)

• Others

- AQ8201-91 Vent cover (with slit)
- AQ8201-92 Blank cover (without slit)
- AQ8201-96 Rack Mount Kit (fro mounting 19-inch rack)

AQ8201A rack Mount Mainframe

Display interface	2 × VGA output (D-sub 15-pin)
GP-IB interface	Based in IEEE-488.2 standard
Power supply	AC 100 to 120/200 to 240V, 50/60 Hz, Max, 400VA
Environmental conditions	Operation temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
Dimensions and mass	Approx. 431.2 (W) × 132.6 (H) × 545 (D) mm Approx. 13kg (mountable on a 19-inch rack)

Note: When 10 modules of AQ8201-11, 11A, 11B are in operation temperature is 10 to 30°C

Accessory for AQ8201A

Rack mount angle: 2 (8×screws)

Options for AQ8201A

- AQ8201-91 Vent cover (with slit)
- AQ8201-92 Blank cover (without slit)

AQ8201-02 Display Controller

Display	6.5-inch TFT color LCD
Environmental conditions	Operation temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
Dimensions and mass	Approx. 425 (W) × 132.5 (H) × 70 (D) mm Approx. 4kg

AQ8201-03 Display Controller Module

Display	LCD 160×240 dots (RF-STN Black/White type)
Environmental Conditions	Operating temperature: 5 to 40°C Storage Temperature: 0 to 50°C Humidity: 85% RH or less (no condensation)
Dimensions and mass	Approx. 79.5 (W) × 130 (H) × 324 (D) mm Approx. 1.5kg

AQ8201-11, 11A WDM DFB-LD Module (Light Source)

Available wavelength range		1524.11 to 1570.01nm ①
Center wavelength		±0.15nm ② ③
Wavelength accuracy		Within ±0.05nm
Spectral width	Coherence control ON	50MHz (typ.)
	Coherence control OFF	5 MHz or less
Optical output level		+10dBm or more ② (AQ8201-11) +13dBm or more ④ (AQ8201-11A)
Polarization extinction ratio		20 dB (typ.) ④ (AQ8201-11A)
SMSR		30 dB or more ⑤
Output level stability	15 minutes	Within ±0.005dB ⑥
	24 hours	Within ±0.03dB ⑥
Wavelength stability	15 minutes	Within ± 0.005nm ②
	24 hours	Within ±0.01nm ②
Wavelength range		1.6nm (min.) ②
Optical attenuation range		10dB (0.01dB step)
Optical isolation		55dB or more
RIN		-145 dB/Hz
Internal modulation		100 Hz to 300 kHz (CHOP)
External modulation		100 Hz to 300 kHz (Sine Wave)
Applicable fiber		SM (10/125μm) (AQ8201-11) PM (10/125μm) (AQ8201-11A)
Optical connector		FC/Angled PC ⑦
Laser product class		IEC825: class3A

Environmental conditions	Operation temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or Less (no condensation)
Dimensions and mass	Approx. 39.5 (W) × 130 (H) × 339 (D) mm Approx. 0.7 kg

*Specifications assured after warm-up for one hour.

Notes:

① Select from Aqaq8201-11, 11A available wavelength on next page.

② CW light, attenuation 0.0dB, coherence control "OFF", at fiber end (FC/Angled PC FC/SPC, 2m, SMF)

③ ±p is specified wavelength.

④ CW light, Attenuation 0.0dB, Coherence control OFF, with end of the optical connector mounted on panel.

⑤ Attenuation 0.0dB at the center wavelength

⑥ Ambient temperature: constant in 20 to 30°C, CW light, attenuation 0.0dB, coherence control "ON", at fiber end (FC/Angled PC-FC/SPC, 2m, SMF)

⑦ Angled PC in manufactured by SEIKOH GIKEN. : Return loss over 60dB or more

Options for AQ8201-02

Extension cables for attaching display controller to the front.

AQ8201-11, 11A Available wavelength Table

(Please consult your vendor or sales offices when you require other wavelengths than listed)

Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)
190.95	1570.01	192.90	1554.13	194.85	1538.58
191.00	1569.59	192.95	1553.73	194.90	1538.19
191.05	1569.18	193.00	1553.33	194.95	1537.79
191.10	1568.77	193.05	1552.93	195.00	1537.40
191.15	1568.36	193.10	1552.52	195.05	1537.00
191.20	1567.95	193.15	1552.12	195.10	1536.61
191.25	1567.54	193.20	1551.72	195.15	1536.22
191.30	1567.13	193.25	1551.32	195.20	1535.82
191.35	1566.72	193.30	1550.92	195.25	1535.43
191.40	1566.31	193.35	1550.52	195.30	1535.04
191.45	1565.90	193.40	1550.12	195.35	1534.64
191.50	1565.50	193.45	1549.72	195.40	1534.25
191.55	1565.09	193.50	1549.32	195.45	1533.86
191.60	1564.68	193.55	1548.91	195.50	1533.47
191.65	1564.27	193.60	1548.51	195.55	1533.07
191.70	1563.86	193.65	1548.11	195.60	1532.68
191.75	1563.45	193.70	1547.72	195.65	1532.29
191.80	1563.05	193.75	1547.32	195.70	1531.90
191.85	1562.64	193.80	1546.92	195.75	1531.51
191.90	1562.23	193.85	1546.52	195.80	1531.12
191.95	1561.83	193.90	1546.12	195.85	1530.72
192.00	1561.42	193.95	1545.72	195.90	1530.33
192.05	1561.01	194.00	1545.32	195.95	1529.94
192.10	1560.61	194.05	1544.92	196.00	1529.55
192.15	1560.20	194.10	1544.53	196.05	1529.16
192.20	1559.79	194.15	1544.13	196.10	1528.77
192.25	1559.39	194.20	1543.73	196.15	1528.38
192.30	1558.98	194.25	1543.33	196.20	1527.99
192.35	1558.58	194.30	1542.94	196.25	1527.60
192.40	1558.17	194.35	1542.54	196.30	1527.22
192.45	1557.77	194.40	1542.14	196.35	1526.83
192.50	1557.36	194.45	1541.75	196.40	1526.44
192.55	1556.96	194.50	1541.35	196.45	1526.05
192.60	1556.55	194.55	1540.95	196.50	1525.66
192.65	1556.15	194.60	1540.56	196.55	1525.27
192.70	1555.75	194.65	1540.16	196.60	1524.88
192.75	1555.34	194.70	1539.77	196.65	1524.50
192.80	1554.94	194.75	1539.37	196.70	1524.11
192.85	1554.54	194.80	1538.98		

AQ8201-11B WDM DFB-LD Module (Light Source)

Available wavelength range		1570.42 to 1620.50nm①
Center wavelength		±0.15 nm② ③
Wavelength accuracy		Within ±0.05nm
Spectral width	Coherence control ON	50 MHz (typ.)
	Coherence control OFF	5 MHz or less
Optical output level		+ 10dBm or more②
SMSR		30dB or more④
Output level stability	15 minutes	Within ± 0.005dB⑤
	24 hours	Within ± 0.03dB⑤
Wavelength stability	15 minutes	Within ± 0.005dB②
	24 hours	Within ± 0.01dB②
Wavelength range		1.6nm (min.) ②
Optical attenuation range		10dB (0.01dB step)
Optical isolation		55dB or more
RIN		-145dB/Hz
Internal modulation		100Hz to 300kHz (CHOP)
External modulation		100Hz to 300kHz (Sine Wave)
Applicable fiber		SM (10/125μm)
Optical connector		FC/Angled PC⑥
Laser product class		IEC825: class3A
Environmental Conditions		Operation temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity:85%RH or less (no condensation)
Dimensions and mass		Approx. 39.5(W)×130(H)×339(D) mm Approx. 0.7kg

*Specifications assure after warm-up for one hour

Notes:

- ① Select from AQ8201-11B available wavelength on next page.
- ② CW light, attenuation 0.0dB, coherence control “OFF”, at fiber end (FC/Angled PD-FC/SPC, 2m, SMF)
- ③ ± is specified wavelength.
- ④ Attenuation 0.0dB at the center wavelength.
- ⑤ Ambient temperature: constant in 20 to 20°C, CW light, attenuation 0.0dB, coherence control “ON”, at fiber end (FC/Angled PC-FC/SPC, 2m, SMF)
- ⑥ Angled PC is manufactured by SEIKOH GIKEN.: return loss over 60dB or more

AQ8201-11B Available Wavelength Table (Please consult your vendor or sales offices when you require other wavelength than as below)						AQ8201-12, 12A ASE Module (Light Source)	
Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)	Spectrum density (-13 dbm/nm)	1525 to 1570nm① (typ.) 1530 to 1565nm①
185.00	1620.50	187.00	1603.17	189.00	1586.20	Optical output power	+ 10dBm or more ① (AQ8201-12) +15dBm or more ① (AQ8201-12A)
185.05	1620.06	187.05	1602.74	189.05	1585.78		
185.10	1619.62	187.10	1602.31	189.10	1585.36	Output level stability	within ±0.005 dB① ②
185.15	1619.19	187.15	1601.88	189.15	1584.95		within ±0.05dB① ③
185.20	1618.75	187.20	1601.46	189.20	1584.53	Optical modulation mod	CW
185.25	1618.31	187.25	1601.03	189.25	1584.11	Polarization extinction mod	0.1dB (typ.)
185.30	1617.88	187.30	1600.60	189.30	1583.69	Optical attenuation range	6dB (0.1dB step)
185.35	1617.44	187.35	1600.17	189.35	1583.27	Applicable fiber	SM (10/125μm)
185.40	1617.00	187.40	1599.75	189.40	1582.85	Optical connector	AQ9441 (*) Universal adapter (option)④
185.45	1616.57	187.45	1599.32	189.45	1582.44	Laser product class	IEC825: class 3A
185.50	1616.13	187.50	1598.89	189.50	1582.02	Environmental conditions	Operating temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
185.55	1615.70	187.55	1598.47	189.55	1581.60		
185.60	1615.26	187.60	1598.04	189.60	1581.18	Dimensions and mass	Approx. 79.5 (W)×130(H)×339(D)mm Approx. 2kg
185.65	1614.83	187.65	1597.62	189.65	1580.77		
185.70	1614.39	187.70	1597.19	189.70	1580.35	* Specifications assured after warm-up for one hour. NOTES: ①CW light, attenuation 0.0dB, at fiber end (SMF,FC/PC, 2m) ②5 minutes (at constant temperature in 20 to 30°C) ③In one hour (± 1°C in 0 to 40°C) ④FC, ST and SC connector are available	
185.75	1613.96	187.75	1596.76	189.75	1579.93		
185.80	1613.52	187.80	1596.34	189.80	1579.52		
185.85	1613.09	187.85	1595.91	189.85	1579.10		
185.90	1612.65	187.90	1595.49	189.90	1578.69		
185.95	1612.22	187.95	1595.06	189.95	1578.27		
186.00	1611.79	188.00	1594.64	190.00	1577.86	AQ8201-13 ECL Module (Light Source)	
186.05	1611.35	188.05	1594.22	190.05	1577.44	Available wavelength range	1460 to 1580nm
186.10	1610.92	188.10	1593.79	190.10	1577.03	Wavelength setting range	10 pm
186.15	1610.49	188.15	1593.37	190.15	1576.61	Wavelength accuracy	Within ±0.2mm① ② ③ ④
186.20	1610.06	188.20	1592.95	190.20	1576.20	Wavelength repeatability	± 50 pm (typ.)① ② ④
186.25	1609.62	188.25	1592.52	190.25	1575.78	Wavelength setting time	3 seconds (typ.)⑤
186.30	1609.19	188.30	1592.10	190.30	1575.37	Spectral width	Coherence control ON 100 MHz (typ.)① ②
186.35	1608.76	188.35	1591.68	190.35	1574.95		Coherence control OFF 5 MHz (typ.)① ②
186.40	1608.33	188.40	1591.26	190.40	1574.54	Optical output level	1460 to 1580nm +6 dBm or more① ② ⑦
186.45	1607.90	188.45	1590.83	190.45	1574.13		1490 to 1580nm +8 dBm or more① ② ⑦
186.50	1607.47	188.50	1590.41	190.50	1573.71		1520 to 1580nm + 10 dBm or more① ② ⑦
186.55	1607.04	188.55	1598.99	190.55	1573.30	SMSR	45dB or more① ② ⑥
186.60	1606.60	188.60	1598.57	190.60	1572.89	Output level stability	15 minutes Within ±0.005dB① ② ④ ⑦
186.65	1606.17	188.65	1589.15	190.65	1572.48		1 hour Within ±0.01dB① ② ④ ⑦
186.70	1605.74	188.70	1588.73	190.70	1572.06	Wavelength stability	15 minutes Within ±0.005nm① ② ④
186.75	1605.31	188.75	1588.30	190.75	1571.65		24 hours Within ±0.01nm (typ.)① ② ④
186.80	1604.88	188.80	1587.88	190.80	1571.24	Optical attenuation range	10dB (0.01dB step)① ⑥
186.85	1604.46	188.85	1587.46	190.85	1570.83	RIN	-145 dB/Hz (typ.)① ②
186.90	1604.03	188.90	1587.04	190.90	1570.42	Internal modulation	100Hz to 300kHz (CHOP)⑧
186.95	1603.60	188.95	1586.62			External modulation	100Hz to 300kHz (Sine Wave)
NOTES ①Temperature fixed at 23°C, CW light, 2m fiber output, single vertical mode ②Optical attenuation: 0.0dB ③After wavelength calibration ④C-band: 1520 to 1750 nm ⑤Full span (120 nm) ⑥Wavelength: 1550 nm ⑦Spectrum width: coherence control ON ⑧Setting resolution: 0.1 kHz, accuracy: ±2 % ⑨Angled PC is manufactured by SEIKOH GIKEN, return loss over 60dB or more ⑩Ambient temperature of the mainframe						Applicable fiber	SM (10/125μm)
						Optical connector	FC/Angled PC⑨
						Laser product class	IEC825: class3A
						Environmental conditions	Operating temperature: 23 ± 5°C⑩ Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
						Dimensions and mass	Approx. 39.5(W)×130(H)×339(D)mm
							Approx. 1.2kg
						*Specifications assured after warm-up for one hour.	

*Specifications assured after warm-up for one hour.

AQ8201-21 OPM module (Optical power meter)		
Wavelength range		700 to 1700nm
Photodetector		Cooled InGaAs
Application		Small-diameter silica fiber emission①
Optical connector		AQ9389B (FC) Connector Adapter (standard)②
Polarization dependant loss		0.02dB P-P (typ.)③
Power range	CW light	-80 to +27 dBm ④
	Chopped light	-80 to +24 dBm ④
Accuracy under reference condition		± 2.5 % (at 1310nm calibration point) ⑤
Total accuracy		± 5% (1000 to 1650nm) ⑥
Linearity		±0.05dB (1000 to 1650nm, -40 to +27dBm)②
Noise	CW light	- 73 dBm or less ⑧
	Chopped light	
Environmental conditions		Operating temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity:85%RH or less (no condensation)
Dimensions and mass		Approx. 39.5 (W) × 130 (H) × 339 (D)mm Approx. 1.2 kg

*Specifications assured at fixed temperature within 23±5°C

* Specifications assured after warm-up for one hour.

Notes:

① Applicable fiber 62.5/125μm (GI) NA 0.275

② ST and SC connector are also available

③ At 1550nm wavelength, SM fiber

④ AT 1310nm wavelength

⑤ Reference conditions

1. Power level: -20dBm (10μW), CW light

2. SM fiber, master FC connector

3. Ambient temperature: 23 ± 5°C

4. Calibrated with AQ9389B (FC) connector adapter (If you disconnect adapter, the accuracy of specifications may be lost. When you change connector adapter, we recommend recalibration.

⑥ Operating conditions:

1. Power level: -20dBm (10μW), CW light

2. 50 μm optical fiber, NA 0.2

3. Ambient temperature: 23±5°C

4. With AQ9389B (FC) connector adapter

⑦ 1. Linearity at wavelength within wavelength specified in total accuracy

2. CW light, environmental temperature: 23±5°C

⑧ 1. Averaging 1s (averaging executed 10 times)

2. In wavelength 1200 to 1600nm

3. CW, chopped light (270 Hz)

Accessory for AQ8201-21

Plug for analog output: 1

AQ8201-31, 32 ATTN Module (Optical attenuator)	
Wavelength range	1200 to 1600nm
Insertion loss	2.5dB or less (1310/1550nm)① ②
Maximum attenuation level	60dB
Attenuation deviation	Within ± 0.1 (1310/1550nm)dB① ②
Repeatability	Within ±0.02dB①
Minimum attenuation step	0.05 dB (AQ8201-31) 0.01 dB (AQ8201-32)
Optical return loss	60dB or more (1310/1550nm)① ② ③
Polarization dependant loss	0.05 dBmP-P (typ.) (1550nm) ①
Maximum input power	+ 23 dBm
Shutter isolation	100dB or more
Applicable fiber	SM (10/125 μm)
Optical connector	FC/Angled PC④
Environmental conditions	Operating temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity:85%RH or less(no condensation)
Dimensions and mass	Approx. 39.5(W)×130(H)339(D)mm Approx. 1 kg

*Specifications assured after warm-up for one hour.

*Specifications assured at fixed temperature within 25 ± 3°C.

Notes

① At constant temperature

② Using master cord

③ With FC/Angled PC connector (return loss: 63dB or more)

④ Angled PC is manufactured by SEIKOH GIKEN.

AQ8201-33 ATTN module (Optical attenuator)	
Wavelength range	1480 to 1650nm
Insertion loss	2.5 dB or less (1550nm)① ②
Maximum attenuation range	60db
Attenuation deviation	Within ±0.1dB (1520 to 1620nm) ①②
Repeatability	±0.005 dB (typ.)① (AQ8201-33)
Minimum attenuation range	0.001dB (AQ8201-33)
Optical return loss	60dB or more (1550nm)① ② ③
Polarization dependant loss	0.05dBP-P (typ.) (1550nm) ①
Maximum input power	+23 dBm
Shutter isolation	100dB or more
Applicable fiber	SM (10/125 μm)
Optical connector	FC/Angled PC④
Environmental conditions	Operating temperature: 5 to 40°C
	Storage temperature: 0 to 50C
	Humictiy:85%RH or less(no condensation)
Dimensions and mass	Approx.39.5(W)×130(H)×339(D)mm Approx. 1kg

*Specifications assured after warm-up for one hour.

*Specifications assured at fixed temperature within 25± 3°C

Notes

① At constant temperature

② Using master cord

③ With FC/Angled PC connector (Return loss: 63dB or more)

④ Angled PC is manufactured by SEIKOH GIKEN

Measurement wavelength range	1200 to 1700nm (vacuum wavelength)	Data analysis	WDN analysis (Table of wavelength, Level and SNR list.) EDFA analysis (gain/NF), peak search spectrum width search, notch width search, Delta marker (max. 100), line marker (analysis range setting), graphical display for long term measurement
Wavelength accuracy	within $\pm 0.05\text{nm}$ (1550 to 1570nm) ① within $\pm 0.3\text{nm}$ (1200 to 1700nm) ①		
Wavelength linearity	within $\pm 0.02\text{nm}$ (1500 to 1570nm) ①		
Wavelength repeatability	within $\pm 0.005\text{nm}$ (1 minute)		
Wavelength resolution	Max. resolution: 0.08nm (typ.) (1550 to 1600nm) Resolution setting: Max., 0.2, 0.5, 1.0nm Resolution accuracy: $\pm 5\%$ (resolution: 0.2nm or more) ②		Others
Measurement level range	-90 to +20dBm (1200 to 1600nm) ② -80 to +20dBm (1600 to 1700nm) ②	Internal memory	2 Mbyte
Level accuracy	$\pm 0.3\text{dB}$ (typ.) (1310/1550nm, input: -30dBm, sensitivity mode: HIGH 1 to 3) ②	Applicable fiber	SM (10/125 μm)
Polarization dependant loss	within $\pm 0.05\text{dB}$ (1310/1550nm) ②	Optical connector	AQ9441(*) Universal Adapter (Option) ③
Level linearity	within $\pm 0.05\text{dB}$ (input: -40 to 0 dBm, Sensitivity mode: HIGH 1 to 3)	Environmental conditions	Operating temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
Level flatness	within $\pm 0.1\text{dB}$ (1550 to 1570nm) ①	Dimensions and mass	Approx. 200(W)×130(H)×339(D)mm Approx. 5kg
Level reproducibility	within $\pm 0.02\text{dB}$ (1310/1550nm, input: -23dBm)	*Specifications assured after warm-up for one hour. Notes: ① 10/125 SM fiber (FC/PC connector), at constant temperature within $25 \pm 3^\circ\text{C}$ ② 10/125 SM fiber (FC/PC connector), at constant temperature within 10 to 35°C ③ Specify FC, SC or ST connector	
Dynamic range (Stray light level)	40dB or more (1523nm, peak: $\pm 1.0\text{nm}$, Resolution: 0.08nm) 30dB or more (1523nm, peak: $\pm 0.4\text{nm}$, Resolution: 0.08nm)	AQ8201-71 RLM Module (Return loss measurement)	
Optical input return loss	30dB (typ.) (1310/1550nm)	Wavelength range	1280 to 1600nm
Sweep time	Approx. 1 second (Span: 50nm or less, sensitivity mode : NORMAL HOLD, averaging time: 1, sample point: AUTO)	Dynamic range	65dB or more ①
Automatic measurement	Program function (5 programs, 200 steps) Long term function	Relative measurement accuracy	within $\pm 0.4\text{dB}$ (0 to 50dB) ② within $\pm 0.7\text{dB}$ (50 to 60dB) ②
Measurement condition settings	Span: 0 to 500nm Sensitivity mod: NORMAL HOLD, AUTO, HIGH 1/2/3 Averaging: 1 to 1000 Sample point: 11 to 20001, AUTO Automatic setting function Sweep between markers 0 nm sweep Averaging measurement of pulse light	Measurement stability	Within $\pm 0.002\text{dB}$ ③
Trace display	Level scale setting Simultaneous display of 3 individual traces Max./min. display Roll averaging display Differential trace display Power density display, % display, Frequency axis	Applicable fiber	SM (10/125 μm)
		Input connection (from light source)	FC/PC
		Output connector (to DUT)	SC/Angled PC ④, ⑤
		Environmental conditions	Operating temperature: 5 to 40°C Storage temperature: 0 to 50°C Humidity: 85%RH or less (no condensation)
		Dimensions and mass	Approx. 39.5(W)×130(H)×339(D)mm Approx. 1.2kg
		*Specifications assured after warm-up for one hour. General conditions otherwise specified: - Optical input level: -5 to 0dBm, CHOP (270 Hz) - Wavelength: 1550 nm - Reference: fresnel refraction (master cord) - Ambient temperature: $23 \pm 1^\circ\text{C}$ Notes ① Varies depending on master cord ② Depends on stability of light source to be used, linearity of photo receiver and isolation of optical directional coupler ③ Fresnel reflection measurement for 5 minutes ④ Angled PC is manufactured by SEIKOH GIKEN. ⑤ Do not connect other master cord than one specified by ANDO to output connector	

ANDO ELECTRIC CO.,LTD. <http://www.ando.co.jp/>

19-7, Kamata 4-chome, Ota-ku, Tokyo, 144-0052 Japan Phone:+81 (0)3-3733-1151 Fax:+81 (0)3-3739-7310

ANDO CORPORATION - M.L.D. <http://www.andocorp.com>

HEADQUARTERS: 2021 N. Capital 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. <http://www.ando.nl/>

HEADQUARTERS: "Vijverdam", Dalsteindreef 57, 1112XC Diemen, The Netherlands Phone:+31(0)20-698-1441 Fax:+31(0)20-699-8938

NIEDERLASSUNG DEUTSCHLAND: Dachauer StraBe 119 B, D-80993 Munchen, Germany Phone:+49(0)89-143-8150 Fax:+49(0)89-1438-1555

ANDO ELECTRIC SINGAPORE PTE.LTD.

19 Kim Keat Road #05-03, Jumbo Industrial Building, Singapore 328804 Phone:+65 251-1391 Fax:+65 251-1987

ANDO ELECTRIC INC.

5F-2, No 81, Pei-Ta Road, Hsin-chu City, Taiwan Phone:+886 35 28 4168 Fax:+886 35 28 4110

Please visit our website for more information: <http://www.ando.com/>



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