



Smart and fully-featured OTDR

AQ1210 Series
Optical Time Domain Reflectometer

Precision Making

Bulletin AQ1210-01EN



Due to the widespread use of mobile devices and the Internet, the importance of optical fiber networks to accommodate the increasing communication traffic is growing rapidly.

Installation and maintenance of optical fiber networks require a measuring instrument with high productivity and an intuitive interface as well as high quality measurement results and high reliability.

Yokogawa, as a 100+ year instrumentation manufacturer, delivers OTDRs (Optical Time Domain Reflectometer) based on our measuring technologies developed since the early days of optical fiber communication and 38+ years of experience in optical test & measurement solutions for real world lab and field testing.

Responding to the growing needs for reliable and ease-of-use field test instruments for installation and maintenance of fiber optic networks, the Yokogawa AQ1210 series OTDR is designed to empower field technicians to make fast and precise measurements with confidence.

The AQ1210 OTDR delivers:

Reliability – Robust design for operating under harsh field conditions.

Technology – Dual operation mode by multi-touch touchscreen and hard-key buttons. Fully automatic measurement and easy-to-read analysis reports through new software applications.

Operability – Lightning startup time. Multi-tasking operation to enhance productivity. Immediate reporting via wireless connectivity.

Complete testing in Smart and fully-featured

Compact body with long-lasting battery operation

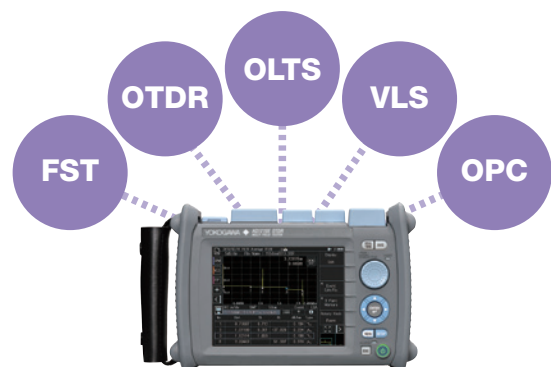
- Footprint approx. size of a “Mini” tablet, weight of 1 Kg (2.2 Lbs.)
- 10 hours battery operation
- USB power feeding

*USB power adapter (Type-C) is required for battery charging (sold separately).

Touchscreen and hard-key buttons

The AQ1210 features a capacitive multi-touch touchscreen, 5.7-inch LCD, and a “field use” friendly rotary dial.

Multiple functions in one unit



Multi Field Tester OTDR AQ1210

a compact package

OTDR

Enhanced OTDR performance

The AQ1210 provides:

- Measurement of PON systems with up to 128 splits
- High-speed real-time measurement
- Smart mapper function
- Multi-fiber measurement
- Fiber Surface Test function (optional)

Connectivity

Remote access is possible via Wi-Fi or ETHERNET connection.



Series

Model lineup

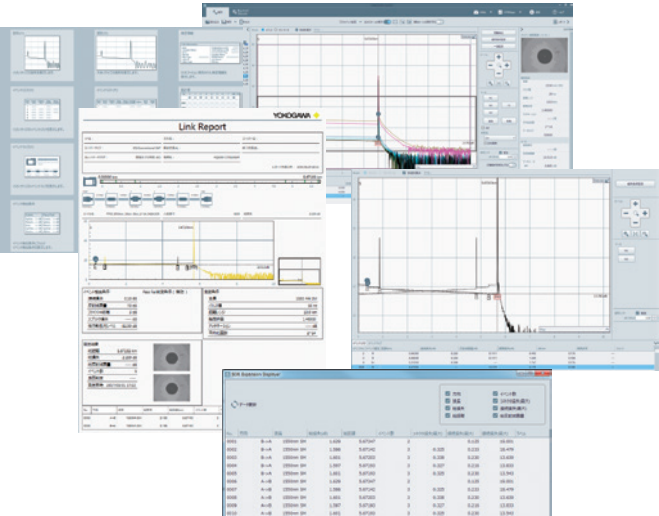
OTDR lineup

Six models offer different wavelength and application combinations

Model	Number of wavelengths	Dynamic range (dB)				Test application		
		1310 (nm)	1550 (nm)	1625 (nm)	1650 (nm)	Installation	Maintenance	
							Dark	Live
AQ1210A	2	37	35			✓	✓	
AQ1215A	2	42	40			✓	✓	
AQ1210E	3	37	35	35		✓	✓	✓
AQ1215E	3	42	40	39		✓	✓	✓
AQ1215F	3	42	40		37	✓	✓	✓
AQ1216F	3	42	40		40	✓	✓	✓

AQ7933 Emulation Software

Powerful post-processing software. Analyzing/editing trace data on a PC. The Report Creation Wizard function provides a step-by-guide for users to generate comprehensive reports in a printable format and MS Excel format.



Optical Power Meter & Checker

Power Meter Measures and displays optical power of a light source as an absolute/relative value for testing transmitter/network performance. Measurement results can be saved for reference. Invaluable test instrument during installation and maintenance. Calibrated and selectable wavelength setting. Single mode and Multi-mode measurement ready. Continuous wave and modulated wave detection capability.

*/SPM, /HPM, or /PPM option is required.

Power Checker Two selections of optical power sensors are available, which are optical power meter and optical power checker*, offering two levels of accuracy and functionality to best suit the user's needs/budget.

*/PC option is required.

Visible Light Source

VLS Visible, continuous/modulated red light laser. Invaluable test instrument for checking continuity of patch cords, launch fibers, or short fiber trunks. Breaks and bends in the fiber can easily be identified visually as the visible light exits the fiber at such fault events.

*/VLS option is required.

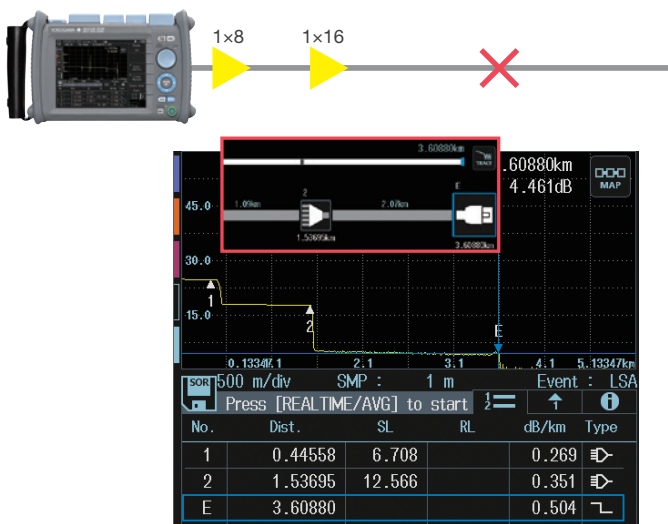
Measurement applications

PON Optimized

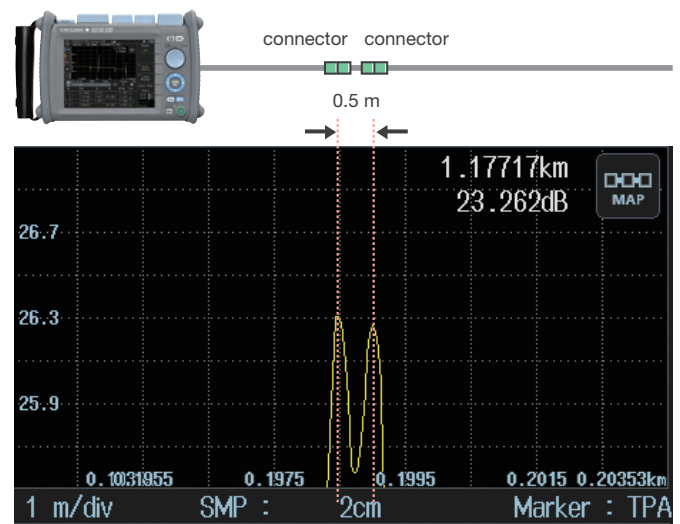
Excellent hardware performance and advanced analysis algorithm enable the AQ1210 to accurately characterize Passive Optical Networks (PON) through high-port-count splitters (up to 1×128)*.

The AQ1210 assists beginner/expert users in simply configuring OTDR measurement settings based on PON topology information for optimal results. Short event dead zone and high sampling resolution enable users to detect near-end location of connectors that are as close as 0.5 meters (<20 inches)*.

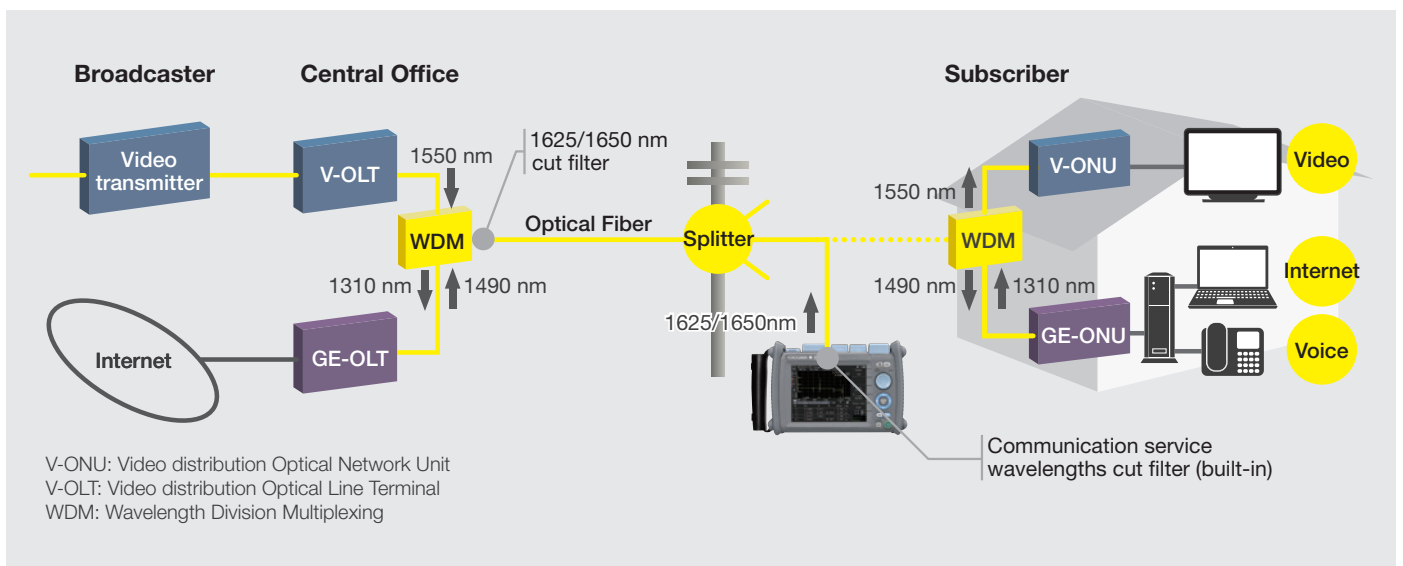
*AQ1215 models.



Example of measurement over a 128-port splitter



Event dead zone 0.5 m

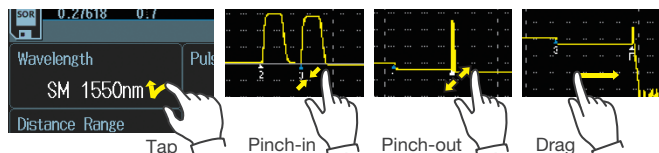


Fast and friendly functionality, all at your fingertips!

Dual-operation mode

Touchscreen and hard-key buttons

Tap, swipe, pinch or press. Choose between the high resolution 5.7-inch multi-touch capacitive touchscreen or the robust hard-key buttons in any combination desired. OTDR operations have never been easier!



Long battery operation time

Over 10 hours!

No worrying about running out of battery power during your daily work. The AQ1210's high capacity Li-Ion polymer battery will last for 10 hours under the Telcordia standard conditions.



Quick boot-up

Under 10 seconds!

From completely OFF to measurement ready in under 10 seconds!

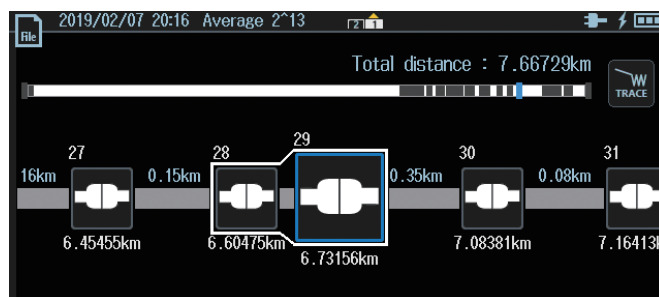


Smart Mapper

Single button measurement. Comprehensive network characterization. Easy to read report

Measurement acquisitions with multiple pulse widths and smart-algorithm enable users to detect and comprehensively characterize network events by pressing one single button. Simple, icon-based map view for easy interpretation of network events. Immediate PASS/FAIL judgment based on user-defined thresholds.

Easily toggled trace view for manual supplementary analysis.



Multi-tasking

Enhancing productivity

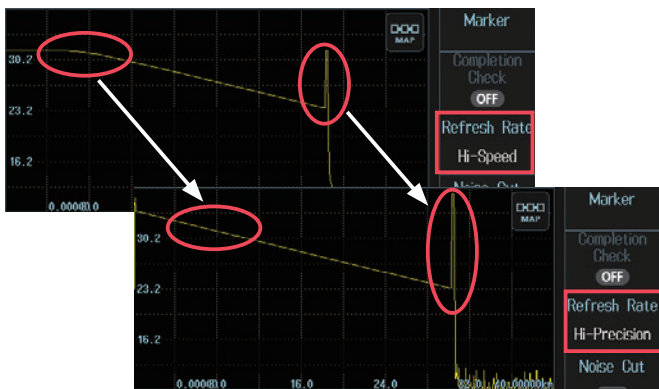
Managed by a highly efficient operating system, multiple functions can be performed simultaneously.

Now, users can perform OTDR measurements on a particular fiber core while simultaneously checking the power level, connector surface quality and visible fiber ID/bending on three other fibers.



High-speed, high-performance real-time measurement

When detecting/identifying the position of a fiber end point or bend of an installed optical fiber network, a user, according to the operating environment, can choose among the two modes: the high-speed mode with less measuring time and the high accuracy mode that is capable of reproducing a high-quality waveform.



Multi-Fiber Project

Database view. Organized. Quick preview of network characteristics

OTDR-based application in a database view.

Guiding users in tracking multi fibers measurements in sequence.

OTDR trace, power level and connector surface image of a particular fiber core are organized as one group.

With PASS/FAIL judgment, fiber core performance is easily characterized.

2019/02/07 19:53												00/96	
Dest. Folder Int. Memory/MPJ/													
2	3	4	5	6	7	8							
10	11	12	13	14	15	16							
18		20	21	22	23	24							
26	Realtime	28	29	30	31	32							
34		36	37	38	39	40							
	FIP	43	OPM	45	46	47	48						
50		52	53	54	55	56							
58	Average	60	61	62	63	64							
66		68	69	70	71	72							
74	75	76	77	78	79	80							
82	83	84	85	86	87	88							
90	91	92	93	94	95	96							

Name: / Label:

[E]

[FIP]

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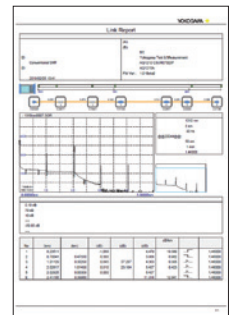
11550nm

2

PDF reporting



Built-in post-processing software for generating OTDR reports in PDF format. Flexible configuration of report template to meet users' report requirements.



File transfer and remote control

File transfer

The AQ1210's data files can be transferred to a smartphone or tablet through Wi-Fi using a web browser or the OTDR data transporter, or a Windows™ PC through Wi-Fi or LAN using a web browser or the AQ7933 Emulation software.

Remote control

The AQ1210 can be controlled remotely by a smartphone or tablet using a web browser and by a Windows™ PC using a web browser, the AQ7933 Emulation software, or remote-control commands through Wi-Fi or LAN.



Note. The USB connection is also available for the file transfer and remote control with a Windows™ PC. A USB-Wi-Fi dongle is required for Wi-Fi connection, and a USB-LAN adapter is required for LAN connection. Please consult with our sales representatives for details.

Connector quality assurance

Using a video fiber inspection probe*, fiber connector surface is visualized for inspection of scratches and dirt. The Fiber Surface Test function (option) can automatically analyze scratches and dirt and makes PASS/FAIL judgment based on IEC61300-3-35 compatible or arbitrary decision criteria.

*Recommended probe:
DI-1000-B2 (Lightel)



Convenient functionality for fast diagnosis of network problems

Macro bending detector

Macro bending events along a fiber under test can be identified and located automatically by OTDR measurements using multiple wavelengths trace comparison and event analysis based on user-defined thresholds.



Advanced trace analysis

Multi-trace analysis

Up to four traces can be overlaid on the display for analysis and comparison. This is useful for evaluating the locations and loss of connections after installing multiple fibers.

2-way trace analysis

Averages the two traces measured from one end of fiber link and the other to find the connection loss properly and accurately. When only measured from one end, the connection loss may be shown incorrectly due to the difference in the backscatter coefficient between the connected fibers.

Differential trace analysis

Displays the difference between two specified traces. Makes it simple to check aging of fibers or connection points, or variation in loss among fibers, and other phenomena.

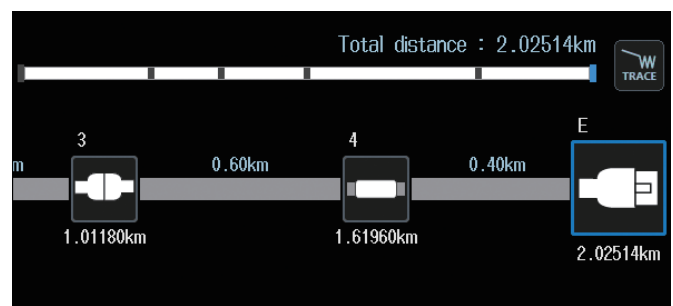
Section analysis (Return loss)

Finds the total return loss in specific section of fiber link. It is often required because the multiple reflections from optical fiber networks can affect the optical communication signal from transmitters of CATV for instance.

OTDR view mode

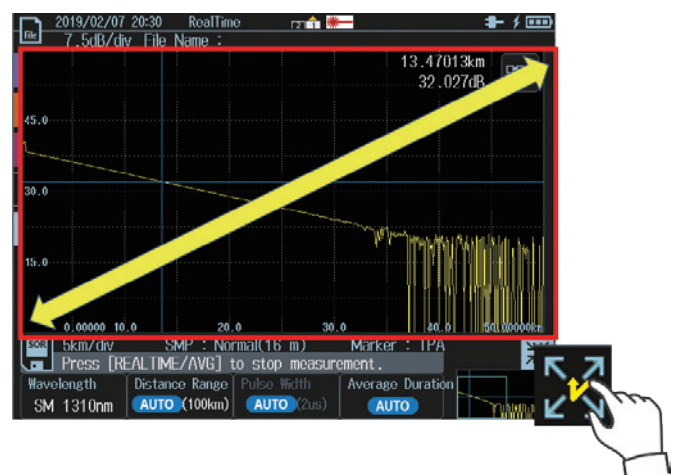


The OTDR view can be switched between the trace and the map by simply tapping the icon. The trace is a traditional view with an OTDR waveform and event markers, and the map is an icon-based view for easy interpretation of network events, which is also used for the Smart mapper function.



Enlarging the trace window

By simply tapping the dedicated icon, the trace display window can be enlarged for easy viewing and manipulation.



Direct data saving

Simply pressing "Direct save" icon, measured data can be saved in SOR, PDF, or both formats according to users' prior selection.



Optical loss test using light source & optical power meter

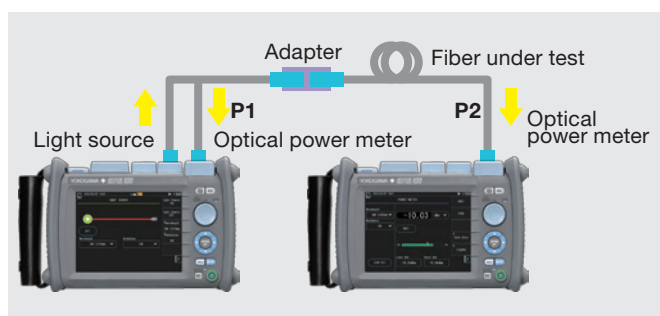
Optical loss test is performed by adjusting the optical output power (P1) at the end of launch fiber and measuring the output power of fiber under test (P2) afterward.

$$\text{Total fiber loss} = P1 - P2 \text{ (dB)}$$

Auto loss test function

The AQ1210 can transmit the wavelength information of light source to the other AQ1210 placed at the other end to set the same wavelength for the optical power meter, and they are capable of switching the wavelengths (1310 and 1550 nm) automatically; therefore, the loss measurements can always be performed at right wavelengths

*/SPM or /HPM option is required.



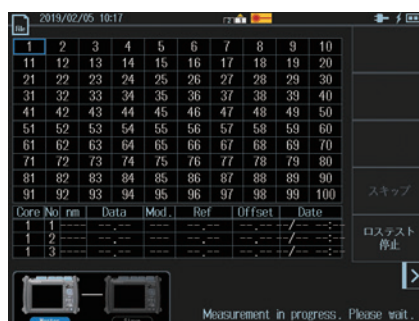
High power measurement

The high power optical power meter (/HPM option) can measure the high optical power up to +27 dBm. It allows to measure video services and long distance transmission lines where an optical amplifier is used to boost the optical signal power.

Multi-fiber loss test

The Multi-fiber loss test function incorporates two AQ1210s as master and slave through the communication fiber in the cable under test. They share a test project information including fiber numbers to be tested and measurement conditions, so that you can ensure the measurement is performed properly for each fiber of the cable under test.

*/SPM or /HPM option is required.

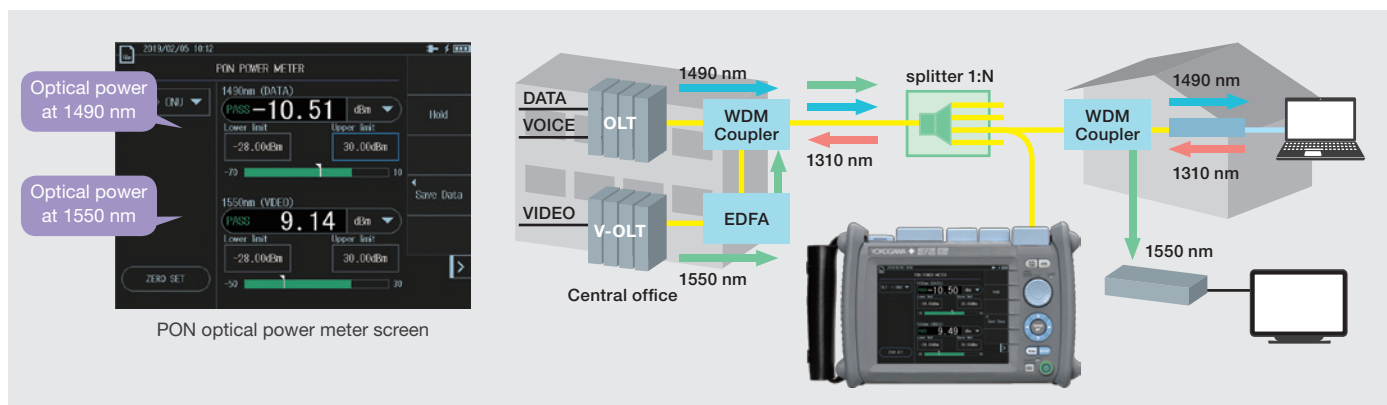


PON power measurement

Simultaneous power measurement at 1490 & 1550 nm

The PON power meter can measure the optical power both at 1490 nm and at 1550 nm simultaneously by separating those wavelengths. It is a suitable tool for measuring the optical power of OLT and V-OLT.

*/PPM option is required.



Specifications

OTDR

Items		Specifications					
Model		AQ1210A	AQ1215A	AQ1210E	AQ1215E	AQ1215F	AQ1216F
Wavelength (nm)		1310 ±25/1550 ±25		1310 ±25/1550 ±25, 1625 ±10	1310 ±25/1550 ±25, 1625 ±25	1310 ±25/1550 ±25, 1650 ±5 ^{*8}	1310 ±25/1550 ±25, 1650 ±25
Number of optical ports		1		2 (Port 2: 1625 nm, including a filter)		2 (Port 2: 1650 nm, including a filter)	
Applicable fiber		SM (ITU-T G.652)					
Distance range (km)		0.1 to 256	0.1 to 512	0.1 to 256	0.1 to 512		
Pulse width (ns)		5 to 20000	3 to 20000	5 to 20000	3 to 20000		
Event dead zone (m) ^{*1,*8}		0.75	0.5	0.75	0.5		
Attenuation dead zone (m) ^{*2,*8}		4	2.5	4	2.5		
PON dead zone (m) ^{*3}		35	30	35	30		
Dynamic range (dB) ^{*4,*8}		37/35	42/40	37/35, 35	42/40, 39	42/40, 37	42/40, 40
Loss measurement accuracy ^{*5}		±0.05 dB/dB	±0.03 dB/dB	±0.05 dB/dB	±0.03 dB/dB		
Optical return loss measurement accuracy		±2 dB					
Number of sampling points		max. 256000					
Sampling resolution		min. 5 cm	min. 2 cm	min. 5 cm	min. 2 cm		
Minimum readout resolution		Horizontal axis: 1 cm, vertical axis: 0.001 dB					
Distance unit		km, mile, kft					
Distance measurement accuracy		± (0.75 m + measured distance × 2 × 10 ⁻⁵ + sampling resolution)					
Group refractive index		1.30000 to 1.79999 (0.00001 intervals)					
Optical connector		SC, FC, LC, or SC angled-PC					
OTDR function	Measurement items	Distance, loss, return loss, return loss between two arbitrary points, dB/km					
	Analysis	Multi-trace analysis, two-way trace analysis, differential trace analysis, section analysis, auto event search, pass/fail judgment, fiber surface test (option)					
	Other functions	Multi-fiber project, rerouted fiber comparison, work completion notice, smart mapper, remote control, web server, report generation					
Light source function	Output power	−3 dBm ±1 dB					
	Output power stability ^{*7}	±0.05 dB (1310 nm, 1550 nm), ±0.15 dB (1625 nm, 1650 nm)					
	Modulation mode	CW, 270 Hz, 1 kHz, 2 kHz					
	Optical output port	OTDR port					
Laser class		Class 1M (IEC 60825-1: 2007, GB 7247.1-2012), Class 1 (EN 60825-1: 2014)					
Display ^{*9}		5.7-inch color TFT LCD (resolution: 640 × 480, multi-touch capacitive touchscreen)					
Interfaces		USB 2.0 type-A × 2: USB mass storage device, fiber inspection probe, USB dongle (LAN, WLAN), USB 2.0 type-C × 1: DC power supply, storage, remote control					
Data storage	Storage	Internal: ≥1000 traces, external: USB storage					
	File format	Write: SOR, CSV, SET, SMP, BMP, JPG, report Read: SOR, SET, SMP					
Power requirements ^{*10}		USB power supply (Type-C), DC 5 V ±5%, max. 3 A					
Battery ^{*8}		Type: Lithium ion polymer Operation time: 10 hours or more (Telcordia GR-196-CORE Issue 2, September 2010), Recharge time: 5 hours (power-off state)					
Environmental conditions		Operating temperature: −10 to 50°C (10 to 35°C when charging the battery), operating humidity: 5 to 90%RH (non-condensing), storage temperature: −20 to 60°C, storage humidity: 0 to 90%RH (non-condensing), altitude: 4000 m, dust and drip protection: IP51 equivalent ^{*12}					
EMC ^{*11}	Emission	EN 61326-1 Class A, EN 55011 Class A Group1					
	Immunity	EN 61326-1 Table2					
Laser safety standard ^{*11}		EN 60825-1: 2014, IEC 60825-1: 2007, GB 7247.1-2012, FDA 21CFR1040.10 and 1040.11					
Environmental regulation standard		EN 50581					
Dimensions		Approx. 210 mm (W) × 148 mm (H) × 69 mm (D) (excluding projections)					
Weight		Approx. 1 kg (including battery)					

CLASS 1 LASER PRODUCT
(EN 60825-1:2014)

*1: Minimum pulse width, return loss: ≥55 dB, group refractive index: 1.5, at 1.5 dB below the unsaturated peak level.

*2: Pulse width: 10 ns, at 1310 nm, return loss: ≥55 dB, group refractive index: 1.5, at a point where the backscatter level is within ±0.5 dB of the normal level.

*3: Pulse width: 100 ns (AQ1210A, AQ1210E), 50 ns (AQ1215A, AQ1215E, AQ1215F, AQ1216F), at 1310 nm, for non-reflective fiber with a loss of 13 dB.

*4: Pulse width: 20000 ns, measurement time: 3 minutes, SNR=1, decrease by 0.5 dB with an angled-PC connector.

*5: ±0.05 dB for a loss of 1 dB or less.

*6: At 20 dB below the spectral peak of pulsed optical output, at 23°C, after 30 minutes warm up.

*7: Constant temperature, for 5 minutes after 5 minutes warm up.

*8: Typical.

*9: The LCD may contain some pixels that are always on or off (0.002% or fewer of all displayed pixels including RGB), but this is not indicative of a general malfunction.

*10: Require approx. 3 amperes for recharging during operation, approx. 2 amperes for recharging in power-off state.

*11: With Optical power meter and Visible light source option

*12: All the lids are being closed.



Optical Power Meter (/SPM, /HPM, /PPM) and Power Checker (/PC)

Items		Specifications			
Model		Standard (/SPM)	High Power (/HPM)	PON (/PPM)	Power Checker (/PC) ^{*4}
Wavelength setting		800 to 1700 nm	800 to 1700 nm	1310, 1490, 1550 nm	1310, 1490, 1550, 1625, 1650 nm
Power range	CW	−70 to +10 dBm	−50 to +27 dBm ^{*1}	−70 to +10 dBm (1310, 1490 nm) −50 to +27 dBm (1550 nm)	−50 to −5 dBm ^{*5}
	CHOP	−70 to +7 dBm	−50 to +24 dBm ^{*1}	—	—
Noise level ^{*2}		0.5 nW (−63 dBm, 1310 nm)	50 nW (−43 dBm, 1310 nm)	0.5 nW (−63 dBm, 1310 nm) 50 nW (−43 dBm, 1550 nm)	—
Uncertainty ^{*3}		≤±5%			±0.5 dB ^{*6}
Applicable fiber		SM (ITU–T G.652), GI (50/125 μm)			—
Readout resolution		0.01 dB			
Level unit		Absolute: dBm, mW, μW, nW, relative: dB			
Modulation mode		CW, 270 Hz, 1 kHz, 2 kHz			
Averaging		1, 10, 50, 100 times			
Data save		100 data per file (up to 1000 files)			
Data logging		Logging intervals: 0.5, 1, 2, 5, 10 s, number of data: 10 to 1000			
Optical connector		SC, FC, 2.5 mm diameter ferrule, 1.25 mm diameter ferrule			
Functions		Auto loss test, multi-fiber loss test			—

^{*1}: 1300 to 1600 nm
^{*2}: At 1310 nm
^{*3}: CW, 1310 ±2 nm (Standard, High Power, PON at 1310), 1550 ±2 nm (PON at 1550 nm), spectral width: 10 nm or less, input power: 100 μW (−10 dBm), SM (ITU-T G.652), FC/PC connector, wavelength setting: measured wavelength ±0.5 nm, excluding a secular change of equipment (add 1% a year after calibration)
^{*4}: OTDR Port 1, not applicable to Port 2
^{*5}: CW, maximum input power: 0 dBm (1 mW)
^{*6}: CW, 1310 ±2 nm, spectral width: 10 nm or less, input power: 100 μW (−10 dBm), SM (ITU-T G.652), FC/PC connector, wavelength setting: measured wavelength ±0.5 nm, excluding a secular change of equipment (add 1% a year after calibration)

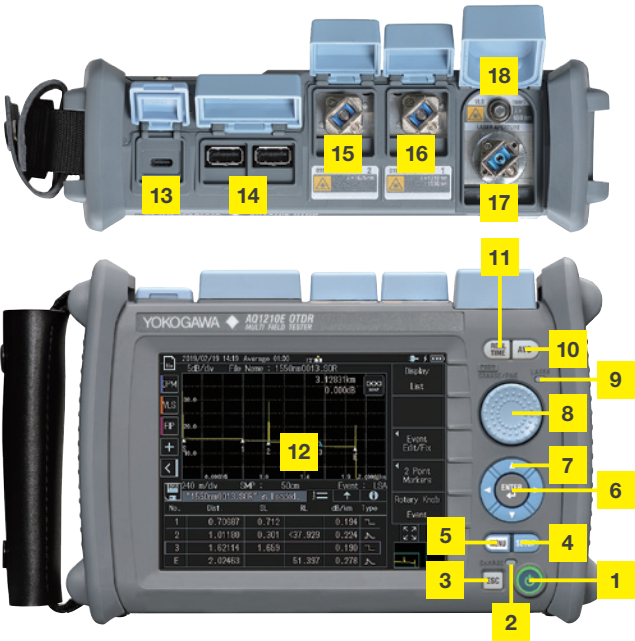
Visible Light Source (VLS)

Items	Specifications
Wavelength	650 ±20 nm
Optical output power	−3 dBm or more (Peak)
Modulation mode	CW, CHOP (Approx. 2 Hz)
Optical connector	2.5 mm diameter ferrule type
Laser class	Class 3R (IEC 60825-1: 2007, EN 60825-1: 2014, GB 7247.1-2012)



Note. All the specifications are valid at 23°C ±2°C and after a warming up for 30 minutes or more, unless otherwise stated.

Design



- 1

Power switch
- 2

CHARGE LED
- 3

ESC Key
- 4

SETUP Key
- 5

MENU Key
- 6

ENTER Key
- 7

Allow Key
- 8

Rotary knob
- 9

LASER LED

10

AVG Key

11

REAL TIME Key

12

LCD

13

USB port Type-C

14

USB port Type-A

15

OTDR port (PORT2)

16

OTDR port (PORT1)

17

OPM port (option)

18

VLS port (option)

Model and suffix code

Model	Suffix	Descriptions
AQ1210A		2WL 1310/1550 nm 37/35 dB
AQ1215A		2WL 1310/1550 nm 42/40 dB
AQ1210E		3WL 1310/1550, 1625 nm 37/35, 35 dB ^{*1}
AQ1215E		3WL 1310/1550, 1625 nm 42/40, 39 dB ^{*1}
AQ1215F		3WL 1310/1550, 1650 nm 42/40, 37 dB ^{*1}
AQ1216F		3WL 1310/1550, 1650 nm 42/40, 40 dB ^{*1}
Language	-HE	English (Multi-language)
	-HM	Chinese
	-HC	Chinese/English
	-HK	Korean/English
	-HR	Russian/English
Optical connector	-USC	Universal adapter (SC)
	-UFC	Universal adapter (FC)
	-ULC	Universal adapter (LC) ^{*2}
	-ASC	Universal adapter (SC Angled-PC) ^{*3}
Options	Optical power meter	/SPM Standard optical power meter
		/HPM High power optical power meter
		/PPM PON optical power meter
	Power checker	/PC
Visible light source	/VLS	Optical connector: 2.5 mm diameter ferrule type
		Fiber Surface Test function
	/FST	Pass/fail judgment
Shoulder belt	/SB	

Standard accessories: Connecting cable for USB power adapter, hand belt, start-up guide

*1: The OTDR port for 1625 or 1650 nm is equipped with a built-in filter.

*2: 1.25 mm diameter ferrule type for the optical power meter

*3: SC type for the optical power meter

Yokogawa's approach to preserving the global environment

- Yokogawa's electrical products are developed and produced in facilities that have received ISO14001 approval.
- In order to protect the global environment, Yokogawa's electrical products are designed in accordance with Yokogawa's Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.

This is a Class A instrument based on Emission standards EN61326-1 and EN55011, and is designed for an industrial environment.

Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

■ Any company's names and product names mentioned in this document are trade names, trademarks or registered trademarks of their respective companies.

NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.

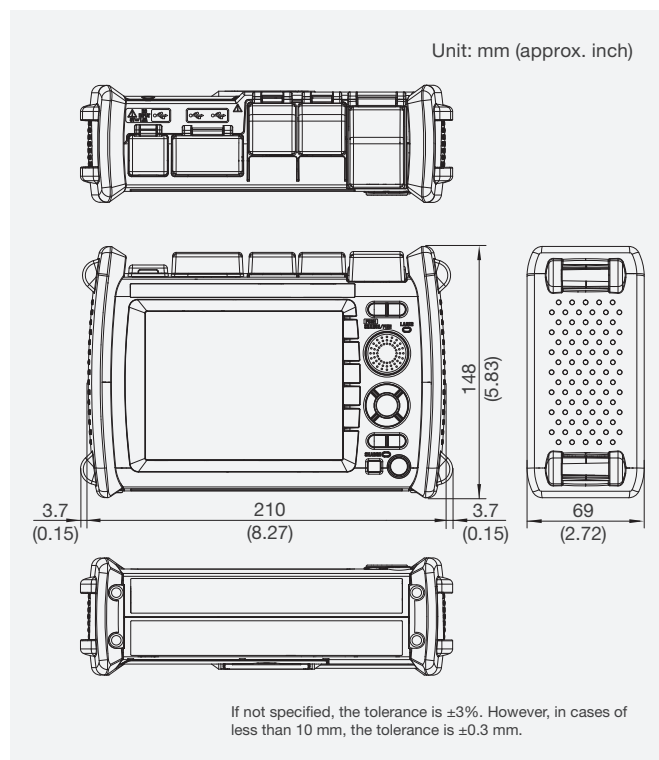
"Typical" or "Typ." in this document means "Typical value", which is for reference, not guaranteed specification.



Accessories (sold separately)

Model	Suffix	Descriptions
AQ7933		AQ7933 Emulation Software
	-SP01	Download version (1-license)
	-SC01	Package version (1-license with CD)
735051		Additional Option License
	-FST	Fiber Surface Test function
735482		Universal Adapter (for OTDR)
	-SCC	SC type
	-FCC	FC type
	-LCC	LC type
	-ASC	SC Angled-PC type
735480		Connector Adapter (for Optical power meter)*
	-SCC	SC type
	-FCC	FC type
735481		Ferrule Adapter (for Optical power meter)*
	-SFC	2.5 mm diameter ferrule type
	-LMC	1.25 mm diameter ferrule type
739884		Battery Pack
A1681WL		USB Cable (Type-C to Type-C)
B8070CY		Shoulder Belt
SU2006A		Soft Carrying Case

*APC compatible



YOKOGAWA

YOKOGAWA TEST & MEASUREMENT CORPORATION

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