YOKOGAWA

AQ1300 Series

1G/10G ETHERNET MULTI FIELD TESTER

Handheld 1G/10G Ethernet Tester
Support 10M to 1G/10G Ethernet
Easy to Operate for Network Path Testing
and Maintenance

AQ1300 MFT-10GbE

10G ETHERNET MULTI FIELD TESTER

AQ1301 MFT-1GbE

1G ETHERNET MULTI FIELD TESTER

www.tmi.yokogawa.com

Bulletin AQ1300-02EN

Handheld 1G/10G Ethernet Tester for Network Path Testing and Maintenance

MFT-1GbE AQ1301
MFT-10GbE AQ1300

Excellent Functionality and Operability Optimized for Field Testing

The AQ1300 series is a compact and lightweight Ethernet tester that is designed to improve both work efficiency and quality at the same time, with function optimized for the network path testing and maintenance of Ethernet networks up to 1G or 10G depending on model chosen.

Easy operation prevents operational errors and stabilizes work quality for routine tasks such as network path testing.
Powerful analysis functions help isolate failures during maintenance work.

The AQ1300 series has two models, AQ1300 and AQ1301 to choose from depending on the measurement interface and bit rate. You can choose the model suitable for your test needs.

AQ1301	10M	100M	1G	
AQ1300	10M	100M	1G	10G

Actual size
Approx. 217.5 mm (W) × 157 mm (H) × 74 mm (D) (excluding protrusions)
(86 in (W) x 62 in (H) x 30 in (D))

World's Smallest in-Class 10GbE Tester (AQ1300)

The AQ1300 is the world's smallest in-class 10G Ethernet tester.
It offers excellent mobility for field work, reduces workload, and ensures work efficiency and safety.

- A5-size
- Easy-to-carry robust structure suitable for field use
- The lightweight (Approx. 1.3 kg (2.9 lbs)) makes it more comfortable to carry or hold in the hand at work.

All Functions in One for Field Testing

All the functions needed for field performance testing are integrated into a compact unit.
The functions are optimized to improve work efficiency in the field where work hours and working conditions are limited.

- Optical and electrical measurement ports for 10M to 1G (AQ1301) and 10M to 10G (AQ1300) are available
- Built-in Optical power meter (factory-installed option for the AQ1300)
- Equipped with a variety of test functions to evaluate Ethernet performance, such as a throughput test, latency measurement, bit error rate test, and PING test.

More Efficient and Reliable Network Path Test

Network path testing or other routine work require not only work efficiency but also that every worker with any skill level can carry out a proper test with the correct procedure and settings.
Automated tests using the setup files pre-loaded on the tester ensures consistent work quality.

- Auto: Just select a setup file and run it to perform automatic measurement and save the measurement results
- Auto (Remote): Link the two units as master and slave to run automatic tests.
- Remote Control: Control remotely from a PC via GUI

Powerful Failure Analysis Functions

The AQ1300 series provides a variety of functions to reproduce the user's traffic environment for more accurate troubleshooting.

- Function to generate a variety of test frames to reproduce the real traffic environment
- Tests with variable frame length and field, overload test, burst traffic test, and multi-flow test
- Various physical layer analysis functions

Intuitive and Comfortable Graphical User Interface (GUI)

The screen is laid out so that you can understand the information you need such as the setting items and setting states at a glance and a unified operating system offers stress-free operation.

- All the menu keys, operation buttons, and rotary knob are laid out on the right side to allow for single hand operation.
- The operation system is optimized for practical use in network path testing and maintenance

Large LCD Screen

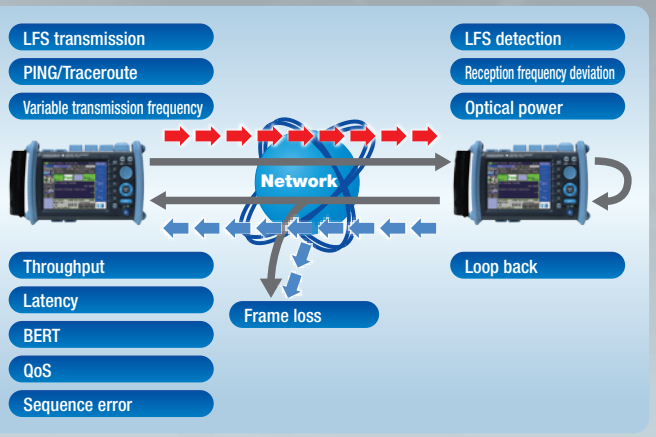
The large screen improves work efficiency and reduces operational errors and mistakes.

- An easy-to-read large color LCD display (5.7-inch, 640 × 480 pixels)

All Functions in One for Field Testing

The AQ1300 series evaluates the performance of various devices, services, and network systems with an Ethernet interface.
It can efficiently and accurately verify whether network systems and services meet the specified quality and functionality. If a failure occurs, it can detect the location and nature of the cause.

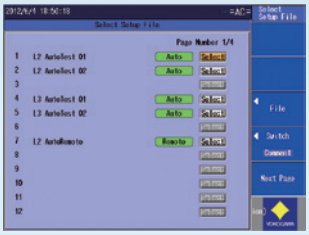
- **AQ1301: 10M to 1G, AQ1300: 10M to 10G**
- **Test layer: L2, L3-IPv4, L3-IPv6**
- **Major test items**
  Throughput, frame loss, latency, error frame, BERT (Bit Error Rate Test), QoS (Quality of Service), and PING
- **L2/L3 loop back function**
- **Pass/Fail judgment function**



Auto Test Mode

A test scenario that performs multiple tests sequentially can be easily created on a PC, uploaded to an AQ1300/1301, and then performed in the field. Tests are performed automatically and the measurement results are saved automatically. This mode requires minimal training from operator and thus ensures quality and consistent results.

- **A test with up to eight steps can be registered in one setup file**
- **Up to 48 setup files can be registered with a tester**
- **You can set whether to enable or disable changing each set parameter**
- **You can set the pass/fail criterion for each test item**



Setup File Selection Screen

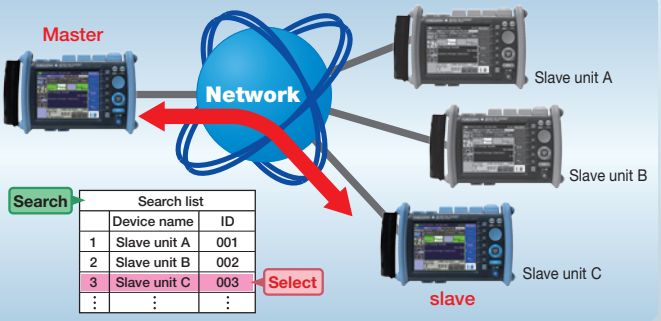
Test Item Selection Screen

1 Create a test scenario
2 Save the measurement setup file
3 Transfer the measurement setup file
4 Select the measurement setup file
5 Select a test item
6 Change test parameters (if necessary)
7 Examples •PING test •Traffic test •QoS test •BERT test
8 Judge the measurement results
9 Save the measurement results automatically
10 The test ends
11 Transfer the measurement results file
12 Save the measurement results file

In-band Remote Function

The in-band remote function allows the master unit to search for and control slave units located at the far end of the network using a test line to perform synchronized tests.

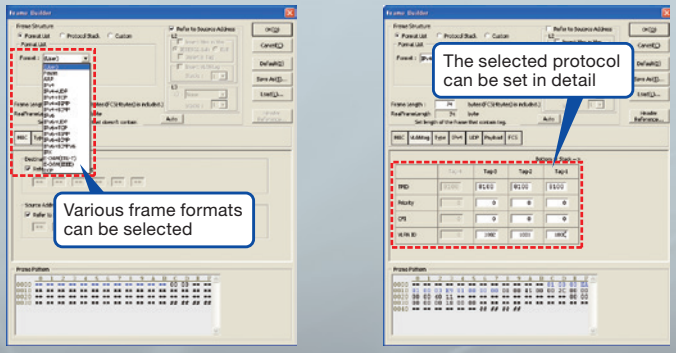
- **Search for multiple slave units in the same domain and generate a list of all devices**
- **Master can send commands to the slaves to start/stop transmission and reception**
- **Master can obtain the test results from the slave unit using the in-band connection.**



Manual Test

The Manual Test is useful for troubleshooting and device verification to setup certain test conditions that are not available using Auto Test

- **Various test frames can be set using Frame Builder in the setup software**
- **Variable frame length and variable field setting**
- **Generate an overload exceeding 100% and burst traffic**
- **Flexible multi-functional receive filter setting**
- **Up to 72-hour statistical logging**

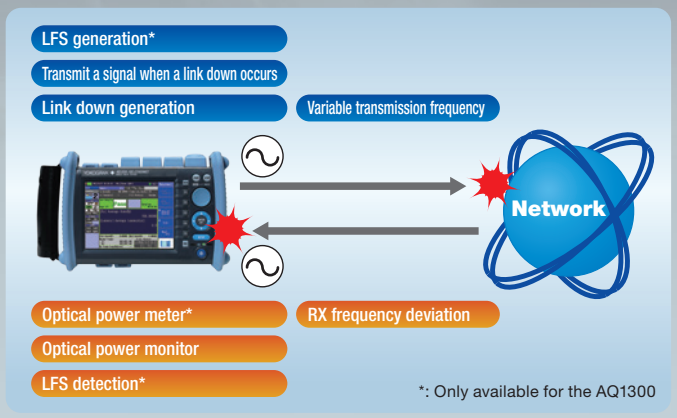


Setup Software (Frame Builder)

Layer 1 Analysis

Various physical layer tests can be performed on the spot to effectively analyze network failures caused by physical layer problems such as incompatibility of the transceiver module.

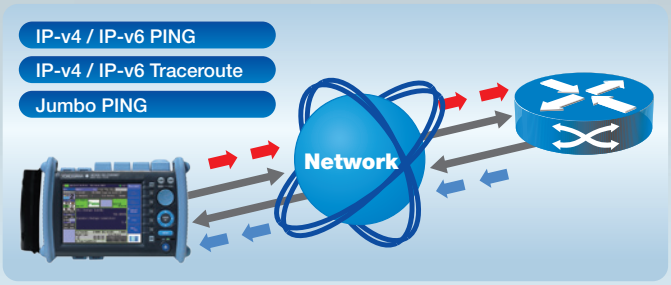
- Optical power monitor function monitors the received optical power level
- High-precision optical power meter on a dedicated port (factory option only available for the AQ1300)
- RX frequency deviation measurement (The AQ1300/AQ1301 measures the frequency deviation of received signals)
- Variable TX frequency (Variable frequency of the test signals transmitted from the AQ1300/AQ1301)
- LFS generation/detection (only available for the AQ1300)
- Link down detection



PING Test

Verify layer 3 network connectivity all the way down to the servers and equipment using a hardware-controlled accurate and reliable PING test.

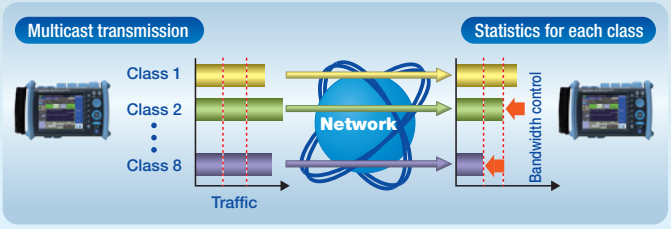
- Hardware-controlled high-speed testing at 1 ms intervals
- IPv6 PING testing supported
- Up to 9999-byte jumbo frame PING testing supported
- Traceroute testing supported



QoS Test

Easily verify the performance of networks that provide Quality of Service (QoS) functions such as priority forwarding and bandwidth control.

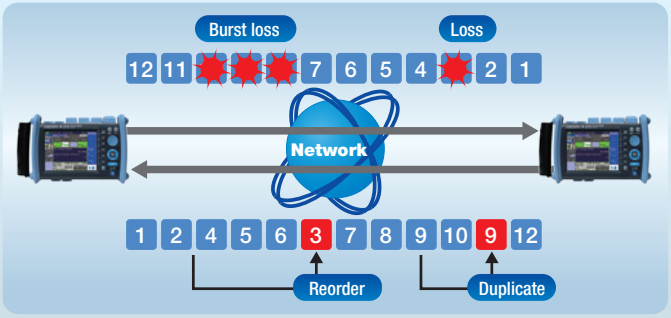
- Performance evaluation of up to eight channels in Manual mode (up to four channels in Auto and Auto (Remote) modes)
- Select the test type from VLAN-CoS, IP-v4-ToS, IPv6, etc.
- Set the pass/fail judgment conditions for each class
- Monitor the sequence error for each class



Sequence Error Checking Function

Packet sequence errors can be monitored by counting the number of out-of-order and duplicate packets for example.

- Count of the number of out-of-order packets
- Count of the number of duplicate packets
- Count of the number of lost packets
- Burst loss count



RFC2544 Test Function

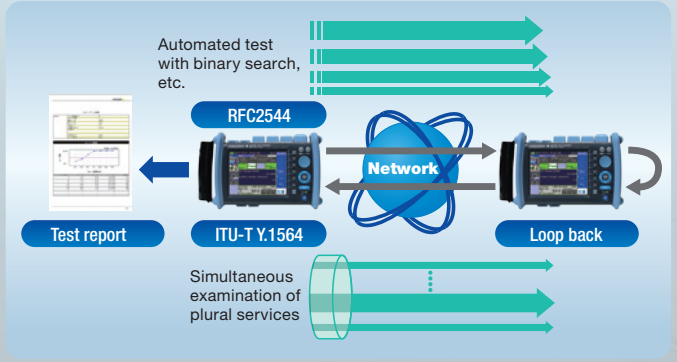
An automated test function in conformance with RFC2544, the standard benchmarking methodology for evaluation of Ethernet services and network systems performance.

- Throughput : Maximum frame transfer rate without frame loss
- Latency : Delay time of a frame
- Frame loss rate : Incidence rate of frame loss with excess traffic
- Back-to-back : Maximum burst value not causing a frame loss
- Packet jitter : Relative variation of latency

ITU-T Y.1564 Test Function

A test for the ability of Ethernet-based services to carry a variety of traffic (voice, data, and video) at defined performance levels.
An automatic test for simultaneously evaluating performance of up to eight service parameters.

- Configuration Test
  CIR(Committed information rate), EIR(Excess information rate)
  CBS(Committed burst size), EBS(Excess burst size)
  Policing
- Perfomance Test
  Test of the threshold defined for guaranteed traffic such as CIR.



Statistics Logging Function

By recording long-term statistical trends, even an intermittent error and concurrency tendency can be detected.

- Four items can be selected for logging
- A log can be recorded every second for up to 72 hours

Remote Control Function

USB or LAN can be used as a remote control interface to perform remote control from a PC in a remote location.
The front panel of the AQ1300/AQ1301 is displayed on the PC screen, so you can perform remote control with the same user interface as that of the AQ1300/AQ1301.

Front View

Bumper
Shock protection

Function keys
Selects the menu on the right side of the display

Menu key
Displays the main menu

Start/Stop keys
Starts/stops measurement

Rotary knob
Moves the cursor and changes parameters. Press the knob to select parameters

Arrow keys/Enter key
Moves the cursor and selects parameters within a dialog box

Setup key
Shows the setup menu

Power key
Power ON/OFF

Hand belt
Makes the device easy to hold and carry around

LCD display
5.7-inch color TFT LCD display

Escape key
Aborts operations or exits from menus

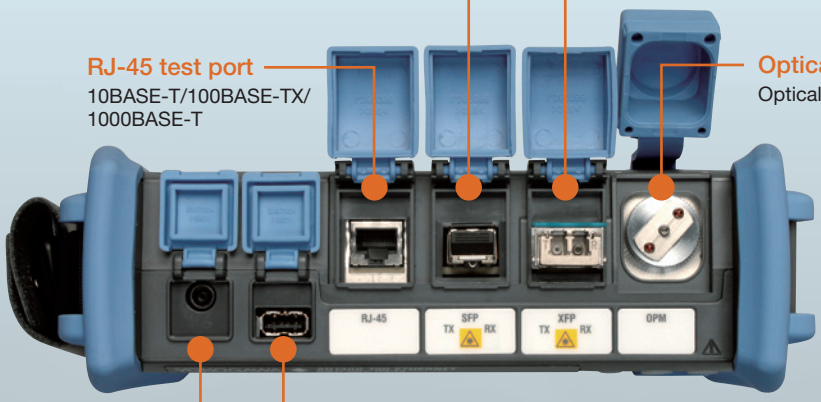
Top View

SFP test port
1000BASE-SX/LX

XFP test port
10GBASE-SR/LR/ER

RJ-45 test port
10BASE-T/100BASE-TX/
1000BASE-T

Optical power test port
Optical power meter (optional)



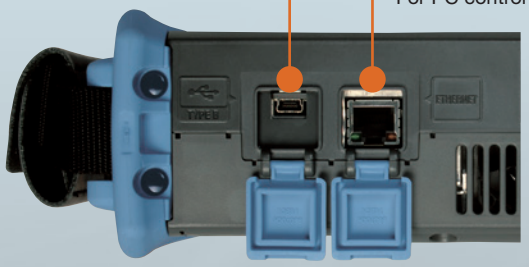
USB TYPE A
For an external memory device

DC power connector
For AC adapter

Bottom View

USB TYPE B (mini USB)
For PC control

LAN
For PC control



Specifications

Interface

Test port	RJ-45	10BASE-T, 100BASE-TX, 1000BASE-T
	SFP	100BASE-FX, 1000BASE-SX, 1000BASE-LX
	XFP*1	10GBASE-SR, 10GBASE-LR, 10GBASE-ER
Remote port	LAN (RJ-45)	10BASE-T/100BASE-TX
	USB TYPE B (mini USB)	For external PC control
Memory port	USB TYPE A	For an external memory device

Test Function

Test Layer	L2 / L3-IPv4 / L3-IPv6	
Test menu	Auto	Automated test according to a test scenario
	Auto (Remote)	Automated test according to a test scenario using remote control
	Manual	Various tests and analysis performed by generating traffic
	RFC2544	Throughput, Latency, Frame loss rate, Back to Back, Packet Jitter
	ITU-T Y.1564	CIR, EIR, CBS, EBS
	VLAN Test	VLAN Trunk Configration
	E-OAM	Continuity Check, Loop back, Link trace
	OPM (Optical power meter)*2	Optical power level measurement with a dedicated port
Test mode	Traffic	Load generation, latency/IFG measurement, payload error measurement, sequence error checking
	QoS	Performance test of up to 8 channels (classes)
	PING	1 ms high-speed PING/Jumbo PING testing supported
	Loop back	Address and port number swapping
	BERT	Frame BERT

Transmission Function

Rate setting	Unit of setting	%(Resolution: 0.00001%), bit (IFG), frames/s
	Rate is variable during transmission	
Frame length	48 to 9,999 bytes*3	
Transmission data setting	Payload setting, variable frame field	
Burst setting	Burst	1 to 65,535 bytes
	Interval	1 µs to 1 s
Transmission time setting	Continuous, number of frames, time	
QoS transmission	Number of channels (classes)	Up to 8 channels (up to 4 channels in Auto and Auto (Remote) modes)
Error addition	FCS, symbol, sequence, payload, and bit errors	
Payload pattern	All zeros, all ones, 0 and 1 alternately, random, user-defined	
Defined frame	VLAN Tag: up to 4 lines, MPLS Label: up to 4 lines	
	E-OAM (ITU-T, IEEE), MAC in MAC (IEEE, EoE)	
Variable frame length	Setting range	64 to 9,999 bytes
	Variable method	+1, -1, random setting
Variable field	Field/offset setting	

Receive Function

Receiving performance	Receivable frame length	48 to 9,999 bytes*3 (Minimum IFG: 5 bytes)
Base filter function	Number of filters	2
	Filter method	Field/offset setting (pattern)
Latency measurement	Measurement item	Latency, IFG
	Measurement resolution	100ns
BERT	Frame BERT (random pattern PRBS15)	
Sequence error	Number of lost packets, out-of-order packets, duplicate packets, maximum burst packet loss	
QoS	Number of channels (classes)	Up to 8 channels or up to 7 channels + other

Loop Back Function

Target frame	Addressing to an own port or all ports (excluding L2 broadcasting and multicast frames, VLAN except for an own VLAN)	
Field swapping	L2	MAC DA/SA
	L3-IPv4, L3-IPv6	DA/SA of IP address, Dst/Src port of TCP/UDP

Emulation Function*4

IPv4 Host	ARP reply, PING reply, MAC automatic acquisition, IP automatic acquisition (DHCP)	
IPv6 Host	NDP reply, PING reply, MAC automatic acquisition (NDP), automatic address generation	
PING	Protocol	IPv4/IPv6
	Frame length	64 to 9,999 bytes
	Transmission mode	Continuous, number of frames, time
	Transmission interval	1ms/10ms/100ms/1s
Traceroute	Protocol	IPv4/IPv6

Layer 1 Measurement Function

Receiving clock*5	Measurement range	-100 to + 100 ppm
	Resolution	0.1ppm
Variable transmission clock	Setting range	-100 to + 100 ppm
	Setting resolution	1ppm
Optical output interruption	Optical output interruption and recovery	
LFS generation function*6	Manual	Continuous transmission (start/stop)
	Auto	When a link down or LF is received, RF is transmitted automatically
Optical power monitor	Simple display of received optical power level	

Log Function

Log acquisition	Logging interval	1 second
	Logging period	Up to 72 hours
	Log item	Up to 4 items

RFC2544 Measurement Function*7

Test item	Throughput, latency, frame loss rate, back-to-back, packet jitter	
Test configuration	Two units at both ends (slave unit in loop back mode at the far end)	
Setting range	Test duration	1 to 999 sec.
	Number of trials	1 to 60
Report output	Format	csv, image (jpg or png), pdf

ITU-T Y.1564 Measurement Function

Test item	Configration test (CIR, EIR, CBS, EBS) Performance test	
Test configration	Standalone, Two units at both ends (Two units at both ends and slave unit in loop back mode at the far end)	
Measurement item	Throughput, Latency, Frame loss rate, raitensy, Packet Jitter (Results judgment)	
Setting Range	Test duration	1 to 60 sec (configration test) 1 minits to 72 hour (paformance test)
Report output	Format	csv, image (jpeg or png), pdf

Remote Control Function

In-band control*8	Communication port	Test port (test line)
	Control Function	The master unit remotely controls the slave unit and synchronizes measurement start/stop
	Slave unit search*9	The master unit searches for slave units and displays a list
	Address assignment to master units*9	The master automatically assigns an IP address to the slave unit
Remote GUI	Communication port	Remote port (RJ-45 or USB TYPE B)
	Remote operation with the same GUI as that of the tester in dedicated software (Windows)	

Optical power meter*10

Optical connector	Universal connector (1.25 ϕ), SC*11, FC*11
Measurement wavelength	850/1300/1310/1490/1550/1625/1650 nm
Measurement power range	-70 dBm to +10 dBm (CW), -70 dBm to +7 dBm (CHOP)
Measurement accuracy	±5% (Ta=23±2°C, condition: 1310 nm, -10 dBm, SM fiber)

General Specifications

Display		5.7-inch color TFT LDC display
AC power	Rated voltage	100 to 120/200 to 240 VAC
	Rated frequency	50/60Hz
Battery power supply	Operating time	AQ1301 : Approx. 2 hours AQ1300 : Approx. 1 hour
	Charging time	Approx. 5 hours (at 23°C, power OFF)
Dimensions	217.5 (W) × 157 (H) × 74 (D) mm (excluding protrusions)	
Weight	Approx. 1.3 kg including battery pack	
Accessories	Standard	CD-ROM (Setup software, User's Manual), Operation Guide, battery pack, AC adapter, power cable, hand belt
	Optional	10GBASE-SR XFP module 10GBASE-LR XFP module 10GBASE-ER XFP module 1000BASE-SX SFP module 1000BASE-LX SFP module 100BASE-FX SFP module Battery pack (spare) AC adapter (spare) Shoulder belt Soft carrying case SC connector for optical power meter FC connector for optical power meter

*1: Only available for the AQ1300 *2: Only available for the AQ1300 (option) *3: The operation for a frame length of 48 to 2,048 bytes is guaranteed for 100BASE-FX *4: Up to VLAN 2 supported *5: Not available for 10BASE-T, 100BASE-FX, and 1000BASE-T *6: When XFP (10G) is selected in the AQ1300 *7: Option for the AQ1300 (standard for the AQ1301) *8: When Auto (Remote) is selected in the test menu *9: In the same VLAN/network segment *10: Option for the AQ1300 (not available for the AQ1301) *11: Use an accessory connector adapter

1G/10G ETHERNET MULTI FIELD TESTER
MFT-1GbE/10GbE AQ1300 Series

Model and Suffix Codes

Model	Suffix Code	Description
AQ1301		AQ1301 MFT-1GbE
AQ1300		AQ1300 MFT-10GbE
Language	-HE	English
Power Coad	-D	UL/CSA standard
	-F	VDE standard
	-R	AS standard
	-Q	BS, Singapore Standard
	-H	GB standard, CCC correspondence
	-P	KC standard (South Korea)
	-T	BSMI, Taiwan Standard
Optical power meter[*1]	/SPML	Standard Optical power meter
XFP module[*1, *2]	/SR	10GBASE-SR XFP module
	/LR	10GBASE-LR XFP module
	/ER	10GBASE-ER XFP module
SFP module[*2]	/SX	1000BASE-SX SFP module
	/LX	1000BASE-LX SFP module
RFC2544[*3]	/BM	RFC2544 function
Shoulder belt	/SB	Shoulder belt
AC adapter	/AC1	Attach 739872 AC adapter[*5]

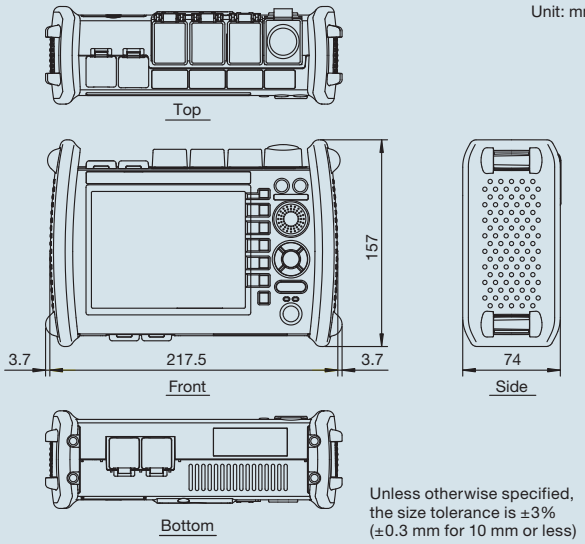
*1: Cannot be specified for the AQ1301 *2: For the SFP and XFP modules, be sure to use the modules listed above. If you use other than an SFP or XFP module from Yokogawa, the functionality and performance of this product are not guaranteed. Furthermore, the warranty will be void. *3: Cannot be specified for the AQ1301 (this option is available for the AQ1301 as standard) *4: Cannot be used with the AQ1301. *5: For the US and the countries that require CE marking.

Accessories

Model	Suffix Code	Description
735454[*2]		Optical transceiver module
	-SR[*4]	10GBASE-SR XFP module
	-LR[*4]	10GBASE-LR XFP module
	-ER[*4]	10GBASE-ER XFP module
	-SX	1000BASE-SX SFP module
	-LX	1000BASE-LX SFP module
739882		Battery pack (reserve)
SU2006A		Soft carrying case
739871		AC / DC adapter
	-D	UL/CSA standard
	-F	VDE standard
	-R	AS standard
	-Q	BS, Singapore Standard
	-H	GB standard, CCC correspondence
	-P	KC standard (South Korea)
	-T	BSMI, Taiwan Standard
739872	-D	UL/CSA standard
	-F	VDE standard
	-Q	BS, Singapore standard
B8070CY		Shoulder belt
735480[*4]	-SCC	SC connector adapter for optical power meters
	-FCC	FC connector adapter for optical power meters
735481[*5]	-LMC	Ferrule Adapter (ϕ1.25)
	-SFC	Ferrule Adapter (ϕ2.5)

Dimensions

Unit: mm



Unless otherwise specified, the size tolerance is ±3% (±0.3 mm for 10 mm or less)

Multi-Field Tester Series

OTDR AQ1200

Multifunctional handheld OTDR

Rich functionality optimized for deployment and maintenance of FTTH

- OTDR function: SMF 1310/1550 nm
- Fault locator function
- Loss test function (option)
- Visible light source (option)
- Compact and lightweight

OLTS AQ1100

Optical loss test set combining an optical power meter and a light source in one unit

- **Three models with a difference light source**
  1. SM1310/1550nm
  2. SM1310/1550/1625nm
  3. MM850/1330nmSM, 1310/1550nm
- **Select from three optical power meter models by application**
  1. Standard: +10 to -70 dBm
  2. High Power: +27 to -50 dBm
  3. PON: 1490/1550 nm parallel measurement

YOKOGAWA

YMI-KS-HMI-SE02

YOKOGAWA METERS & INSTRUMENTS CORPORATION
Global Sales Dept. /Phone: +81-422-52-6237 Facsimile: +81-422-52-6462
E-mail: tm@cs.jp.yokogawa.com

YOKOGAWA CORPORATION OF AMERICA	Phone: +1-770-253-7000	Facsimile: +1-770-254-0928
YOKOGAWA EUROPE B.V.	Phone: +31-88-4641000	Facsimile: +31-88-4641111
YOKOGAWA SHANGHAI TRADING CO., LTD.	Phone: +86-21-6239-6363	Facsimile: +86-21-6880-4987
YOKOGAWA ELECTRIC KOREA CO., LTD.	Phone: +82-2-2628-3810	Facsimile: +82-2-2628-3899
YOKOGAWA ENGINEERING ASIA PTE. LTD.	Phone: +65-6241-9933	Facsimile: +65-6241-2606
YOKOGAWA INDIA LTD.	Phone: +91-80-4158-6000	Facsimile: +91-80-2852-1441
YOKOGAWA ELECTRIC CIS LTD.	Phone: +7-495-737-7868	Facsimile: +7-495-737-7869
YOKOGAWA AMERICA DO SUL LTDA.	Phone: +55-11-5681-2400	Facsimile: +55-11-5681-4434
YOKOGAWA MIDDLE EAST & AFRICA B.S.C(c)	Phone: +973-17-358100	Facsimile: +973-17-336100

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